POWERTECH (USA) INC.

RICHARD BLUBAUGH
Vice President - Environmental
Health & Safety Resources

Received on 8/13/10

August 12, 2010

Uranium Recovery Licensing Branch
Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Ron Burrows, Project Manager

Re: Powertech (USA) Inc.'s Response to the Request for Addition Information to Support the Environmental Review of its Application for a Nuclear Regulatory Uranium Recovery Facility in the State of South Dakota – Docket 040-09075, TAC No. J 00533

Dear Mr. Burrows,

Please find enclosed a digital copy of Powertech (USA) Inc.'s response, which were inadvertently omitted from the response package sent August 11, 2010.
Files and Folders included on the CD:

- FinalResponses_ER_RAIs_10Aug10
- Appendix WR-7
- Exhibits

Also find two paper copies of ER_RAI Figure AQ-1; these should be inserted after page 9 in the Air Quality section of the response submittal.

Respectfully yours,

Richard Blubaugh
Vice President – Environmental Health & Safety Resources
Powertech (USA) Inc.

Enclosures
cc: M. Hollenbeck
W. Mays
R. Clement
A. Thurlkill
Thompson & Pugsley, PLLC

Powertech (USA) Inc.

RICHARD E. BLUBAUGH
Vice President – Environmental
Health & Safety Resources

August 11, 2010

Uranium Recovery Licensing Branch
Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and
Environmental Management Programs
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Ron Burrows, Project Manager

Re: Powertech (USA) Inc.'s Response to the Request for Additional Information to Support the Environmental Review of its Application for a Nuclear Regulatory Commission Uranium Recovery License for its Proposed Dewey-Burdock In Situ Leach Uranium Recovery Facility in the State of South Dakota
Docket 040-09075, TAC No. J 00533

Dear Mr. Burrows:

By letter dated August 11, 2009, Powertech (USA) Inc. submitted its source material license application to the U.S. Nuclear Regulatory Commission (NRC) for the Dewey-Burdock Uranium Recovery Project. The NRC staff reviewed the application and determined that additional information was required in order to complete its review of the proposed action. By letter dated April 14, 2010, the NRC staff provided its Request for Additional Information (RAI) to support the staff's review of the submitted Environmental Report (ER). With this letter, Powertech (USA) Inc. is providing its response to the NRC staff's ER RAI. Powertech (USA) Inc. will provide its response to the RAIs relevant to the Technical and Supplemental Reports at a later date.

Two paper copies of this response and related appendices are provided in three-ring binder form with oversize exhibits included at the back of the response document. An electronic copy is also provided. The NRC staff's requests (bold font) for information are included just prior to each Powertech (USA) response. For some requests, where further clarification is deemed necessary, the associated comments are also included. Also included is a table indicating that section and page(s) of the ER where the additional information is pertinent.

5575 DTC Parkway, Suite 140 Telephone: 303-790-7528 Website: www.powertechuranium.com
Greenwood Village, CO 80111 USA Facsimile: 303-790-3885 Email: info@powertechuranium.com

Since the additional information (map; ER_RAI Exhibit CH-1) regarding ER RAI Cultural-1 is considered by state and federal requirements to be privileged and confidential and not available to the public, we have included the enclosed affidavit in support of providing protection from disclosure and maintaining the map as privileged and confidential under 10 CFR Section 3.90(a)(4).

We acknowledge that a copy of this letter and response, with the exception of the map ER_RAI Exhibit CH-1, will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS).

Respectfully yours,

Richard E. Blubaugh
Vice President – Environmental Health & Safety Resources
Powertech (USA) Inc.

Enclosures
cc: M. Hollenbeck
W. Mays
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A. Thurlkill
Thompson & Pugsley, PLLC

<u>POWERTECH (USA) INC.</u>

AFFIDAVIT OF Richard E. Blubaugh

Vice President – Environmental Health & Safety Resources

1. **My name is Richard E. Blubaugh and I am the Vice President of Environmental, Health and Safety Resources for Powertech (USA) Inc. I am authorized to execute this affidavit on behalf of Powertech (USA) Inc. and may bind Powertech (USA) Inc. to the statements contained herein;**

2. **Powertech (USA) Inc. has submitted an application to the United States Nuclear Regulatory Commission (NRC) requesting a Uranium Recovery License for its uranium in situ leach recovery project in Fall River and Custer Counties, South Dakota;**

3. **With its license application, Powertech (USA) Inc. submitted a Technical Report (TR) and an Environmental Report (ER), that include descriptions that qualify for withholding pursuant to 10 CFR Section 2.390(a)(4);**

4. **Powertech (USA) Inc. has received a request from NRC for additional information to support the Environmental Report review being conducted by NRC staff, that includes a request for a map overlaying certain cultural and historical resource sites on the facilities map for the proposed Dewey-Burdock Project;**

5. **Powertech has provided the requested map as ER_RAI Exhibit CH-1 and pursuant to NRC regulations, Powertech (USA) Inc. has marked the map with the statement: "10 CFR Section 2.390(a)(4); Privileged and Confidential;"**

6. **The map, ER_RAI Exhibit CH-1, contains information relating to cultural sites, and Powertech (USA) Inc. hereby requests that the aforementioned map be withheld from public disclosure;**

7. **For the following reasons, Powertech (USA) Inc. asserts that the aforementioned map should be withheld from public disclosure as privileged and confidential information:**

    i. **The data and information contained on the above-mentioned map have been held in confidence by Powertech (USA) Inc. Powertech (USA) Inc. does not provide such information to public or private entities;**
    ii. **The data and information contained in the above-mentioned map are customarily held in confidence by businesses and other organizations seeking to protect information related to certain cultural resources;**
    iii. **The data and information contained on the above-mentioned map are being transmitted to the NRC staff in Powertech (USA) Inc.'s response to a request for additional information by NRC staff in confidence. Indeed, any such data and information shown to NRC staff were only revealed in a non-public context;**

iv. **The above-mentioned map regarding cultural resources in Powertech (USA) Inc.'s response to the request for additional information in support of the license application is not available in any public sources;**

v. **Release of the map may cause substantial harm to cultural resources on private and public property for the following reasons:**

  a. **Certain individuals may use the information to unlawfully collect cultural artifacts for personal use; and**

  b. **The South Dakota State Archaeologist, the state agency responsible for the study and protection of cultural sites and artifacts, has been issued a full report detailing the location(s) and artifact(s) discovered.**

vi. **If it were to become publicly available, the cultural resource information provided on the map would provide no tangible benefit to members of the public since artifacts cannot be legally collected. Therefore, withholding the map designated by Powertech (USA) Inc. for confidentiality protection will not harm members of the public. However, as stated above, releasing the location of cultural resource sites could result in the theft or destruction of potentially significant cultural artifacts; and**

vii. **Powertech (USA) Inc. fully understands that withholding the map does not deprive any independent party from inspecting the confidential information under the terms of an appropriate protective order in the context of an NRC licensing hearing or other administrative proceeding.**

[signature]

Richard E. Blubaugh, Vice President
Powertech (USA) Inc.

State of Colorado)
)ss.
County of Arapahoe)

The foregoing Affidavit was subscribed, sworn and acknowledged before me this 11th day of August, 2010, by Richard E. Blubaugh, as Vice President of Powertech (USA) Inc., a South Dakota corporation.

Witness my hand and official seal.

[signature]

Notary Public

My commission expires: KIM M. KENNEDY NOTARY PUBLIC STATE OF COLORADO My Commission Expires 08/02/2012

Recieved on 8/13/10

POWERTECH (USA) INC.

RICHARD E. BLUBAUGH
Vice President – Environmental
Health & Safety Resources

August 11, 2010

Uranium Recovery Licensing Branch
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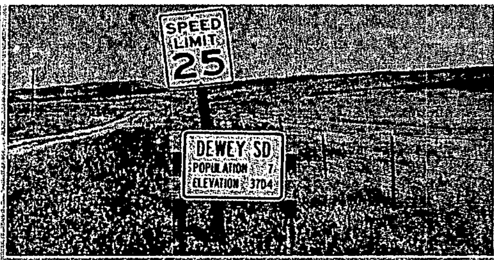

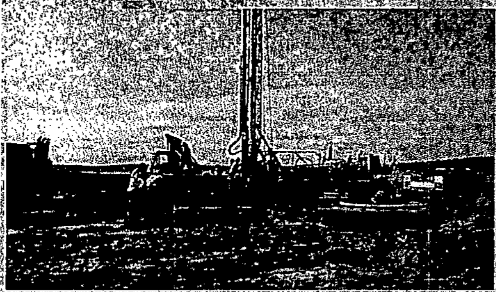
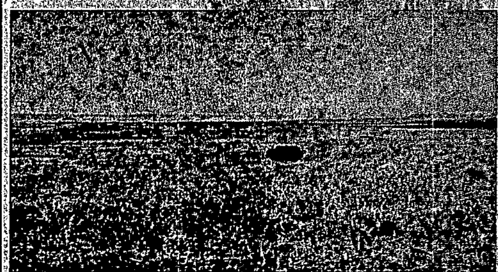
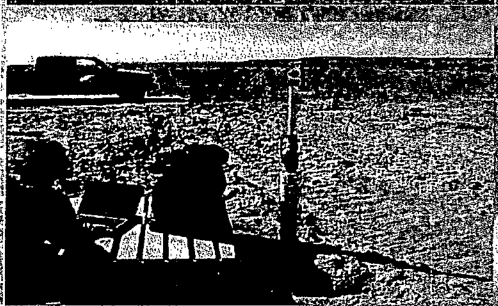


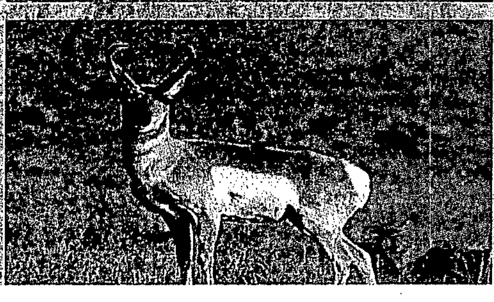

POWERTECH (USA) INC.

Dewey-Burdock Project

Application for NRC Uranium Recovery License Fall River and Custer Counties, South Dakota ER_RAI Response

August 11, 2010

Prepared for

U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, MD 20852

Prepared by

Powertech (USA) Inc.
5575 DTC Parkway, Suite #140
Greenwood Village, CO 80111
Phone: 303-790-7528
Facsimile: 303-790-3885

POWERTECH (USA) INC.

Response to U.S. Nuclear Regulatory Commission Request for Additional Information Powertech (USA) Inc. Dewey-Burdock Project Environmental Review of Application for a U.S. Nuclear Regulatory Commission Source Material License

August 2010

Prepared for

US Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, MD 20852

Prepared by

Powertech (USA) Inc.
5575 DTC Parkway, Suite 140
Greenwood Village, CO 80111

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POWERTECH (USA) INC.

South Dakota
Responses to
Requests for Additional Information
Environmental Report

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RAI PA

POWERTECH (USA) INC.

Response to the U.S. Nuclear Regulatory Commission's (NRC) Request for Additional Information for the Dewey-Burdock Uranium Project Environmental Report Submitted August 11, 2009.

Proposed Action:

RAI PA-1

Provide information on the roads leading to the proposed project area from Custer, South Dakota and Newcastle, Wyoming.

Response to RAI PA-1:

Applicant refers the reviewer to the "Worker Access Routes Map" depicted on **ER_RAI Exhibit PA-1.1** and refers to **ER_RAI Response TR-1**.

RAI PA-2

Confirm, clarify, and provide information on land disturbance associated with the proposed project.

1. ER Section 1.2.3 describes the total acreage that would be disturbed during construction, operation, and restoration activities and the additional acreage that will be disturbed if land application is used to dispose of treated wastewater. However, the ER does not provide information on the acreage disturbed by specific facilities and infrastructure (e.g., buildings, pipelines, access roads). Provide a breakdown of the acreage disturbed by construction of site facilities (buildings), pipelines, access roads, well fields, impoundments for the deep well disposal liquid waste management option, and impoundments and irrigation areas for the land application liquid waste management option.

2. ER Section 3.5.2 notes that ISR operations associated with the project are expected to disturb approximately 1,007 ha [2.488 acres}. This is inconsistent with the maximum potential land disturbance of 190 ha [463 acres] for the project described in ER Section 1.2.3. Please clarify this inconsistency.

3. ER Section 1.2.3 indicates that a total of 144 ha [355 acres] of land would potentially be affected or disturbed at the project site if the land application option is used to dispose of treated wastewater, However, Section 3.1, Appendix B, of the Supplemental Report indicates that the total irrigated area for the land application option at any given time would be 127 ha [315 acres] at the Burdock site and 127 ha [315 acres) at the Dewey site. Therefore, based on information from the SR, a total of 254 ha [630 acres] could be affected if the land application option is used to dispose of treated wastewater. Please confirm and clarify the total acres of land that would potentially be affected or disturbed if the land application option is used to dispose of treated wastewater.

Response to PA-2.1:

1.) The breakdown of total disturbance for the project described for each option of proposed waste water disposal is described in ER_RAI Table PA-2.0 and ER_RAI Table PA-2.1.

Site Facilities includes satellite and central processing plant sites. These sites contain associated building(s), external tanks, parking areas, and other structures within the fenced area and represent the total disturbance associated with all the necessary structures related to each plant site. The structures within the two site areas are detailed in Figure 3.2-2 and Figure 3.2-3 in the Technical Report.

Table ER_RAI PA-2.0: Total Surface Disturbance – Land Application Option

Item	Surface Disturbance (acres)
Site Facilities	24
Trunkline Installation	25
Access Roads	21
Well Fields	140
Impoundments	136
Land Application (Irrigation)	1052
Total	1398

Table ER_RAI PA-2.1: Total Surface Disturbance – Deep Disposal Well Option

Item	Surface Disturbance (acres)
Site Facilities	24
Trunkline Installation	25
Access Roads	21
Well Fields	140
Impoundments	33
Total	243

<u>Response to PA-2.2:</u>

2.) The sentence "Approximately 2,488 acres (23 percent) are expected to be disturbed by ISR operations associated with this project" is incorrect and should read "Approximately 1,398 acres with the land application option or 243 acres with the deep well disposal option. Acres represent the proposed range of disturbance by ISR operations associated with the Dewey-Burdock project". The total amount of estimated disturbance is 1,398 acres for the land application option and 243 acres for the deep disposal well option.

<u>Response to PA-2.3</u>:

3.) The estimations in ER Section 1.2.3 have been updated and should read "If the maximum area for land application of treated wastewater is included in the footprint of the Proposed Action, a maximum estimation of potentially disturbed surface from construction and operations would be 1052 acres. This includes all normally operated irrigation pivots, spare operating irrigation pivots and areas constructed to contain any surface runoff. This estimation excludes ponds associated with the land application option. An additional surface disturbance of 136 acres is required for the impoundments associated with the land application option. The total area expected to be irrigated at any one time during the operation of the project is 730 acres and is split between Dewey and Burdock irrigation areas.

Verbiage Update for ER Section 1.2.3 page 1.5 last paragraph:

"While, the PAA encompasses 10,580 acres, the maximum land potentially disturbed by the Proposed Action is estimated to be 1,398 acres (facilities, trunklines, roads, well fields, impoundments, and irrigation area) for the life of the project. Of this, approximately 1,200 acres are expected to be pre-production construction. The estimates of surface disturbance are for full operation of the land application option including facilities, trunklines, roads, well fields, impoundments, and irrigated area.

Construction and Reclamation of portions of the disturbed surface within the well fields and associated trunk-lines will be an ongoing activity such that less than the total estimated disturbance of 1,398 acres is expected to be actively disturbed at any one time during the project life."

RAI PA-3

Provide information on the acreage occupied by ponds for the deep well disposal option.

Response to RAI PA-3:

Applicant directs the reviewer's attention to **ER_RAI Table PA-3.0** below for acreage occupied by ponds for the deep well disposal option.

Dewey-Burdock Project - Pond Water Surface Areas

ER_RAI Table PA- 3.0 Deep Well Disposal

Description	Crest Length (ft)	Crest Width (ft)	Interior Slope (V:H)	Water Length (ft)	Water Width (ft)	Water Area Per Pond (acre)	Number of Ponds in Facility	Water Area Per Facility (Acre)
Dewey Plant Site								
Radium Settling Pond	680	170	1:3	662	152	2.3	1.0	2.3
Outlet Pond	370	160	1:4.5	343	133	1.0	1.0	1.0
Surge Pond	250	250	1:4.5	223	223	1.1	1.0	1.1
Total Active Pond Water Area - Dewey								**4.5**
Spare Pond	680	170	1:3	662	152	2.3	1.0	2.3
Burdock Plant Site								
Radium Settling Pond	680	170	1:3	662	152	2.3	1.0	2.3
Outlet Pond	370	160	1:4.5	343	133	1.0	1.0	1.0
Surge Pond	250	250	1:4.5	223	223	1.1	1.0	1.1
Central Plant Pond	275	275	1:3	257	257	1.5	1.0	1.5
Total Active Pond Water Area - Burdock								**6.0**
Spare Pond	680	170	1:3	662	152	2.3	1.0	2.3
Total Active Pond Water Area - Entire Facility								**10.5**

Note:
- Active Pond Areas do not include the area of spare ponds, which will normally be empty
- All areas shown assume 3' of freeboard in the pond

RAI PA-4

Provide information on the acreage ponds occupy for the land application option.

Response to PA-4:

Applicant directs the reviewer's attention to **ER_RAI Table PA-4.0** below for acreage occupied by ponds for the land application option.

Dewey-Burdock Project - Pond Water Surface Areas

ER_RAI Table PA- 4.0 Land Application

Description	Crest Length (ft)	Crest Width (ft)	Interior Slope (V:H)	Water Length (ft)	Water Width (ft)	Water Area Per Pond (acre)	Number of Ponds in Facility	Water Area Per Facility (Acre)
Dewey Plant Site								
Storage Ponds	465	465	1:4.5	438	438	4.4	4.0	17.6
Radium Settling Pond	880	220	1:3	862	202	4.0	1.0	4.0
Outlet Pond	280	162	1:4.5	253	135	0.8	1.0	0.8
Total Active Pond Water Area - Dewey								**22.4**
Spare Storage Pond	465	465	1:4.5	438	438	4.4	1.0	4.4
Spare Radium Settling Pond	880	220	1:3	862	202	4.0	1.0	4.0
Burdock Plant Site								
Storage Ponds	465	465	1:4.5	438	438	4.4	4.0	17.6
Radium Settling Pond	880	220	1:3	862	202	4.0	1.0	4.0
Outlet Pond	280	162	1:4.5	253	135	0.8	1.0	0.8
Central Plant Pond	362	362	1:3	344	344	2.7	1.0	2.7
Total Active Pond Water Area - Burdock								**25.1**
Spare Storage Pond	465	465	1:4.5	438	438	4.4	1.0	4.4
Spare Radium Settling Pond	880	220	1:3	862	202	4.0	1.0	4.0
Total Active Pond Water Area - Entire Facility								**47.5**

Note:
- Active Pond Areas do not include the area of spare ponds, which will normally be empty
- All areas shown assume 3' of freeboard in the pond

RAI PA-5

Provide updated information on federal, state, county, and tribal licenses and permits required to construct and operate the proposed Dewey-Burdock project.

1. Updated information listed in ER Table 1.6-1 on federal, state, county, and tribal licenses and permits required for the proposed Dewey-Burdock project.

2. New information on any additional federal, state, county, and tribal licenses, permits, and approvals required for the proposed Dewey-Burdock project. For example, SR Section 4.2 indicates that Powertech intends to apply for a Class V (Non Hazardous) deep injection permit for disposal of liquid wastes generated from the project through a permitting process with the U.S. Environmental Protection Agency.

Response to PA-5.1:

1.) ER Table 1.6-1 has been updated below.

Table 1.6-1: Permits and Licenses for the Proposed Project

Issuing Agency	Description	Status
South Dakota Department of Environment and Natural Resources Joe Foss Building 523 E Capitol Pierre, SD 57501	Uranium Exploration Permit	Submitted
	Temporary Water Right for Testing	Submitted
	Temporary Discharge Permit for Testing	Submitted
	Scenic and Unique Lands Designation	Submitted
	Large Scale Mine Permit	Pending
	Water Appropriation Permit	Pending
	Class III Underground Injection Control Permit	Pending
	Air Quality Permit	Pending
	Groundwater Discharge Permit	Pending
	NPDES Water Discharge Permit	Pending
US Nuclear Regulatory Commission Washington, DC 20555	Uranium Recovery (Source and 11e. (2) Byproduct Material)	Application Submitted herein

US EPA Region 8 8OC-EISC 1595 Wynkoop St Denver, CO 80202-1129	Class III Underground Injection Control Permit and Aquifer Exemption	Submitted and deemed complete
	Class V Underground Injection Control Permit	Submitted and deemed complete
Custer County 420 Mount Rushmore Road Custer, SD 57730-1934	Building Permits	Pending
Fall River County County Courthouse Hot Springs, SD 57747-1309	Building Permits	Pending
US Bureau of Land Management, South Dakota Field Office	Plan of Operations	Pending
State Historic Preservation Office	State and Federal Licensing/Permitting	Per NRC processing
Tribal Historic Preservation Office	State and Federal Licensing/Permitting	Per NRC processing

Response to PA-5.2:

2.) Powertech (USA) submitted its permit application to the U.S. Environmental Protection Agency (EPA) for a Class V (Non-Hazardous) UIC permit on March 30, 2010. EPA notified the applicant that the application was determined to be administratively complete on April 28, 2010. EPA has not requested any additional information since the completeness determination.

Air Quality:

RAI AQ-1

Explain how emission levels relate to compliance with ambient air standards.

Response to RAI AQ-1:

Powertech has converted the emission mass flow rates into concentration values at the source locations. These are reported in **ER_RAI Table AQ-1.1**"*Vehicle Emission Factors and Concentrations at Source,"* (**Appendix ER_RAI Air Quality, 2010**) assuming a constant air density of 1 kg/m^3. In order to assess the effective impact on air quality, a dispersion model was employed (AERMOD), to calculate concentrations at receptor locations for the various pollutants identified in the four different phases (Construction, Operations, Aquifer Restoration, and Decommissioning).

AERMOD simulates the dispersion of pollutants under various meteorological and boundary layer conditions (EPA, 2004) derived from surface and upper air measurements. Surface meteorological data were acquired from the Dewey-Burdock weather station, and the National Weather Service (NWS) weather station at Custer, SD (approximately 30 mi NE of the Powertech site). Upper air sounding data were acquired from the NWS Rapid City, SD station (approximately 60 mi NE of the site). The meteorological data were preprocessed by the AERMET code assuming a distribution of surface parameters (Bowen Ratio, Albedo, and Roughness Length) based on the analysis of topographical maps.

The sources were geographically located in four main areas covering the planned facilities and well fields. The ground level receptors were collocated with those in the MILDOS simulation (TR Table 7.3-4). An entire year (2009) was simulated with AERMOD under the assumption of flat terrain; summary results are provided in **ER_RAI Tables AQ-8.1** through **AQ-8.4**, (Appendix ER_RAI Air Quality, 2010) also addressed under "Response to RAI-AQ-8" below.

The results of modeling indicate that National Ambient Air Quality Standards (NAAQS) will not be exceeded at any of the receptor sites as shown in **ER_RAI Figure AQ-1.**

RAI AQ-2

Provide emission estimates discretely for all four ISR phases.

Response to RAI AQ-2:

Refer to **ER_RAI Table AQ-1.1** "Vehicle Emission Factors and Concentrations at Source" (Appendix ER_RAI Air Quality, 2010) updates the emission estimates shown in the SR, separating emission parameters discretely for all four ISR phases.

RAI AQ-3 ***Provide greenhouse gas emission levels for the ISR phases and the basis for the emission levels.***

Response to RAI AQ-3:

Greenhouse gas emissions (GHG) were estimated for each phase of the project for mobile sources, stationary sources, and indirect emissions from electricity consumption as shown in **ER_RAI Table AQ-3.1** "Annual Greenhouse Gas Emission Estimates" (Appendix ER_RAI Air Quality, 2010). The three major greenhouse gases carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) were included in this analysis. Chlorofluorocarbon (CFC) and hydrochlorofluorocarbon (HCFC) greenhouse gases were not included in the analysis as they are not expected to be emitted.

Mobile source GHG emissions were estimated by expanding the previously calculated emission estimates, based on type and number of mobile equipment, to include CH_4 and N_2O, as shown in **ER_RAI**

Table AQ-3.2 (Appendix ER_RAI Air Quality, 2010). Emission factors for these gases were available in mass per hour estimates for diesel and gasoline equipment and vehicles available from the EPA (EPA, 2004) and as mass per volume of fuel for propane sources (EPA, 1993). The appropriate emission factors were applied to the estimated operating hours to calculate emission rates.

Stationary source GHG emissions on the site, mainly propane heaters, were calculated using EPA emission factors for propane combustion (**ER_RAI Table AQ-3.3**); located in Appendix ER_RAI Air Quality, 2010.

Indirect emissions from electricity consumption were calculated from an emissions rate of 0.94 tons/MWh provided by Black Hills Power (Black Hills Corporation, 2008). CH_4 and N_2O emissions were estimated using the ratio of CH_4 and N_2O to CO_2 emissions in gas and coal production (EPA, 2010) and the relative energy mix by the utility. Emissions from electrical consumption are listed in **ER_RAI Table AQ-3.4** (Appendix ER_RAI Air Quality, 2010).

Emissions from these sources were summed for each project phase (**ER_RAI Table AQ-3.1**, Appendix ER_RAI Air Quality, 2010). CH_4 and N_2O were converted to CO_2 equivalents (CO_2e) to calculate a total annual estimate using the relative global warming potential (GWP), defined as the ability to absorb outgoing radiation, of each gas (IPCC, 2007). CO_2e represents the equivalent amount of CO_2 that results in the same level of warming potential as another greenhouse gas at a given concentration. The GWP of a gas depends on both the warming potential and atmospheric lifetime of the gas (average residence time in the atmosphere). GWPs and CO_2e calculations utilizing GWPs are associated with a specific time horizon. As CH_4 and N_2O have different atmospheric lifetimes than CO_2, CO_2e estimates including the CH_4 and N_2O emissions were calculated for the 20-year time horizon following the IPCC conventions used by the EPA. CO_2e emissions in **ER_RAI Table AQ-3.1**, Appendix ER_RAI Air Quality, 2010, are annual estimates with calculations based on the 20-year time horizon.

***<u>RAI AQ-4</u>* Discuss the applicability of any greenhouse gas regulations, and if appropriate, address compliance with these regulations.**

Response to RAI AQ-4:

The EPA GHG reporting rule in October 2009 specifies that facilities emitting 25,000 tons of carbon dioxide equivalents (CO_2e) per year must report annual emissions of CO_2, CH_4, N_2O, sulfur hexafluoride, HCFCs, perfluorocarbons, and other fluorinated gases in CO_2e. For this project CO_2, CH_4, and N_2O are anticipated to be emitted. This rule also states that the accuracy of emissions must be ensured by recordkeeping and testing.

In May 2010, the EPA released a final rule increasing the threshold from 25,000 tons per year CO_2e to 100,000 tons per year (EPA, 2010 Press Release). Along with the reporting rule, the EPA increased the threshold for triggering Title V permitting and Prevention of Significant Deterioration (PSD) applicability to 100,000 tons per year of CO_2e.

Total emissions of all project phases of CO_2e are not expected to exceed the 100,000 tons per year threshold for any phase of the project, as shown in **ER_RAI Table AQ-3.1**, Appendix ER_RAI Air Quality, 2010 and will not be subject to reporting to the South Dakota Department of Environment and Natural Resources (DENR) of as part of Title V permitting.

RAI AQ-5
Provide information on the air permit, if available.
Response to RAI AQ-5:
As described in RAI AQ-4, greenhouse gas emissions will not trigger a Title V and PSD permit for any phase of the project, because in May 2010, the threshold for GHG was increased to 100,000 tons/year for CO_2e. However the permitting threshold for other regulated pollutants remains at 100 tons per year. Only emissions of CO for the construction and operation phases are expected to exceed the applicability threshold of 100 tons per year (**ER_RAI Table AQ-1.1**, Appendix ER_RAI Air Quality, 2010), thus triggering Title V air quality permitting under the South Dakota DENR statutory requirements. The air quality permit process has not yet been completed, but will be conducted in accordance with South Dakota and EPA procedures and timelines. The air quality permit will include emission estimates and dispersion modeling results to address PSD requirements.

RAI AQ-6
Provide an assessment concerning compliance with Prevention of Significant Deterioration (PSD) regulations.
Response to RAI AQ-6:
Powertech recognizes that Wind Cave National Park, a PSD Class I area, is located some 29 miles northeast of the project. As part of RAI AQ-1, air quality was modeled using AERMOD based on emissions estimates, meteorological data, and the location of receptor sites. The modeling allowed estimates of concentrations of emitted pollutants at sites away from the source to be compared to National Ambient Air Quality Standards (NAAQS). The results of the AERMOD model (**ER_RAI Table AQ-1.2**, Appendix ER_RAI Air Quality, 2010) indicate that NAAQS along the northern and eastern boundary of the property will not be exceeded. Therefore, there will be no impact on the Wind Cave National Park from the project.

RAI AQ-7
Provide the rationale or supporting documentation regarding proposed mitigation measures.
Response to RAI AQ-7:
Powertech will implement dust control procedures to reduce dust levels during construction, operation, aquifer restoration and decommissioning as referenced in Section 5.6. The most effective measures will be the routine application of water to roads and construction areas and maintaining a strict maximum speed limit for all vehicles. A water application rate of 0.2 gallons per square yard per hour has been shown to reduce PM_{10} emission rates by 50 percent (EPA, 1992). However, Powertech will adjust the water application rate depending on the level of construction vehicle activity and site meteorological conditions. Maintaining adequate surface moisture content can reduce PM_{10} emissions by 75 percent and a 5-fold increase in surface moisture content can reduce PM_{10} emissions by 95 percent (EPA, 1992). Lowering vehicle speeds from 45 miles per hour to 35 miles per can be effective in reducing dust emissions by up to 22 percent (Washington State, 1996). Powertech intends to enforce a maximum speed limit of 25 mph for all moving vehicles within the property. Other dust control options that may be implemented to control fugitive dust are the application of gravel to roadways and the timely revegetation of disturbed construction areas.

RAI AQ-8

Provide the rationale or supporting documentation regarding cumulative impact conclusion for air quality.

Response to RAI AQ-8:

The project is located within an attainment area for NAAQS. Preliminary quantitative information is provided through the analysis described in the response to **ER_RAI-AQ-1**. **ER_RAI Tables AQ-8.1 through AQ-8.4** (Appendix ER_RAI Air Quality, 2010) provide a summary of the results of the dispersion analysis (including atmospheric conditions), with maximum concentration values predicted at all specified receptors and a comparison to the National Ambient Air Quality Standards (NAAQS) criteria. All predicted concentrations are below the NAAQS standards; therefore no significant cumulative impacts would be anticipated.

RAI AQ-9

Clarify the description of fugitive dust emission estimates.

1. Powertech should clarify whether traffic from commuting workers was included in the fugitive dust emissions estimates, and if it was not, either provide an updated estimate that includes commuting worker traffic or provide the basis for excluding the information.

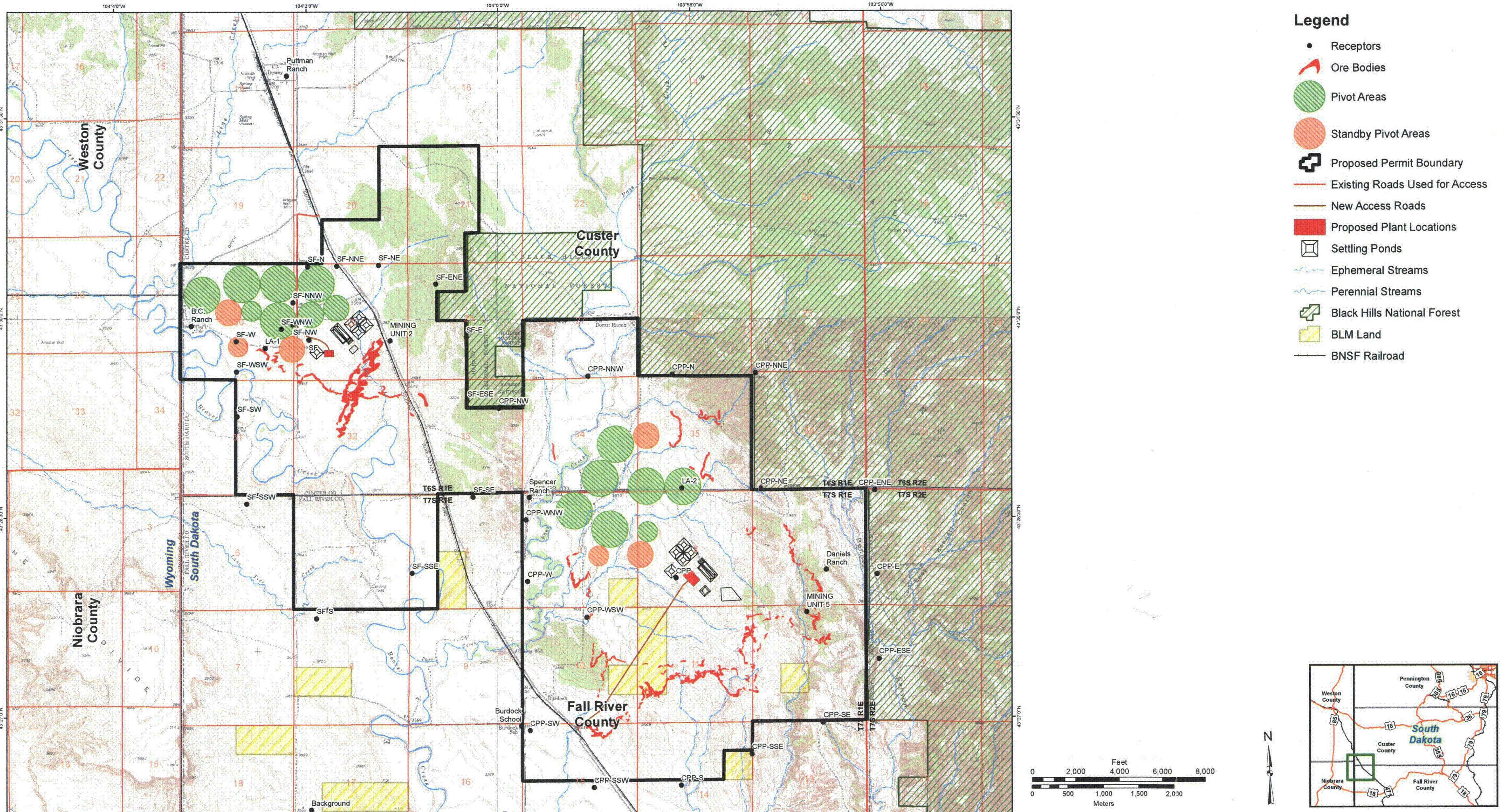
2. Powertech should clarify whether the fugitive dust estimates for the operational period include activities that would be conducted for the aquifer restoration phase. This information is needed for the staff to evaluate the potential impacts of fugitive dust emissions.

Response to AQ-9.1:

Dust emissions due to commuting workers were not included in the SR Section 6.2 estimates. A new analysis has been carried out and the emissions of fugitive dust estimates have been updated in **ER_RAI Table AQ-9.1** "Fugitive Dust Estimates" **(Appendix ER_RAI Air Quality, 2010)**.

Response to AQ-9.2:

The project activities have been subdivided into construction, operations, aquifer restoration, and decommissioning. See Appendix ER_RAI Air Quality, 2010.



POWERTECH (USA) INC.

ER_RAI Figure AQ-1

Air Quality Receptor Locations

REVISIONS				
#	DRAWN	CHECKED	APPROVED	DATE

CHECK SCALES — If this bar does not measure 1 inch then map is not at its original scale

ANSI D 22" x 34"

PLOT DATE 09-May-2010 | DATE 29-Mar-2010 | PROJECT Dewey-Burdock Project

DRAWN Knight Piesold and Co. | CHECKED A. Thurlkill | COORDS NAD 27, South Dakota State Plane South (feet) | 1

SCALE As Noted | FILENAME C:\1102\279.09\GIS\Receptor_final.mxd (P:\Dewey-Burdock\Submittals\Receptor_final93.mxd) | 1 OF 1

ER_RAI AQ - References

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ER_RAI AQ - Tables

POWERTECH (USA) INC.

APPENDIX ER_RAI

AIR QUALITY

POWERTECH (USA) INC.

Tables

Powertech (USA) Inc.

ER_RAI Table AQ1.1
Powertech (USA) Inc.
Dewey-Burdock Project

Vehicle Emission Factors and Concentrations at Source

Phase	Activity	Emission Vehicle	Number of Vehicles	Size/Model	Horsepower Rating	Operating Hours				Emission Factors							Emissions													
										PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes
						(hr/d)	(d/wk)	(mo/yr)	(hrs/yr)	(lbs/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)
Construction Phase	Earthworks Construction	Scraper	3.00	Caterpillar 631G	462	10	5	2	433	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	3.0	2.8	0.61	9.3	1594	3.48	0.64	0.66	0.62	0.13	2.0	345	0.75	0.14
		Bulldozer	1.00	Caterpillar D9T	410	10	5	2	433	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.9	0.8	0.18	2.7	472	1.03	0.19	0.20	0.18	0.04	0.6	102	0.22	0.04
		Compactor	1.00	Caterpillar 825H	315	10	5	2	433																					
		Motor Grader	1.00	Caterpillar 16M	297	10	5	2	433	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.7	0.6	0.13	2.0	342	0.75	0.14	0.14	0.13	0.03	0.4	74	0.16	0.03
		Heavy Duty Water Truck (1,500 gal)	2.00	2009 Ford 750	325	8	5	6	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	1.4	1.3	0.29	4.3	748	1.63	0.30	0.74	0.69	0.15	2.3	389	0.85	0.16
		Fueling Truck	1.00	2009 Ford 750	325	3	5	2	130	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.7	0.7	0.14	2.2	374	0.82	0.15	0.05	0.04	0.01	0.1	24	0.05	0.01
		Light Duty pickup	3.00	Generic Pick-up	265	4	5	2	173	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	0.6	0.5	8.75	5.5	859	17.16	0.39	0.05	0.04	0.76	0.5	74	1.49	0.03
	Facilities Construction	Crane	2.00	Terex AC 160-2	516	8	5	2	347	0.002	0.002	0.031000	0.007	1.150	0.003	0.0005	2.3	2.1	31.99	6.9	1187	2.59	0.48	0.39	0.37	5.55	1.2	206	0.45	0.08
		Welding Equipment	8.00	Miller Big Blue 500	47	8	5	6	1040	0.002	0.002	0.031000	0.007	1.150	0.003	0.0005	0.8	0.8	11.66	2.5	432	0.95	0.17	0.43	0.40	6.06	1.3	225	0.49	0.09
		Forklift	2.00	Caterpillar TH 580B	100	8	5	6	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.4	0.4	0.09	1.3	230	0.50	0.09	0.23	0.21	0.05	0.7	119	0.26	0.05
		Man lift	4.00	JLG 400S - Diesel	50	8	5	6	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.4	0.4	0.09	1.3	230	0.50	0.09	0.23	0.21	0.05	0.7	120	0.26	0.05
		Heavy Duty Diesel Truck	2.00	2009 Ford 750	325	8	5	6	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	1.4	1.3	0.29	4.3	748	1.63	0.30	0.74	0.69	0.15	2.3	389	0.85	0.16
		Light Duty Truck	10.00	Generic Pick-up	265	4	5	6	520	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	1.9	1.6	29.15	18.4	2862	57.22	1.29	0.50	0.41	7.58	4.8	744	14.88	0.33
	Well Field/Electric Construction 1	HDPE Fusion Equipment	2.00	McElroy Tracstar 900	83	8	5	6	1040	0.002	0.002	0.031000	0.007	1.150	0.003	0.0005	0.4	0.3	5.15	1.1	191	0.42	0.08	0.19	0.18	2.68	0.6	99	0.22	0.04
		Trackhoe	1.00	Caterpillar 330D	268	8	5	6	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.6	0.5	0.12	1.8	308	0.67	0.12	0.31	0.29	0.06	0.9	160	0.35	0.06
		Backhoe	1.00	Caterpillar 420E	93	8	5	6	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.2	0.2	0.04	0.6	107	0.23	0.04	0.11	0.10	0.02	0.3	56	0.12	0.02
		Welding Equipment	1.00	Miller Big Blue 500	47	4	5	6	520	0.002	0.002	0.031000	0.007	1.150	0.003	0.0005	0.1	0.1	1.46	0.3	54	0.12	0.02	0.03	0.03	0.38	0.1	14	0.03	0.01
		Electrical Pole Truck	2.00	2009 Ford 750	325	8	5	4	693	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	1.4	1.3	0.29	4.3	748	1.63	0.30	0.50	0.46	0.10	1.5	259	0.57	0.10
		Motor Grader	1.00	Caterpillar 16M	297	8	5	2	347	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.7	0.6	0.13	2.0	342	0.75	0.14	0.11	0.11	0.02	0.3	59	0.13	0.02
		Forklift	1.00	Caterpillar TH 580B	100	8	5	6	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.2	0.2	0.04	0.7	115	0.25	0.05	0.11	0.11	0.02	0.3	60	0.13	0.02
		Light Duty Truck	6.00	Generic Pick-up	265	8	5	6	1040	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	1.1	0.9	17.49	11.1	1717	34.33	0.77	0.60	0.49	9.09	5.8	893	17.85	0.40
	Drilling	Truck Mount Rotary Drill Rig, Diesel Truck	13.00	Gefco Speedstar 30K	550	10	5	12	2600	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	15.7	14.7	3.15	47.8	8223	17.98	3.31	20.45	19.05	4.10	62.1	10689	23.37	4.30
		Heavy Duty Water Truck (1,500 gal)	13.00	2009 Ford 750	325	4	5	12	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	9.3	8.7	1.86	28.2	4859	10.62	1.96	4.83	4.50	0.97	14.7	2527	5.52	1.02
		Backhoe	1.00	Caterpillar 420E	93	8	5	12	2080	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.2	0.2	0.04	0.6	107	0.23	0.04	0.21	0.20	0.04	0.6	111	0.24	0.04
		Forklift	2.00	Caterpillar TH 580B	100	8	5	12	2080	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.4	0.4	0.09	1.3	230	0.50	0.09	0.46	0.43	0.09	1.4	239	0.52	0.10
		Cementer (gas)	4.00	Deutz Engine	90	8	5	12	2080	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	0.3	0.2	3.96	2.5	389	7.77	0.17	0.27	0.22	4.12	2.6	404	8.08	0.18
		Logging Truck	4.00	2008 Ford F450	325	8	5	12	2080	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	2.9	2.7	0.57	8.7	1495	3.27	0.60	2.97	2.77	0.60	9.0	1555	3.40	0.63
		Light Duty Truck	15.00	Generic Pick-up	265	2	5	12	520	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	2.9	2.3	43.73	27.7	4293	85.82	1.93	0.75	0.61	11.37	7.2	1116	22.31	0.50
	Well Field/Electric Construction 2	HDPE Fusion Equipment - Gas Engine	2.00	McElroy Tracstar 900	83	8	5	12	2080	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	0.1	0.1	1.83	1.2	179	3.58	0.08	0.12	0.10	1.90	1.2	186	3.73	0.08
		Hydraulic Excavator	1.00	Caterpillar 330D	268	8	5	12	2080	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.6	0.5	0.12	1.8	308	0.67	0.12	0.61	0.57	0.12	1.9	321	0.70	0.13
		Backhoe	1.00	Caterpillar 420E	93	8	5	12	2080	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.2	0.2	0.04	0.6	107	0.23	0.04	0.21	0.20	0.04	0.6	111	0.24	0.04
		Welding Equipment	1.00	Miller Big Blue 500	47	4	5	12	1040	0.002	0.002	0.031000	0.007	1.150	0.003	0.0005	0.1	0.1	1.46	0.3	54	0.12	0.02	0.05	0.05	0.76	0.2	28	0.06	0.01
		Electrical Pole Truck	2.00	2009 Ford 750	325	8	5	6	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	1.4	1.3	0.29	4.3	748	1.63	0.30	0.74	0.69	0.15	2.3	389	0.85	0.16
		Motor Grader	1.00	Caterpillar 16M	297	8	1	12	416	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.7	0.6	0.13	2.0	342	0.75	0.14	0.14	0.13	0.03	0.4	71	0.16	0.03
		Forklift	1.00	Caterpillar TH 580B	100	8	5	12	2080	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	0.1	0.1	1.10	0.7	108	2.16	0.05	0.07	0.06	1.14	0.7	112	2.24	0.05
		Light Duty Truck	6.00	Generic Pick-up	265	8	5	12	2080	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	1.1	0.9	17.49	11.1	1717	34.33	0.77	1.19	0.98	18.19	11.5	1786	35.70	0.80
															Totals:		55	51	184	222	36814	296	15	**39**	**36**	**77**	**143**	**24057**	**147**	**10**

POWERTECH (USA) INC.

ER_RAI Table AQ1.1
Powertech (USA) Inc.
Dewey-Burdock Project

Vehicle Emission Factors and Concentrations at Source

Phase	Activity	Emission Vehicle	Number of Vehicles	Size/Model	Horsepower Rating	Operating Hours				Emission Factors							Emissions													
										PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes
						(hr/d)	(d/wk)	(mo/yr)	(hrs/yr)	(lbs/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)
Operations Phase - Well Field Construction/Production/Groundwater Restoration	Central Processing Plant	Propane heating**	1	-	18 gal/hr	24	7	6	4368	0.7	0.0002	13.0	7.5	12500	1.000	N/A	0.01	3.5E-06	0.23	0.13	221	0.02	N/A	0.03	7.7E-06	0.5	0.29	483	0.04	N/A
		Thermal Fluid Heater - propane**	2	-	16 gal/hr	24	7	12	8736	0.7	0.0002	13.0	7.5	12500	1.000	N/A	0.02	6.5E-06	0.42	0.24	408	0.03	N/A	0.10	2.8E-05	1.9	1.07	1780	0.14	N/A
		Emergency Backup Generator - propane**	1	-	12 gal/hr	0.25	1	12	13	0.7	0.0002	13.0	7.5	12500	1.000	N/A	0.01	2.5E-06	0.16	0.09	155	0.01	N/A	5.6E-05	1.6E-08	1.0E-03	6.0E-04	1.0	8.0E-05	N/A
		Fire Suppression System - Diesel pump	1	-	100	0.25	1	12	13	0.002	0.002	0.031000	0.007	1.150	0.003	0.0005	0.22	0.205	3.10	0.67	115	0.3	0.05	0.001	0.001	0.02	0.004	0.7	0.002	0.00
	Satellite Facility	Propane heating**	1	-	4 gal/hr	24	7	6	4368	0.7	0.0002	13.0	7.5	12500	1.000	N/A	0.00	7.5E-07	0.05	0.03	47	0.004	N/A	0.01	1.6E-06	0.1	0.06	102	0.01	N/A
		Emergency Backup Generator - propane**	1	-	6 gal/hr	0.25	1	12	13	0.7	0.0002	13.0	7.5	12500	1.000	N/A	0.004	1.2E-06	0.08	0.05	77	0.01	N/A	2.8E-05	8.0E-09	5.2E-04	3.0E-04	0.5	4.0E-05	N/A
		Fire Suppression System - Diesel pump	1	-	100	0.25	1	12	13	0.002	0.002	0.031	0.007	1.150	0.003	0.0005	0.22	0.205	3.10	0.67	115	0.3	0.05	1.4E-03	1.3E-03	0.02	4.3E-03	0.7	1.6E-03	0.00
	Office Building	Propane heating**	1	-	1 gal/hr	24	7	6	4368	0.7	0.0002	13.0	7.5	12500	1.000	N/A	0.001	2.2E-07	0.01	0.01	14	0.001	N/A	0.002	4.9E-07	0.03	0.02	31	0.002	N/A
	Maintenance and Warehouse Building	Propane heating**	1	-	3 gal/hr	24	7	6	4368	0.7	0.0002	13.0	7.5	12500	1.000	N/A	0.002	5.3E-07	0.03	0.02	33	0.003	N/A	0.004	1.2E-06	0.08	0.04	72	0.01	N/A
	Drilling*	Truck Mount Rotary Drill Rig, Diesel Truck	13	Gefco Speedstar 30K	550	10	5	12	2600	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	16	15	3.15	48	8223	18.0	3.3	20.45	19.05	4.1	62.1	10689	23.4	4.30
		Heavy Duty Water Truck (1,500 gal)	13	2009 Ford 750	325	4	5	12	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	9	9	1.86	28	4859	10.6	2.0	4.83	4.50	1.0	14.7	2527	5.5	1.02
		Backhoe	1	Caterpillar 420E	93	8	5	12	2080	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.2	0.2	0.04	0.6	107	0.2	0.04	0.21	0.20	0.0	0.6	111	0.2	0.04
		Forklift	2	Caterpillar TH 580B	100	8	5	12	2080	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.4	0.4	0.09	1.3	230	0.5	0.1	0.46	0.43	0.1	1.4	239	0.5	0.10
		Cementer (gas)	4	Deutz Engine	90	8	5	12	2080	0.001	0.001	0.011000	0.007	1.080	0.022	0.0005	0.3	0.2	3.96	2.5	389	7.8	0.2	0.27	0.22	4.1	2.6	404	8.1	0.18
		Logging Truck	4	2009 Ford F450	325	8	5	12	2080	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	2.9	2.7	0.57	8.7	1495	3.3	0.6	2.97	2.77	0.6	9.0	1555	3.4	0.63
		Light Duty Truck	15	Generic Pick-up	265	2	5	12	520	0.001	0.001	0.011000	0.007	1.080	0.022	0.0005	2.9	2.3	43.73	27.7	4293	85.8	1.9	0.75	0.61	11.4	7.2	1116	22.3	0.50
	CPP Operations	Man Lift	1	JLG 400S - Diesel	50	4	1	12	208	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.1	0.1	0.02	0.3	58	0.1	0.02	0.01	0.01	0.0	0.0	6	0.01	0.00
		Welding Equipment	1	Miller Big Blue 500	47	4	3	12	624	0.002	0.002	0.031000	0.007	1.150	0.003	0.0005	0.1	0.1	1.46	0.3	54	0.1	0.02	0.03	0.03	0.5	0.1	17	0.04	0.01
		Forklift (warehouse)	1	Clark C80 (LPG)	93	4	5	12	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.2	0.2	0.04	0.6	107	0.2	0.04	0.11	0.10	0.0	0.3	56	0.12	0.02
		Forklift (packaging)	1	Clark 20sC (LPG)	39	3	7	12	1092	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.1	0.1	0.02	0.3	45	0.1	0.02	0.05	0.04	0.0	0.1	24	0.05	0.01
		Light Duty Truck	8	Generic Pick-up	265	6	5	12	1560	0.001	0.001	0.011000	0.007	1.080	0.022	0.0005	1.5	1.3	23.32	14.8	2290	45.8	1.0	1.19	0.98	18.2	11.5	1786	35.7	0.80
		Light Duty Vehicles	4	Generic Vehicle	150	6	7	12	2184	0.001	0.001	0.011000	0.007	1.080	0.022	0.0005	0.4	0.4	6.60	4.2	648	13.0	0.3	0.47	0.39	7.2	4.6	708	14.1	0.32
	SF/WF Operations	Resin Hauling Semi - Truck	1	2000 Western Star 4964FX	430	4	5	12	1040	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.9	0.9	0.19	2.9	495	1.1	0.2	0.49	0.46	0.1	1.5	257	0.6	0.10
		Pump pulling truck	4	Smeal 5T	325	6	5	12	1560	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	2.9	2.7	0.57	8.7	1495	3.3	0.6	2.23	2.08	0.4	6.8	1166	2.5	0.47
		Motor Grader	1	Caterpillar 16M	297	8	1	12	416	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.7	0.6	0.13	2.0	342	0.7	0.1	0.14	0.13	0.0	0.4	71	0.16	0.03
		Logging Truck	1	2009 Ford F450	325	8	5	12	2080	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.7	0.7	0.14	2.2	374	0.8	0.2	0.74	0.69	0.1	2.3	389	0.85	0.16
		Light Duty Truck	2	Generic Pick-up	265	24	7	12	8736	0.001	0.001	0.011000	0.007	1.080	0.022	0.0005	0.4	0.3	5.83	3.7	572	11.4	0.3	1.67	1.37	25.5	16.1	2500	50.0	1.12
		Light Duty Vehicles	2	Generic Vehicle	150	6	5	12	1560	0.001	0.001	0.011000	0.007	1.080	0.022	0.0005	0.2	0.2	3.30	2.1	324	6.5	0.1	0.17	0.14	2.6	1.6	253	5.1	0.11
	Product Transport	Diesel Semi with Trailer to transport product	1	2000 Western Star 4964FX	430	8	0.5	12	208	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.9	0.9	0.19	2.9	495	1.1	0.2	0.10	0.09	0.0	0.3	51	0.11	0.02
															Totals:		41	38	102	164	28076	211	11	**37**	**34**	**79**	**145**	**26396**	**173**	**10**

** Emissions Factors are in Units of lb/10^3 gal consumed

ER_RAI Table AQ1.1
Powertech (USA) Inc.
Dewey-Burdock Project

Vehicle Emission Factors and Concentrations at Source

Phase	Activity	Emission Vehicle	Number of Vehicles	Size/Model	Horsepower Rating	Operating Hours				Emission Factors							Emissions													
										PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes
						(hr/d)	(d/wk)	(mo/yr)	(hrs/yr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)
Aquifer restoration	Restoration Operations	Cementer (gas)	1	Deutz Engine	90	8	5	2	347	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	0.1	0.1	1.0	0.6	97	1.9	0.04	0.01	0.01	0.2	0.1	17	0.34	0.01
		Light Duty Truck	2	Generic Pick-up	265	6	5	12	1560	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	0.4	0.3	5.8	3.7	572	11.4	0.26	0.30	0.24	4.5	2.9	446	8.9	0.20
		Light Duty Vehicles	1	Generic Vehicle	150	6	5	12	1560	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	0.1	0.1	1.7	1.0	162	3.2	0.07	0.08	0.07	1.3	0.8	126	2.5	0.06
															Totals:		0.6	0.5	8.5	5.4	831.6	16.6	0.4	**0.4**	**0.3**	**6.0**	**3.8**	**589.7**	**11.8**	**0.3**

Phase	Activity	Emission Vehicle	Number of Vehicles	Size/Model	Horsepower Rating	Operating Hours				Emission Factors							Emissions													
										PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes
						(hr/d)	(d/wk)	(mo/yr)	(hrs/yr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lb/hp-hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)
Decommissioning Phase	Earthwork	Scraper	3	Caterpillar 631G	462	10	5	4	867	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	3.0	2.8	0.6	9.3	1594	3.5	0.6	1.3	1.2	0.3	4.0	691	1.5	0.28
		Motor Grader	1	Caterpillar 16M	297	10	5	4	867	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.7	0.6	0.1	2.0	342	0.7	0.1	0.3	0.3	0.1	0.9	148	0.3	0.06
		Compactor	1	Caterpillar 16M	297	10	5	4	867	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.7	0.6	0.1	2.0	342	0.7	0.1	0.3	0.3	0.1	0.9	148	0.3	0.06
		Bulldozer	1	Caterpillar D9T	410	10	5	4	867	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.9	0.8	0.2	2.7	472	1.0	0.2	0.4	0.4	0.1	1.2	204	0.4	0.08
		Hydraulic Excavator	2	Caterpillar 330D	268	10	5	3	650	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	1.2	1.1	0.2	3.6	616	1.3	0.2	0.4	0.4	0.1	1.2	200	0.4	0.08
		Backhoe	2	Caterpillar 420E	93	10	5	3	650	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.4	0.4	0.1	1.2	214	0.5	0.1	0.1	0.1	0.0	0.4	70	0.2	0.03
		Loader	1	Caterpillar 980H	351	10	5	3	650	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.8	0.7	0.2	2.3	404	0.9	0.2	0.3	0.2	0.1	0.8	131	0.3	0.05
		Tractor	1	John Deere 9630T	530	10	5	3	650	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	1.2	1.1	0.2	3.5	610	1.3	0.2	0.4	0.4	0.1	1.2	198	0.4	0.08
		Fueling Truck	1	2009 Ford 750	325	8	5	3	520	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.7	0.7	0.1	2.2	374	0.8	0.2	0.2	0.2	0.0	0.6	97	0.2	0.04
		Light Duty Truck	2	Generic Pick-up	265	10	5	3	650	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	0.4	0.3	5.8	3.7	572	11.4	0.3	0.1	0.1	1.9	1.2	186	3.7	0.08
	Demolition	Crane	1	Terex AC 160-2	516	8	5	4	693	0.002	0.002	0.031000	0.007	1.150	0.003	0.0005	1.1	1.1	16.0	3.4	593	1.3	0.2	0.4	0.4	5.5	1.2	206	0.4	0.08
		Welding/Cutting Equipment	4	Miller Big Blue 500	47	8	5	4	693	0.002	0.002	0.031000	0.007	1.150	0.003	0.0005	0.4	0.4	5.8	1.3	216	0.5	0.1	0.1	0.1	2.0	0.4	75	0.2	0.03
		Man Lift	4	JLG 400S - Diesel	50	8	5	4	693	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.4	0.4	0.1	1.3	230	0.5	0.1	0.2	0.1	0.0	0.5	80	0.2	0.03
		Forklift	3	Caterpillar TH 580B	100	8	5	4	693	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	0.7	0.6	0.1	2.0	345	0.8	0.1	0.2	0.2	0.0	0.7	119	0.3	0.05
		Heavy Duty Truck (Diesel)	4	2009 Ford 750	325	4	5	4	347	0.002	0.002	0.000441	0.007	1.150	0.003	0.0005	2.9	2.7	0.6	8.7	1495	3.3	0.6	0.5	0.5	0.1	1.5	259	0.6	0.10
		Light Duty Truck	5	Generic Pick-up	265	8	5	4	693	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	1.0	0.8	14.6	9.2	1431	28.6	0.6	0.3	0.3	5.1	3.2	496	9.9	0.22
		Light Duty Vehicles	5	Generic Vehicle	150	4	5	12	1040	0.001	0.001	0.011	0.007	1.080	0.022	0.0005	0.5	0.4	8.3	5.2	810	16.2	0.4	0.3	0.2	4.3	2.7	421	8.4	0.19
															Totals:		17	16	53	64	10658	73	4	**6**	**5**	**20**	**22**	**3,730**	**28**	**2**

Notes: No Control Technologies accounted for
AP-42 Section 3.3 was used for Efs
* AP - 42 Section 1.5 used for Efs

POWERTECH (USA) INC.

ER_RAI Table AQ1.1
Powertech (USA) Inc.
Dewey-Burdock Project

Vehicle Emission Factors and Concentrations at Source

	Activity	Concentrations at sources													
		PM_{10}	SO_x	NO_x	CO	CO_2	TOC	CH3CHO	PM_{10}	SO_x	NO_x	CO	CO2	TOC	CH3CHO
		mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	µg/m^3	ppm	ppb	ppm	ppm	mg/m^3	ppm
Construction Phase	Earthworks Construction	388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51
	Facilities Construction	388	361	5462	1177	202638	443	82	387654	201	3	1029	112716	443	45
		388	361	5462	1177	202638	443	82	387654	201	3	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51
	Well Field/Electric Construction 1	388	361	5462	1177	202638	443	82	387654	201	3	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	5462	1177	202638	443	82	387654	201	3	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51
	Drilling	388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		133	109	2025	1281	198836	3975	89	132741	60	1	1120	110601	3975	50
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51
	Well Field/Electric Construction 2	135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	5462	1177	202638	443	82	387654	201	3	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51

ER_RAI Table AQ1.1
Powertech (USA) Inc.
Dewey-Burdock Project

Vehicle Emission Factors and Concentrations at Source

	Activity	Concentrations at sources													
		PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO2	TOC	Aldehydes
		mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	$\mu g/m^3$	ppm	ppb	ppm	ppm	mg/m^3	ppm
Operations Phase - Well Field Construction/Production/Groundwater Restoration	Central Processing Plant	9	0	170	98	163780	13	N/A	9172	0	0.09	86	91101	13	N/A
		9	0	170	98	163780	13	N/A	9172	0	0.09	86	91101	13	N/A
		9	0	170	98	163780	13	N/A	9172	0	0.09	86	91101	13	N/A
		388	361	5462	1177	202638	443	N/A	387654	201	2.91	1029	112716	443	N/A
	Satellite Facility	9	0	170	98	163780	13	N/A	9172	0	0.09	86	91101	13	N/A
		11	0	212	123	204295	16	N/A	11440	0	0.11	107	113637	16	N/A
		388	361	5462	1177	202638	443	N/A	387654	201	2.91	1029	112716	443	N/A
	Office Building	9	0	170	98	163780	13	N/A	9172	0	0.09	86	91101	13	N/A
	Maintenance and Warehouse Building	9	0	170	98	163780	13	N/A	9172	0	0.09	86	91101	13	N/A
	Drilling*	388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		133	109	2025	1281	198836	3975	N/A	132741	60	1.08	1120	110601	3975	N/A
		388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		135	111	2062	1305	202437	4047	N/A	135146	62	1.10	1140	112604	4047	N/A
	CPP Operations	388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		411	383	5796	1249	215000	470	N/A	411304	213	3.08	1091	119592	470	N/A
		388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		135	111	2062	1305	202437	4047	N/A	135146	62	1.10	1140	112604	4047	N/A
		135	111	2062	1305	202437	4047	N/A	135146	62	1.10	1140	112604	4047	N/A
	SF/WF Operations	388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A
		135	111	2062	1305	202437	4047	N/A	135146	62	1.10	1140	112604	4047	N/A
		135	111	2062	1305	202437	4047	N/A	135146	62	1.10	1140	112604	4047	N/A
	Product Transport	388	361	78	1177	202638	443	N/A	387654	201	0.04	1029	112716	443	N/A

POWERTECH (USA) INC.

ER_RAI Table AQ1.1
Powertech (USA) Inc.
Dewey-Burdock Project

Vehicle Emission Factors and Concentrations at Source

	Activity	Concentrations at sources													
		PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO2	TOC	Aldehydes
		mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	µg/m³	ppm	ppb	ppm	ppm	mg/m³	ppm
Aquifer restoration	Restoration Operations	133	109	2025	1281	198836	3975	89	132741	60	1	1120	110601	3975	50
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51

	Activity	Concentrations at sources													
		PM_{10}	SO_x	NO_x	CO	CO_2	TOC	Aldehydes	PM_{10}	SO_x	NO_x	CO	CO2	TOC	Aldehydes
		mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	µg/m³	ppm	ppb	ppm	ppm	mg/m³	ppm
Decommissioning Phase	Earthwork	388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51
	Demolition	388	361	5462	1177	202638	443	82	387654	201	3	1029	112716	443	45
		411	383	5796	1249	215000	470	87	411304	213	3	1091	119592	470	48
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		388	361	78	1177	202638	443	82	387654	201	0	1029	112716	443	45
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51
		135	111	2062	1305	202437	4047	91	135146	62	1	1140	112604	4047	51

POWERTECH (USA) INC.

ER_RAI Table AQ3.1
Powertech (USA) Inc.
Dewey-Burdock Project

Annual Greenhouse Gas Emission Estimates

	Vehicles			Stationary			Electrical Consumption			All Sources			CO_2 equivalent emission (t/yr)[1]
	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	
	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)	(t/yr)
Construction Phase	24,076	7	3	1281	0.09	0.03	597	0.1	0.6	25,954	6.9	3.6	27,486
Operations Phase	26,396	17	6	1281	0.09	0.03	24,359	2.6	26.2	52,036	19.7	32.1	62,743
Restoration Phase	590	4	1	1281	0.09	0.03	7,369	0.8	7.9	9,240	4.8	9.2	12,254
Decommissioning Phase	3,730	3	1	1281	0.09	0.03	597	0.1	0.6	5,607	3.1	1.8	6,352

[1] CO_2e calculated based on 20-year warming potential. Global warming potentials and atmospheric lifetimes used to calculate CO_2 equivalent emissions:

	CO_2	CH_4	N_2O
Mean atmospheric Lifetime (years)	Variable[a]	12	114
20-year Warming Potential (relative to CO_2)	1	72	289
100-year Warming Potential (relative to CO_2)	1	25	298
500-year Warming Potential (relative to CO_2)	1	7.6	153

[a] Carbon dioxide is not well characterized by an atmospheric lifetime due to intensive biogeochemical cycling.

POWERTECH (USA) INC.

ER_RAI Table AQ3.2
Powertech (USA) Inc.
Dewey-Burdock Project

Annual Greenhouse Gas Emission Estimates from Mobile Sources

Phase	Activity	Emission Vehicle	Number of Vehicles	Size/Model	Horsepower Rating	Operating Hours (hr/d)	(d/wk)	(mo/yr)	(hrs/yr)	CO_2 (lb/hp-hr)	CH_4 (lb/hp-hr)	N_2O (lb/hp-hr)	CO_2 (lbs/hr)	CH_4 (lbs/hr)	N_2O (lbs/hr)	CO_2 (t/yr)	CH_4 (t/yr)	N_2O (t/yr)
Construction Phase	Earthworks Construction	Scraper	3.00	Caterpillar 631G	462	10	5	2	433	1.150	N/A	N/A	1594	0.05	0.05	345	0.01	0.01
		Bulldozer	1.00	Caterpillar D9T	410	10	5	2	433	1.150	N/A	N/A	472	0.05	0.05	102	0.01	0.01
		Compactor	1.00	Caterpillar 825H	315	10	5	2	433		N/A	N/A	0.0					
		Motor Grader	1.00	Caterpillar 16M	297	10	5	2	433	1.150	N/A	N/A	342	0.05	0.05	74	0.01	0.01
		Heavy Duty Water Truck (1,500 gal)	2.00	2009 Ford 750	325	8	5	6	1040	1.150	N/A	N/A	748	0.05	0.05	389	0.02	0.03
		Fueling Truck	1.00	2009 Ford 750	325	3	5	2	130	1.150	N/A	N/A	374	0.05	0.05	24	0.00	0.00
		Light Duty pickup	3.00	Generic Pick-up	265	4	5	2	173	1.080	N/A	N/A	859	0.60	0.74	74	0.05	0.06
	Facilities Construction	Crane	2.00	Terex AC 160-2	516	8	5	2	347	1.150	N/A	N/A	1187	0.05	0.05	206	0.01	0.01
		Welding Equipment	8.00	Miller Big Blue 500	47	8	5	6	1040	1.150	N/A	N/A	432	0.05	0.05	225	0.02	0.03
		Forklift	2.00	Caterpillar TH 580B	100	8	5	6	1040	1.150	N/A	N/A	230	0.05	0.05	119	0.02	0.03
		Man lift	4.00	JLG 400S - Diesel	50	8	5	6	1040	1.150	N/A	N/A	230	0.05	0.05	120	0.02	0.03
		Heavy Duty Diesel Truck	2.00	2009 Ford 750	325	8	5	6	1040	1.150	N/A	N/A	747.5	0.05	0.05	389	0.02	0.03
		Light Duty Truck	10.00	Generic Pick-up	265	4	5	6	520	1.080	N/A	N/A	2862	2.26	0.74	744	0.59	0.19
	Well Field/Electric Construction 1	HDPE Fusion Equipment	2.00	McElroy Tracstar 900	83	8	5	6	1040	1.150	N/A	N/A	191	0.05	0.05	99	0.02	0.03
		Trackhoe	1.00	Caterpillar 330D	268	8	5	6	1040	1.150	N/A	N/A	308	0.05	0.05	160	0.02	0.03
		Backhoe	1.00	Caterpillar 420E	93	8	5	6	1040	1.150	N/A	N/A	107	0.05	0.05	56	0.02	0.03
		Welding Equipment	1.00	Miller Big Blue 500	47	4	5	6	520	1.150	N/A	N/A	54	0.05	0.05	14	0.01	0.01
		Electrical Pole Truck	2.00	2009 Ford 750	325	8	5	4	693	1.150	N/A	N/A	748	0.05	0.05	259	0.02	0.02
		Motor Grader	1.00	Caterpillar 16M	297	8	5	2	347	1.150	N/A	N/A	342	0.05	0.05	59	0.01	0.01
		Forklift	1.00	Caterpillar TH 580B	100	8	5	6	1040	1.150	N/A	N/A	115	0.05	0.05	60	0.02	0.03
		Light Duty Truck	6.00	Generic Pick-up	265	8	5	6	1040	1.080	N/A	N/A	1717	2.26	0.74	893	1.18	0.38
	Drilling*	Truck Mount Rotary Drill Rig, Diesel Truck	13.00	Gefco Speedstar 30K	550	10	5	12	2600	1.150	N/A	N/A	8223	0.05	0.05	10689	0.1	0.07
		Heavy Duty Water Truck (1,500 gal)	13.00	2009 Ford 750	325	4	5	12	1040	1.150	N/A	N/A	4859	2.26	0.74	2527	1.2	0.38
		Backhoe	1.00	Caterpillar 420E	93	8	5	12	2080	1.150	N/A	N/A	107	0.05	0.05	111	0.05	0.06
		Forklift	2.00	Caterpillar TH 580B	100	8	5	12	2080	1.150	N/A	N/A	230	0.05	0.05	239	0.05	0.06
		Cementer (gas)	4.00	Deutz Engine	90	8	5	12	2080	1.080	N/A	N/A	389	0.05	0.05	404	0.05	0.06
		Logging Truck	4.00	2008 Ford F450	325	8	5	12	2080	1.150	N/A	N/A	1495	0.05	0.05	1555	0.05	0.06
		Light Duty Truck	15.00	Generic Pick-up	265	2	5	12	520	1.080	N/A	N/A	4293	2.26	0.74	1116	0.59	0.19
	Well Field/Electric Construction 2	HDPE Fusion Equipment - Gas Engine	2.00	McElroy Tracstar 900	83	8	5	12	2080	1.150	N/A	N/A	191	0.05	0.05	199	0.05	0.06
		Hydraulic Excavator	1.00	Caterpillar 330D	268	8	5	12	2080	1.150	N/A	N/A	308	0.05	0.05	321	0.05	0.06
		Backhoe	1.00	Caterpillar 420E	93	8	5	12	2080	1.150	N/A	N/A	107	0.05	0.05	111	0.05	0.06
		Welding Equipment	1.00	Miller Big Blue 500	47	4	5	12	1040	1.150	N/A	N/A	54	0.05	0.05	28	0.02	0.03
		Electrical Pole Truck	2.00	2009 Ford 750	325	8	5	6	1040	1.150	N/A	N/A	748	0.05	0.05	389	0.02	0.03
		Motor Grader	1.00	Caterpillar 16M	297	8	1	12	416	1.150	N/A	N/A	342	0.05	0.05	71	0.01	0.01
		Forklift	1.00	Caterpillar TH 580B	100	8	5	12	2080	1.150	N/A	N/A	115	0.05	0.05	119	0.05	0.06
		Light Duty Truck	6.00	Generic Pick-up	265	8	5	12	2080	1.080	N/A	N/A	1717	2.26	0.74	1786	2.35	0.77
													Totals (t/yr)			24,076	7	3

Notes: No control technologies accounted for
AP-42 Section 3.3 was used for emissions factors
* AP-42 Section 1.5 was used for emissions factors

Powertech (USA) Inc.

ER_RAI Table AQ3.2
Powertech (USA) Inc.
Dewey-Burdock Project

Annual Greenhouse Gas Emission Estimates from Mobile Sources

Phase	Activity	Emission Vehicle	Number of Vehicles	Size/Model	Horsepower Rating	Operating Hours (hr/d)	Operating Hours (d/wk)	Operating Hours (mo/yr)	Operating Hours (hrs/yr)	CO_2 (lb/hp-hr)	CH_4 (lb/hp-hr)	N_2O (lb/hp-hr)	CO_2 (lbs/hr)	CH_4 (lbs/hr)	N_2O (lbs/hr)	CO_2 (t/yr)	CH_4 (t/yr)	N_2O (t/yr)
Operations Phase - Well Field Construction/Production/Groundwater Restoration	Central Processing Plant	Propane heating**	1	-	18 gal/hr	24	7	6	4368	12500	1.000	1.000	221	0.02	0.02	483	0.04	N/A
		Thermal Fluid Heater - propane**	2	-	16 gal/hr	24	7	12	8736	12500	1.000	1.000	408	0.03	0.03	1780	0.14	N/A
		Emergency Backup Generator - propane**	1	-	12 gal/hr	0.25	1	12	13	12500	1.000	1.000	155	0.01	0.01	1.0	8.0E-05	N/A
		Fire Suppression System - Diesel pump	1	-	100	0.25	1	12	13	1.150	N/A	N/A	115	0.046	0.0540	0.7	0.000	0.00
	Satellite Facility	Propane heating**	1	-	4 gal/hr	24	7	6	4368	12500	1.000	1.000	47	0.00	0.02	102	0.01	N/A
		Emergency Backup Generator - propane**	1	-	6 gal/hr	0.25	1	12	13	12500	1.000	1.000	77	0.01	0.02	0.5	4.0E-05	N/A
		Fire Suppression System - Diesel pump	1	-	100	0.25	1	12	13	1.150	N/A	N/A	115	0.046	0.0540	0.7	3.0E-04	0.00
	Office Building	Propane heating**	1	-	1 gal/hr	24	7	6	4368	12500	1.000	1.000	14	0.01	0.02	31	0.013	N/A
	Maintenance and Warehouse Building	Propane heating**	1	-	3 gal/hr	24	7	6	4368	12500	1.000	1.000	33	0.01	0.02	72	0.01	N/A
	Drilling*	Truck Mount Rotary Drill Rig, Diesel Truck	13	Gefco Speedstar 30K	550	10	5	12	2600	1.150	N/A	N/A	8223	0.046	0.0540	10689	0.1	0.07
		Heavy Duty Water Truck (1,500 gal)	13	2009 Ford 750	325	4	5	12	1040	1.150	N/A	N/A	4859	0.046	0.0540	2527	0.0	0.03
		Backhoe	1	Caterpillar 420E	93	8	5	12	2080	1.150	N/A	N/A	107	0.046	0.0540	111	0.0	0.06
		Forklift	2	Caterpillar TH 580B	100	8	5	12	2080	1.150	N/A	N/A	230	0.046	0.0540	239	0.0	0.06
		Cementer (gas)	4	Deutz Engine	90	8	5	12	2080	1.080	N/A	N/A	389	0.046	0.0540	404	0.0	0.06
		Logging Truck	4	2009 Ford F450	325	8	5	12	2080	1.150	N/A	N/A	1495	0.046	0.0540	1555	0.0	0.06
		Light Duty Truck	15	Generic Pick-up	265	2	5	12	520	1.080	N/A	N/A	4293	2.260	0.7400	1116	0.6	0.19
	CPP Operations	Man Lift	1	JLG 400S - Diesel	50	4	1	12	208	1.150	N/A	N/A	58	0.046	0.0540	6	0.00	0.01
		Welding Equipment	1	Miller Big Blue 500	47	4	3	12	624	1.150	N/A	N/A	54	0.046	0.0540	17	0.01	0.02
		Forklift (warehouse)	1	Clark C80 (LPG)	93	4	5	12	1040	1.150	1.000	1.000	107	0.01	0.02	56	0.00	0.01
		Forklift (packaging)	1	Clark 20sC (LPG)	39	3	7	12	1092	1.150	1.000	1.000	45	0.01	0.02	24	0.00	0.01
		Light Duty Truck	8	Generic Pick-up	265	6	5	12	1560	1.080	N/A	N/A	2290	2.260	0.7400	1786	1.8	0.58
		Light Duty Vehicles	4	Generic Vehicle	150	6	7	12	2184	1.080	N/A	N/A	648	2.260	0.7400	708	2.5	0.81
	SF/WF Operations	Resin Hauling Semi - Truck	1	2000 Western Star 4964FX	430	4	5	12	1040	1.150	N/A	N/A	495	0.046	0.0540	257	0.0	0.03
		Pump pulling truck	4	Smeal 5T	325	6	5	12	1560	1.150	N/A	N/A	1495	0.046	0.0540	1166	0.0	0.04
		Motor Grader	1	Caterpillar 16M	297	8	1	12	416	1.150	N/A	N/A	342	0.046	0.0540	71	0.01	0.01
		Logging Truck	1	2009 Ford F450	325	8	5	12	2080	1.150	N/A	N/A	374	0.046	0.0540	389	0.05	0.06
		Light Duty Truck	2	Generic Pick-up	265	24	7	12	8736	1.080	N/A	N/A	572	2.260	0.7400	2500	9.9	3.23
		Light Duty Vehicles	2	Generic Vehicle	150	6	5	12	1560	1.080	N/A	N/A	324	2.260	0.7400	253	1.8	0.58
	Product Transport	Diesel Semi with Trailer to transport product	1	2000 Western Star 4964FX	430	8	0.5	12	208	1.150	N/A	N/A	495	0.046	0.0540	51	0.0	0.01
													Totals (t/yr)			26,396	17	6

Notes: No control technologies accounted for
AP-42 Section 3.3 was used for emissions factors
* AP-42 Section 1.5 was used for emissions factors
** Emissions Factors are in Units of lb/10^3 gal consumed

ER_RAI Table AQ3.2
Powertech (USA) Inc.
Dewey-Burdock Project

Annual Greenhouse Gas Emission Estimates from Mobile Sources

Phase	Activity	Emission Vehicle	Number of Vehicles	Size/Model	Horsepower Rating	Operating Hours (hr/d)	Operating Hours (d/wk)	Operating Hours (mo/yr)	Operating Hours (hrs/yr)	CO_2 (lb/hp-hr)	CH_4 (lb/hp-hr)	N_2O (lb/hp-hr)	CO_2 (lbs/hr)	CH_4 (lbs/hr)	N_2O (lbs/hr)	CO_2 (t/yr)	CH_4 (t/yr)	N_2O (t/yr)
Aquifer restoration	Restoration Operations	Cementer (gas)	1	Deutz Engine	90	8	5	2	347	1.080	N/A	N/A	97	2.260	0.7400	17	0.39	0.13
		Light Duty Truck	2	Generic Pick-up	265	6	5	12	1560	1.080	N/A	N/A	572	2.260	0.7400	446	1.8	0.58
		Light Duty Vehicles	1	Generic Vehicle	150	6	5	12	1560	1.080	N/A	N/A	162	2.260	0.7400	126	1.8	0.58
													Totals (t/yr)			590	4	1

Phase	Activity	Emission Vehicle	Number of Vehicles	Size/Model	Horsepower Rating	Operating Hours (hr/d)	Operating Hours (d/wk)	Operating Hours (mo/yr)	Operating Hours (hrs/yr)	CO_2 (lb/hp-hr)	CH_4 (lb/hp-hr)	N_2O (lb/hp-hr)	CO_2 (lbs/hr)	CH_4 (lbs/hr)	N_2O (lbs/hr)	CO_2 (t/yr)	CH_4 (t/yr)	N_2O (t/yr)
Decommissioning Phase	Earthwork	Scraper	3	Caterpillar 631G	462	10	5	4	867	1.150			1593.9	0.046	0.0540	691	0.02	0.02
		Motor Grader	1	Caterpillar 16M	297	10	5	4	867	1.150			341.55	0.046	0.0540	148	0.02	0.02
		Compactor	1	Caterpillar 16M	297	10	5	4	867	1.150			341.55	0.046	0.0540	148	0.02	0.02
		Bulldozer	1	Caterpillar D9T	410	10	5	4	867	1.150			471.5	0.046	0.0540	204	0.02	0.02
		Hydraulic Excavator	2	Caterpillar 330D	268	10	5	3	650	1.150			616.4	0.046	0.0540	200	0.01	0.02
		Backhoe	2	Caterpillar 420E	93	10	5	3	650	1.150			213.9	0.046	0.0540	70	0.01	0.02
		Loader	1	Caterpillar 980H	351	10	5	3	650	1.150			403.65	0.046	0.0540	131	0.01	0.02
		Tractor	1	John Deere 9630T	530	10	5	3	650	1.150			609.5	0.046	0.0540	198	0.01	0.02
		Fueling Truck	1	2009 Ford 750	325	8	5	3	520	1.150			373.75	0.046	0.0540	97	0.01	0.01
		Light Duty Truck	2	Generic Pick-up	265	10	5	3	650	1.080			572.4	2.260	0.7400	186	0.73	0.24
	Demolition	Crane	1	Terex AC 160-2	516	8	5	4	693	1.150			593.4	0.046	0.0540	206	0.02	0.02
		Welding/Cutting Equipment	4	Miller Big Blue 500	47	8	5	4	693	1.150			216.2	0.046	0.0540	75	0.02	0.02
		Man Lift	4	JLG 400S - Diesel	50	8	5	4	693	1.150			230	0.046	0.0540	80	0.02	0.02
		Forklift	3	Caterpillar TH 580B	100	8	5	4	693	1.150			344.655	0.046	0.0540	119	0.02	0.02
		Heavy Duty Truck (Diesel)	4	2009 Ford 750	325	4	5	4	347	1.150			1495	0.046	0.0540	259	0.01	0.01
		Light Duty Truck	5	Generic Pick-up	265	8	5	4	693	1.080			1431	2.260	0.7400	496	0.78	0.26
		Light Duty Vehicles	5	Generic Vehicle	150	4	5	12	1040	1.080			810	2.260	0.7400	421	1.18	0.38
													Totals (t/yr)			3,730	3	1

Notes: No control technologies accounted for
AP-42 Section 3.3 was used for emissions factors

POWERTECH (USA) INC.

ER_RAI Table AQ3.3
Powertech (USA) Inc.
Dewey-Burdock Project

Annual Greenhouse Gas Emission Estimates from Stationary Sources

	Item	No.	Fuel	Capacity	Capacity units	Efficiency	Heat Input	Propane for operation @ capacity	Load factor (percent of time operating during operating hours) (JMMO est.)	Operating Hours				Annual Propane		CO_2 emissons		N_2O*		CH_4**	
						%	kBtu/h	gal/h		(hr/d)	(d/wk)	(mo/yr)	h/y	gal/y	lb/yr	lb/yr	t/yr	lb/yr	t/yr	lb/yr	t/yr
1	CPP building space heaters	1	Propane	2277	kBtu/h	70%	3253	35	50%	24	7	6	4368	77220	11503	965250	483	69.5	0.035	19.3	0.010
2	SF building space heaters	1	Propane	480	kBtu/h	70%	686	7	50%	24	7	6	4368	16278	2425	203478	102	14.7	0.007	4.1	0.002
3	Office bldg space heaters	1	Propane	180	kBtu/h	70%	257	3	40%	24	7	6	4368	4883	727	61043	31	4.4	0.002	1.2	0.001
4	Maintenance bldg space heaters	1	Propane	342	kBtu/h	70%	489	5	50%	24	7	6	4368	11598	1728	144978	72	10.4	0.005	2.9	0.001
5	Fulton FT-C-0160 Thermal fluid Heater	2	Propane	1600	kBtu/h	80%	2000	22	75%	16	7	12	5824	94957	14145	1186957	593	85.5	0.043	23.7	0.012
6	CPP Emergency Backup Gen.	1	Propane	200	kW	60%	1137	12		weekly testing											
7	SF Emergency Backup Gen.	1	Propane	100	kW	60%	569	6		weekly testing											
8	Fire Pump hp	2	Diesel	100	hp	60%	255	3		weekly testing											
																Total	1281		0.09		0.03

Notes:

*Based on 0.9 lb N_2O/1000gal

**Based on 0.25 lb CH_4/1000 gal

Powertech (USA) Inc.

ER_RAI Table AQ3.4
Powertech (USA) Inc.
Dewey-Burdock Project

Annual Greenhouse Gas Emission Estimates from Electrical Consumption

	GPM	PSI	Eff.	HP	kW	Total Units	Daily Hours	Days	Annual MW/hr	Maximum MW	Average MW	Central Plant	Satellite Plant
Wellfield													
Production Well Pumps	20			10	7	270	24	365	17520	2.00	2.00	2.00	2.00
Wellhead heaters					1	270	24	183	591	0.14	0.07	0.14	0.14
Header House Heating					5	14	24	183	296	0.07	0.03	0.07	0.07
Header House Instrumentation					1	14	24	365	118	0.01	0.01	0.01	0.01
Contingency of 25%									4631	0.55	0.53	0.55	0.55
Total					*23157*								
Satellite Plant (500 tons/year IX)*													
Injection and Production Boosters	900	50	1	44	32	6	24	365	1705	0.19	0.19		0.19
Resin Transfer Pumps	200	50	1	10	7	2	6	365	32	0.01	Z		0.01
Waste Water Booster	200	150	1	29	22	1	6	365	47	0.02	0.01		0.02
Sump Pumps	100	25	0.3	5	4	2	6	365	16	0.01	Z		0.01
Lighting Satellite Plant					1	20	24	365	88	0.01	0.01		0.01
HVACSatellite Plant					10	1	24	365	88	0.01	0.01		0.01
Instrumentation Satellite Plant					2	1	24	365	18	Z	Z		Z
Ventilation Satellite Plant				5	4	4	24	365	130	0.01	0.01		0.01
Total					*2122*								
Central Plant with IX (1,000 lbs./year yellowcake 500 lbs./year IX)													
Injection and Production Boosters	900	50	1	44	32	6	24	365	1705	0.19	0.19	0.19	
Resin Transfer Pumps	200	50	1	10	7	2	4	365	21	0.01	Z	0.01	
Brine Tranfer Pump	150	50	1	7	5	2	12	365	47	0.01	0.01	0.01	
Soda Ash Transfer Pump	150	50	1	7	5	2	12	365	47	0.01	0.01	0.01	
Electric Water Heater					100	1	12	365	438	0.10	0.05	0.10	
Resin Shaker				25	19	2	4	365	54	0.04	0.01	0.04	
Elution Transfer Pumps	150	50	1	7	5	2	12	365	47	0.01	0.01	0.01	
Process Water Pump	150	50	1	7	5	1	12	365	24	0.01	Z	0.01	
Ventilation Fans				5	4	8	24	365	260	0.03	0.03	0.03	
Thickener Rake Drive				15	11	2	24	365	195	0.02	0.02	0.02	
Precipitation Agitator Drive				20	15	2	24	365	260	0.03	0.03	0.03	
Thickener Underflow Pump	75	50	1	4	3	1	12	365	12	Z	Z	Z	
Thickener Supernate Pump	75	50	1	4	3	1	12	365	12	Z	Z	Z	
Waste Water Booster	200	150	1	29	22	1	24	365	189	0.02	0.02	0.02	
RO Feed Pump	400	200	1	78	58	1	24	365	505	0.06	0.06	0.06	
Permeate Injection Pump	200	150	1	29	22	1	24	365	189	0.02	0.02	0.02	
Dryer Feed Pump (Filter Press solids)			50	37		2	4	365	108	0.07	0.01	0.07	
Rotary Vacuum Dryer Drive				50	37	2	24	365	649	0.07	0.07	0.07	
Vacuum Pump				15	11	2	24	365	195	0.02	0.02	0.02	
Cooling Tower Circulation Pumps	300	50	1	15	11	2	24	365	189	0.02	0.02	0.02	
Hot Oil Circulation Pumps	300	50	1	15	11	2	24	365	189	0.02	0.02	0.02	
Deep Disposal Well Pump	400	400	0.3	311	231	1	24	365	2021	0.23	0.23	0.23	
Land Application Feed Pump	400	150	1	58	43	1	24	183	189	0.04	0.02	0.04	
Sump Pumps	100	50	1	5	4	4	6	365	32	0.01	Z	0.01	
Air Compressor				20	15	1	6	365	32	0.01	Z	0.01	
Lighting Central Plant					1	60	24	365	263	0.03	0.03	0.03	
HVAC Central Plant					20	1	24	365	175	0.02	0.02	0.02	
Instrumentation Central Plant					5	1	24	365	44	0.01	0.01	0.01	
Ventilation Central Plant				5	4	15	24	365	487	0.06	0.06	0.06	
Total					*8579*								

POWERTECH (USA) INC.

ER_RAI Table AQ3.4
Powertech (USA) Inc.
Dewey-Burdock Project

Annual Greenhouse Gas Emission Estimates from Electrical Consumption

	GPM	PSI	Eff.	HP	kW	Total Units	Daily Hours	Days	Annual MW/hr	Maximum MW	Average MW	Central Plant	Satellite Plant
Restoration Operations													
Production Well Pumps	20			10	14	50	24	365	5913	0.68	0.68	0.68	
Wellhead heaters					1	50	24	183	110	0.03	0.01	0.03	
Header House Heating					5	3	24	183	55	0.01	0.01	0.01	
Header House Instrumentation					1	3	24	365	22	Z	Z	Z	
Reverse Osmosis Feed Pump	200	1	195	144		1	12	365	632	0.14	0.07	0.14	
Permeate Injection Pump	600	150	1	88	65	1	12	365	284	0.06	0.03	0.06	
Groundwater Sweep Injeciton Pump	400	150	1	58	43	1	12	365	189	0.04	0.02	0.04	0.68
Total					*7204*								0.03
Site Office													Z
Lighting					0.2	100	16	365	117	0.02	0.01	0.02	
HVAC					10	1	24	365	88	0.01	0.01	0.01	0.14
Water System					3	1	24	365	26	Z	Z	Z	0.06
IT Use					3	1	16	365	18	Z	Z	Z	0.04
Total									*248*				
Maintenance Building													
Lighting					0.2	50	16	365	58	0.01	0.01	0.01	
HVAC					10	1	24	365	88	0.01	0.01	0.01	
Air Compressor					10	1	6	365	22	0.01	Z	0.01	
Misc					10	1	24	365	88	0.01	0.01	0.01	
Total					*256*								
External Lighting					1	20	12	365	88	0.02	0.01	0.02	
Potable Water System					10	1	12	365	44	0.01	0.01	0.01	

Note: Z - value equals zero

Power Consumption Totals by Phase		Annual MW/hr
Intial Construction Phase		635
Operations Phase		25,914
Restorations Phase		7,839
Decommissioning Phase		635

		Annual emissions		
Greenhouse Gas Emissions Totals by Phase		CO_2	CH_4	N_2O
Intial Construction Phase		597	0.1	0.6
Operations Phase		24,359	2.6	26.2
Restorations Phase		7,369	0.8	7.9
Decommissioning Phase		597	0.1	0.6

POWERTECH (USA) INC.

ER_RAI Table AQ8.1
Powertech (USA) Inc.
Dewey-Burdock Project

AERMOD Results with National Ambient Air Quality Standards - Construction

			SOx				NOx			CO				PM10	TOC		Aldehydes			
			Maximum 24-hour Mean(1)		Annual Mean		Percentile 1-hour Means Below 100 ppb(2)	Annual Mean		Maximum 8-hour Mean(1)		Maximum 1-hr Mean(1)		Maximum 24-hour mean(3)	Maximum 1-hour Mean	Annual Mean	Maximum 1-hour Mean		Annual Mean	Annual Mean
Receptor	X	Y	µg/m³	ppm	µg/m³	ppm		µg/m³	ppb	µg/m³	ppm	µg/m³	ppm	µg/m³	µg/m³	µg/m³	µg/m³	ppb	µg/m³	ppm
CPP	305954	132461	24.4	9.82E-03	2.7E-01	1.1E-04	99.9	0.679	2.0E-01	219.2	3.9E-02	1754	0.309	24.4	2338	1.36	133.3	36.9	7.7E-02	2.1E-02
SF-NE	301977	137001	0.2	6.82E-05	1.0E-02	4.1E-06	100.0	0.026	7.4E-03	2.0	3.5E-04	14	0.002	0.2	19	0.05	1.1	0.3	2.9E-03	8.1E-04
SF-E	303164	135946	39.5	1.59E-02	4.3E-01	1.7E-04	99.9	1.075	3.1E-01	342.7	6.0E-02	2741	0.483	39.5	3655	2.15	208.3	57.6	1.2E-01	3.4E-02
SF-SE	303165	133718	0.1	4.46E-05	4.1E-03	1.7E-06	100.0	0.010	3.0E-03	0.8	1.4E-04	5	9.0E-04	0.11	7	0.02	0.4	0.1	1.2E-03	3.2E-04
SF-S	300888	132123	13.4	5.42E-03	1.5E-01	6.0E-05	99.9	0.371	1.1E-01	121.9	2.1E-02	975	0.172	13.4	1301	0.74	74.1	20.5	4.2E-02	1.2E-02
SF-SW	299901	134989	0.2	6.55E-05	8.5E-03	3.4E-06	100.0	0.021	6.1E-03	1.9	3.4E-04	13	0.002	0.2	18	0.04	1.0	0.3	2.4E-03	6.7E-04
SF-W	299929	136031	30.1	1.21E-02	3.3E-01	1.3E-04	99.9	0.824	2.4E-01	277.9	4.9E-02	2223	0.392	30.1	2964	1.65	168.9	46.7	9.4E-02	2.6E-02
SF-NW	300736	136229	27.2	1.10E-02	3.0E-01	1.2E-04	99.9	0.744	2.2E-01	239.9	4.2E-02	1919	0.338	27.2	2558	1.49	145.8	40.3	8.5E-02	2.3E-02
SF-N	300976	137027	0.2	7.38E-05	1.0E-02	4.0E-06	100.0	0.025	7.2E-03	2.1	3.6E-04	15	0.003	0.2	20	0.05	1.2	0.3	2.8E-03	7.9E-04
CPP-N	306025	135298	0.3	1.12E-04	1.8E-02	7.1E-06	100.0	0.044	1.3E-02	2.8	5.0E-04	23	0.004	0.3	30	0.09	1.7	0.5	5.0E-03	1.4E-03
CPP-NE	307208	133654	0.4	1.75E-04	7.6E-03	3.1E-06	100.0	0.019	5.5E-03	3.7	6.4E-04	29	0.005	0.4	39	0.04	2.2	0.6	2.2E-03	6.0E-04
CPP-E	308788	132390	34.3	1.38E-02	3.8E-01	1.5E-04	99.9	0.942	2.7E-01	291.7	5.1E-02	2334	0.411	34.3	3111	1.88	177.3	49.1	1.1E-01	3.0E-02
CPP-SE	307946	130366	0.2	6.39E-05	2.3E-03	9.2E-07	100.0	0.006	1.6E-03	1.7	2.9E-04	10	0.002	0.2	13	0.01	0.8	0.2	6.5E-04	1.8E-04
CPP-S	305899	129580	0.6	2.33E-04	1.1E-02	4.2E-06	100.0	0.026	7.6E-03	4.9	8.6E-04	39	0.007	0.6	52	0.05	3.0	0.8	3.0E-03	8.3E-04
CPP-SW	303824	130435	0.5	1.89E-04	8.7E-03	3.5E-06	100.0	0.022	6.3E-03	4.0	7.0E-04	32	0.006	0.5	42	0.04	2.4	0.7	2.5E-03	6.8E-04
CPP-W	303879	132505	19.3	7.78E-03	2.1E-01	8.6E-05	99.9	0.531	1.5E-01	177.3	3.1E-02	1419	0.250	19.3	1892	1.06	107.8	29.8	6.1E-02	1.7E-02
CPP-NW	303580	134939	0.1	4.77E-05	6.5E-03	2.6E-06	100.0	0.016	4.7E-03	0.9	1.5E-04	6	0.001	0.12	8	0.03	0.5	0.1	1.9E-03	5.1E-04
B.C. Ranch	299312	136270	22.5	9.08E-03	2.5E-01	1.0E-04	99.9	0.618	1.8E-01	198.5	3.5E-02	1588	0.280	22.5	2117	1.24	120.7	33.4	7.0E-02	1.9E-02
Burdock School	303704	130499	0.4	1.49E-04	6.2E-03	2.5E-06	100.0	0.016	4.5E-03	3.1	5.5E-04	25	0.004	0.4	33	0.03	1.9	0.5	1.8E-03	4.9E-04
Daniels Ranch	308083	132484	29.5	1.19E-02	4.5E-01	1.8E-04	99.8	1.126	3.3E-01	254.8	4.5E-02	2038	0.359	29.5	2718	2.25	154.9	42.9	1.3E-01	3.6E-02
LA-2	306091	133708	0.1	4.81E-05	4.0E-03	1.6E-06	100.0	0.010	2.9E-03	1.1	2.0E-04	7	1.3E-03	0.12	9	0.02	0.5	0.1	1.1E-03	3.2E-04
SF	300949	136005	32.8	1.32E-02	3.6E-01	1.4E-04	99.9	0.896	2.6E-01	298.0	5.2E-02	2384	0.420	32.8	3179	1.79	181.2	50.1	1.0E-01	2.8E-02
Heck Ranch	307686	126075	0.3	1.27E-04	7.3E-03	3.0E-06	100.0	0.018	5.3E-03	2.7	4.7E-04	21	0.004	0.3	28	0.04	1.6	0.4	2.1E-03	5.8E-04
MINING UNIT 5	307788	131905	8.6	3.45E-03	1.2E-01	4.9E-05	99.9	0.306	8.9E-02	63.4	1.1E-02	507	0.089	8.6	677	0.61	38.6	10.7	3.5E-02	9.7E-03
SF-NNE	301387	137016	0.2	7.14E-05	1.0E-02	4.1E-06	100.0	0.025	7.3E-03	2.0	3.6E-04	15	0.003	0.2	20	0.05	1.1	0.3	2.9E-03	7.9E-04
SF-ENE	302768	136702	2.9	1.16E-03	4.1E-02	1.6E-05	100.0	0.102	2.9E-02	24.5	4.3E-03	196	0.035	2.9	262	0.20	14.9	4.1	1.2E-02	3.2E-03
SF-ESE	303140	135057	0.1	5.19E-05	8.6E-03	3.5E-06	100.0	0.022	6.3E-03	1.5	2.7E-04	11	0.002	0.13	14	0.04	0.8	0.2	2.5E-03	6.8E-04
SF-SSE	302260	132693	11.6	4.69E-03	1.3E-01	5.1E-05	99.9	0.319	9.2E-02	95.2	1.7E-02	761	0.134	11.6	1015	0.64	57.9	16.0	3.6E-02	1.0E-02
SF-SSW	299980	133764	0.1	4.73E-05	4.5E-03	1.8E-06	100.0	0.011	3.2E-03	0.9	1.7E-04	7	1.2E-03	0.12	9	0.02	0.5	0.1	1.3E-03	3.5E-04
SF-WSW	299918	135608	12.3	4.98E-03	1.4E-01	5.5E-05	99.9	0.341	9.9E-02	89.4	1.6E-02	715	0.126	12.3	954	0.68	54.4	15.0	3.9E-02	1.1E-02
SF-WNW	300567	136174	29.2	1.18E-02	3.2E-01	1.3E-04	99.9	0.798	2.3E-01	262.5	4.6E-02	2100	0.370	29.2	2800	1.60	159.6	44.2	9.1E-02	2.5E-02
SF-NNW	300745	136536	9.6	3.86E-03	1.1E-01	4.3E-05	100.0	0.269	7.8E-02	71.3	1.3E-02	570	0.100	9.6	760	0.54	43.3	12.0	3.1E-02	8.5E-03
CPP-NNW	304850	135327	0.8	3.34E-04	2.2E-02	9.1E-06	99.9	0.056	1.6E-02	7.9	1.4E-03	63	0.011	0.8	84	0.11	4.8	1.3	6.4E-03	1.8E-03
CPP-NNE	307200	135268	0.3	1.03E-04	1.5E-02	6.1E-06	100.0	0.038	1.1E-02	1.7	3.0E-04	8	1.4E-03	0.3	11	0.08	0.6	0.2	4.3E-03	1.2E-03
CPP-ENE	308810	133561	59.3	2.39E-02	1.5E+00	6.2E-04	99.5	3.849	1.1E+00	418.8	7.4E-02	3286	0.579	59.3	4381	7.70	249.7	69.1	4.4E-01	1.2E-01
CPP-ESE	308766	131213	0.2	9.38E-05	5.2E-03	2.1E-06	100.0	0.013	3.7E-03	2.0	3.5E-04	12	0.002	0.2	16	0.03	0.9	0.3	1.5E-03	4.1E-04
CPP-SSE	306915	129965	0.2	7.43E-05	2.9E-03	1.2E-06	99.9	0.007	2.1E-03	1.6	2.7E-04	12	0.002	0.2	17	0.01	0.9	0.3	8.3E-04	2.3E-04
CPP-SSW	304685	129603	45.0	1.81E-02	1.1E+00	4.5E-04	99.6	2.776	8.0E-01	368.7	6.5E-02	2581	0.455	45.0	3441	5.55	196.2	54.3	3.2E-01	8.8E-02
CPP-WSW	304688	131973	10.9	4.39E-03	1.2E-01	4.9E-05	99.9	0.302	8.7E-02	81.5	1.4E-02	652	0.115	10.9	870	0.60	49.6	13.7	3.4E-02	9.5E-03
CPP-WNW	303897	133365	0.1	5.49E-05	7.5E-03	3.0E-06	100.0	0.019	5.4E-03	1.6	2.8E-04	11	0.002	0.1	15	0.04	0.9	0.2	2.1E-03	5.9E-04
Puttman Ranch	300790	139692	0.1	3.47E-05	1.0E-03	4.1E-07	100.0	0.003	7.4E-04	0.7	1.3E-04	4	7.6E-04	0.09	6	0.01	0.3	0.1	2.9E-04	8.0E-05
Background	300698	129462	0.1	2.56E-05	1.2E-03	4.8E-07	100.0	0.003	8.6E-04	0.4	7.3E-05	2	4.3E-04	0.06	3	0.01	0.2	0.1	3.4E-04	9.4E-05
Englebert Ranch	306258	127626	0.1	5.27E-05	1.1E-03	4.4E-07	100.0	0.003	7.8E-04	1.5	2.6E-04	9	1.5E-03	0.13	12	0.01	0.7	0.2	3.1E-04	8.6E-05
LA-1	300328	135918	29.2	1.18E-02	3.2E-01	1.3E-04	99.9	0.798	2.3E-01	264.1	4.7E-02	2113	0.372	29.2	2817	1.60	160.6	44.4	9.1E-02	2.5E-02
Edgemont	316985	113870	0.4	1.70E-04	1.2E-02	4.7E-06	100.0	0.029	8.4E-03	4.8	8.4E-04	38	0.007	0.4	51	0.06	2.9	0.8	3.3E-03	9.1E-04
Spencer Ranch	303953	133671	0.1	3.79E-05	4.2E-03	1.7E-06	100.0	0.010	3.0E-03	0.7	1.3E-04	5	9.2E-04	0.09	7	0.02	0.4	0.1	1.2E-03	3.3E-04
MINING UNIT 2	302093	135944	35.3	1.42E-02	3.8E-01	1.6E-04	99.9	0.962	2.8E-01	312.3	5.5E-02	2498	0.440	35.3	3331	1.92	189.9	52.5	1.1E-01	3.0E-02
National Ambient Air Quality Standards				0.14		0.03	98th		53		35		9	150						

Notes:
(1) Not to be exceeded more than once per year
(2) To attain this standard the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor must not exceed 0.100 ppm (effective January 22, 2010)
(3) Not to be exeeced more than once per year on average over 3 years

ER_RAI Table AQ8.2
Powertech (USA) Inc.
Dewey-Burdock Project

AERMOD Results with National Ambient Air Quality Standards - Operations

			SOx				NOx			CO				PM_{10}	TOC		Aldehydes			
			Maximum 24-hour Mean[1]		Annual Mean		Percentile 1-hour Means Below 100 ppb[2]	Annual Mean		Maximum 8-hour Mean[1]		Maximum 1-hr Mean[1]		Maximum 24-hour mean[3]	Maximum 1-hour Mean	Annual Mean	Maximum 1-hour Mean		Annual Mean	Annual Mean
Receptor	X	Y	µg/m³	ppm	µg/m³	ppm		µg/m³	ppb	µg/m³	ppm	µg/m³	ppm	µg/m³	µg/m³	µg/m³	µg/m³	ppb	µg/m³	ppm
CPP	305954	132461	7.8	3.15E-03	2.1E-01	8.7E-05	99.9	1.285	**3.7E-01**	174	**3.1E-02**	423	**0.074**	**7.8**	604	2.14	28.7	7.9	1.0E-01	2.8E-02
SF-NE	301977	137001	0.2	8.62E-05	1.5E-02	6.1E-06	100.0	0.086	**2.5E-02**	4	**7.9E-04**	30	**0.005**	**0.2**	43	0.14	2.0	0.6	7.0E-03	1.9E-03
SF-E	303164	135946	15.7	6.32E-03	4.2E-01	1.7E-04	99.8	2.169	**6.3E-01**	321	**5.6E-02**	1178	**0.207**	**16.0**	1489	3.71	84.2	23.3	1.8E-01	5.1E-02
SF-SE	303165	133718	0.1	3.34E-05	6.2E-03	2.5E-06	100.0	0.032	**9.3E-03**	1	**2.3E-04**	10	**1.7E-03**	**0.09**	14	0.06	0.7	0.2	2.7E-03	7.6E-04
SF-S	300888	132123	4.3	1.74E-03	1.2E-01	4.7E-05	100.0	0.684	**2.0E-01**	96	**1.7E-02**	238	**0.042**	**4.3**	341	1.14	16.2	4.5	5.5E-02	1.5E-02
SF-SW	299901	134989	11.4	4.59E-03	1.2E-01	4.8E-05	100.0	0.263	**7.6E-02**	106	**1.9E-02**	850	**0.150**	**12.5**	908	0.58	64.5	17.8	3.8E-02	1.1E-02
SF-W	299929	136031	11.7	4.70E-03	3.0E-01	1.2E-04	99.8	1.592	**4.6E-01**	245	**4.3E-02**	804	**0.142**	**11.8**	1046	2.71	56.9	15.7	1.3E-01	3.7E-02
SF-NW	300736	136229	9.0	3.64E-03	2.5E-01	1.0E-04	99.9	1.419	**4.1E-01**	197	**3.5E-02**	492	**0.087**	**9.1**	686	2.38	33.7	9.3	1.1E-01	3.2E-02
SF-N	300976	137027	0.2	8.41E-05	1.5E-02	5.9E-06	100.0	0.083	**2.4E-02**	4	**7.7E-04**	29	**0.005**	**0.2**	41	0.14	1.9	0.5	6.7E-03	1.9E-03
CPP-N	306025	135298	23.0	9.25E-03	2.4E-01	9.6E-05	99.9	0.529	**1.5E-01**	189	**3.3E-02**	1506	**0.265**	**25.1**	1610	1.16	114.2	31.6	7.6E-02	2.1E-02
CPP-NE	307208	133654	0.2	9.31E-05	1.3E-02	5.2E-06	100.0	0.073	**2.1E-02**	5	**8.5E-04**	29	**0.005**	**0.2**	42	0.12	2.0	0.5	5.9E-03	1.6E-03
CPP-E	308788	132390	11.1	4.46E-03	5.3E-01	2.1E-04	99.8	2.216	**6.4E-01**	235	**4.1E-02**	632	**0.111**	**12.0**	778	3.99	48.0	13.3	2.1E-01	5.9E-02
CPP-SE	307946	130366	0.2	7.49E-05	6.2E-03	2.5E-06	100.0	0.021	**6.0E-03**	2	**3.4E-04**	13	**0.002**	**0.2**	14	0.04	1.0	0.3	2.3E-03	6.3E-04
CPP-S	305899	129580	14.7	5.92E-03	3.3E-01	1.3E-04	99.9	0.644	**1.9E-01**	123	**2.2E-02**	980	**0.173**	**16.1**	1047	1.48	74.3	20.6	1.0E-01	2.8E-02
CPP-SW	303824	130435	0.3	1.25E-04	1.5E-02	6.2E-06	100.0	0.072	**2.1E-02**	4	**7.5E-04**	34	**0.006**	**0.3**	49	0.13	2.3	0.6	6.5E-03	1.8E-03
CPP-W	303879	132505	6.3	2.53E-03	1.6E-01	6.6E-05	99.9	0.981	**2.8E-01**	140	**2.5E-02**	347	**0.061**	**6.3**	496	1.64	23.5	6.5	7.8E-02	2.2E-02
CPP-NW	303580	134939	14.2	5.74E-03	1.4E-01	5.8E-05	99.9	0.292	**8.5E-02**	130	**2.3E-02**	1041	**0.183**	**15.60**	1113	0.66	79.0	21.8	4.5E-02	1.2E-02
B.C. Ranch	299312	136270	7.5	3.01E-03	2.1E-01	8.3E-05	99.9	1.176	**3.4E-01**	163	**2.9E-02**	405	**0.071**	**7.5**	566	1.98	27.8	7.7	9.5E-02	2.6E-02
Burdock School	303704	130499	0.5	2.20E-04	1.4E-02	5.8E-06	100.0	0.058	**1.7E-02**	6	**9.7E-04**	44	**0.008**	**0.6**	47	0.11	3.3	0.9	5.7E-03	1.6E-03
Daniels Ranch	308083	132484	42.4	1.71E-02	1.2E+00	4.8E-04	99.6	3.748	**1.1E+00**	334	**5.9E-02**	2445	**0.431**	**46.3**	2632	7.28	185.0	51.2	4.3E-01	1.2E-01
LA-2	306091	133708	0.2	7.43E-05	6.8E-03	2.8E-06	100.0	0.037	**1.1E-02**	4	**6.8E-04**	20	**3.6E-03**	**0.18**	29	0.06	1.4	0.4	3.1E-03	8.5E-04
SF	300949	136005	12.8	5.14E-03	3.3E-01	1.3E-04	99.8	1.750	**5.1E-01**	266	**4.7E-02**	899	**0.158**	**13.0**	1161	2.99	63.8	17.6	1.5E-01	4.1E-02
Heck Ranch	307686	126075	0.1	5.53E-05	9.1E-03	3.6E-06	100.0	0.053	**1.5E-02**	3	**5.1E-04**	23	**0.004**	**0.1**	33	0.09	1.6	0.4	4.2E-03	1.2E-03
MINING UNIT 5	307788	131905	55.5	2.24E-02	1.2E+00	4.9E-04	99.7	2.652	**7.7E-01**	450	**7.9E-02**	3245	**0.572**	**60.8**	3470	5.81	246.2	68.1	3.8E-01	1.1E-01
SF-NNE	301387	137016	0.2	8.51E-05	1.5E-02	6.0E-06	100.0	0.084	**2.4E-02**	4	**7.8E-04**	29	**0.005**	**0.2**	42	0.14	2.0	0.5	6.8E-03	1.9E-03
SF-ENE	302768	136702	0.6	2.57E-04	4.7E-02	1.9E-05	100.0	0.274	**7.9E-02**	12	**2.1E-03**	59	**0.010**	**0.6**	85	0.46	4.0	1.1	2.2E-02	6.1E-03
SF-ESE	303140	135057	16.2	6.54E-03	1.6E-01	6.6E-05	99.9	0.344	**1.0E-01**	145	**2.6E-02**	1164	**0.205**	**17.79**	1244	0.77	88.3	24.4	5.2E-02	1.4E-02
SF-SSE	302260	132693	3.4	1.39E-03	1.0E-01	4.1E-05	100.0	0.604	**1.7E-01**	76	**1.3E-02**	178	**0.031**	**3.4**	254	1.01	12.1	3.3	4.8E-02	1.3E-02
SF-SSW	299980	133764	0.1	2.79E-05	6.7E-03	2.7E-06	100.0	0.034	**9.8E-03**	1	**2.6E-04**	11	**1.9E-03**	**0.07**	15	0.06	0.7	0.2	2.9E-03	8.1E-04
SF-WSW	299918	135608	15.1	6.09E-03	2.4E-01	9.6E-05	99.9	0.904	**2.6E-01**	162	**2.9E-02**	1116	**0.197**	**16.4**	1251	1.66	83.4	23.1	9.1E-02	2.5E-02
SF-WNW	300567	136174	10.1	4.06E-03	2.7E-01	1.1E-04	99.9	1.518	**4.4E-01**	218	**3.8E-02**	574	**0.101**	**10.1**	790	2.56	39.6	11.0	1.2E-01	3.4E-02
SF-NNW	300745	136536	2.4	9.79E-04	9.8E-02	3.9E-05	100.0	0.572	**1.7E-01**	51	**9.1E-03**	142	**0.025**	**2.4**	199	0.96	9.7	2.7	4.6E-02	1.3E-02
CPP-NNW	304850	135327	20.6	8.29E-03	2.2E-01	8.9E-05	99.9	0.522	**1.5E-01**	171	**3.0E-02**	1363	**0.240**	**22.5**	1457	1.11	103.4	28.6	7.2E-02	2.0E-02
CPP-NNE	307200	135268	26.3	1.06E-02	2.7E-01	1.1E-04	99.9	0.558	**1.6E-01**	212	**3.7E-02**	1696	**3.0E-01**	**28.8**	1813	1.25	128.7	35.6	8.4E-02	2.3E-02
CPP-ENE	308810	133561	18.1	7.31E-03	1.4E+00	5.6E-04	98.7	7.890	**2.3E+00**	228	**4.0E-02**	1063	**0.187**	**18.5**	1412	13.30	74.5	20.6	6.4E-01	1.8E-01
CPP-ESE	308766	131213	16.4	6.61E-03	1.6E-01	6.6E-05	99.9	0.318	**9.2E-02**	164	**2.9E-02**	1311	**0.231**	**18.0**	1401	0.73	99.4	27.5	5.0E-02	1.4E-02
CPP-SSE	306915	129965	0.6	2.55E-04	1.6E-02	6.4E-06	100.0	0.045	**1.3E-02**	7	**1.2E-03**	47	**0.008**	**0.7**	51	0.09	3.6	1.0	5.5E-03	1.5E-03
CPP-SSW	304685	129603	13.5	5.43E-03	9.5E-01	3.8E-04	99.2	5.368	**1.6E+00**	173	**3.1E-02**	798	**0.140**	**13.7**	1065	9.04	55.8	15.4	4.4E-01	1.2E-01
CPP-WSW	304688	131973	3.1	1.23E-03	1.0E-01	4.2E-05	100.0	0.609	**1.8E-01**	67	**1.2E-02**	153	**0.027**	**3.1**	218	1.02	10.4	2.9	4.9E-02	1.3E-02
CPP-WNW	303897	133365	0.2	6.07E-05	1.1E-02	4.4E-06	100.0	0.063	**1.8E-02**	3	**5.6E-04**	20	**0.003**	**0.2**	28	0.11	1.3	0.4	5.1E-03	1.4E-03
Puttman Ranch	300790	139692	0.1	2.70E-05	8.8E-04	3.5E-07	100.0	0.004	**1.1E-03**	1	**1.5E-04**	4	**7.8E-04**	**0.07**	6	0.01	0.3	0.1	3.5E-04	9.7E-05
Background	300698	129462	0.0	1.94E-05	2.1E-03	8.3E-07	100.0	0.010	**2.9E-03**	1	**2.0E-04**	7	**1.2E-03**	**0.05**	9	0.02	0.4	0.1	8.7E-04	2.4E-04
Englebert Ranch	306258	127626	0.1	5.42E-05	1.8E-03	7.3E-07	100.0	0.008	**2.4E-03**	2	**3.0E-04**	9	**1.5E-03**	**0.14**	10	0.01	0.6	0.2	7.5E-04	2.1E-04
LA-1	300328	135918	12.6	5.09E-03	3.2E-01	1.3E-04	99.9	1.605	**4.6E-01**	252	**4.4E-02**	1022	**0.180**	**13.4**	1270	2.77	73.6	20.4	1.4E-01	3.8E-02
Edgemont	316985	113870	0.3	1.02E-04	1.7E-02	6.7E-06	100.0	0.084	**2.4E-02**	6	**9.8E-04**	29	**0.005**	**0.3**	41	0.15	2.0	0.5	7.2E-03	2.0E-03
Spencer Ranch	303953	133671	0.1	3.32E-05	6.3E-03	2.6E-06	100.0	0.034	**9.7E-03**	1	**2.5E-04**	11	**1.9E-03**	**0.09**	15	0.06	0.7	0.2	2.8E-03	7.8E-04
MINING UNIT 2	302093	135944	14.3	5.76E-03	3.7E-01	1.5E-04	99.8	1.929	**5.6E-01**	292	**5.1E-02**	1096	**0.193**	**14.6**	1382	3.31	78.5	21.7	1.6E-01	4.6E-02
National Ambient Air Quality Standards				0.14		0.03	98th		53		35		9	150						

Notes:
(1) Not to be exceeded more than once per year
(2) To attain this standard the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor must not exceed 0.100 ppm (effective January 22, 2010)
(3) Not to be exeeced more than once per year on average over 3 years

POWERTECH (USA) INC.

ER_RAI Table AQ8.3
Powertech (USA) Inc.
Dewey-Burdock Project

AERMOD Results with National Ambient Air Quality Standards - Restoration

			SOx				NOx			CO				PM_{10}	TOC		Aldehydes			
			Maximum 24-hour Mean[1]		Annual Mean		Percentile 1-hour Means Below 100 ppb[2]	Annual Mean		Maximum 8-hour Mean[1]		Maximum 1-hr Mean[1]		Maximum 24-hour mean[3]	Maximum 1-hour Mean	Annual Mean	Maximum 1-hour Mean		Annual Mean	Annual Mean
Receptor	X	Y	µg/m³	ppm	µg/m³	ppm		µg/m³	ppb	µg/m³	ppm	µg/m³	ppm	µg/m³	µg/m³	µg/m³	µg/m³	ppb	µg/m³	ppm
CPP	305954	132461	5.468	2.20E-03	1.4E-01	5.8E-05	100.0	0.616	**1.8E-01**	49.8	**8.8E-03**	120.8	**0.021**	**1.562**	362.3	1.232	7.85	2.172	2.7E-02	7.4E-03
SF-NE	301977	137001	0.012	4.69E-06	1.3E-04	5.2E-08	100.0	0.001	**1.6E-04**	0.1	**1.8E-05**	0.6	**0.000**	**0.003**	1.7	0.001	0.04	0.010	2.0E-05	5.5E-06
SF-E	303164	135946	0.015	6.21E-06	2.1E-04	8.5E-08	100.0	0.001	**2.7E-04**	0.1	**2.4E-05**	0.7	**0.000**	**0.004**	2.0	0.002	0.04	0.012	4.0E-05	1.1E-05
SF-SE	303165	133718	0.044	1.78E-05	2.8E-03	1.1E-06	100.0	0.012	**3.4E-03**	0.4	**6.7E-05**	2.8	**5.0E-04**	**0.013**	8.5	0.024	0.18	0.051	5.1E-04	1.4E-04
SF-S	300888	132123	3.016	1.22E-03	7.9E-02	3.2E-05	100.0	0.338	**9.8E-02**	27.5	**4.8E-03**	68.1	**0.012**	**0.862**	204.3	0.677	4.43	1.225	1.5E-02	4.1E-03
SF-SW	299901	134989	0.021	8.39E-06	4.7E-04	1.9E-07	100.0	0.002	**5.9E-04**	0.2	**2.7E-05**	1.0	**0.000**	**0.006**	3.1	0.004	0.07	0.019	9.0E-05	2.5E-05
SF-W	299929	136031	0.019	7.56E-06	2.1E-04	8.5E-08	100.0	0.001	**2.7E-04**	0.1	**2.4E-05**	0.9	**0.000**	**0.005**	2.8	0.002	0.06	0.017	4.0E-05	1.1E-05
SF-NW	300736	136229	0.015	6.17E-06	1.9E-04	7.7E-08	100.0	0.001	**2.3E-04**	0.1	**1.9E-05**	0.8	**0.000**	**0.004**	2.3	0.002	0.05	0.014	4.0E-05	1.1E-05
SF-N	300976	137027	0.012	4.72E-06	1.3E-04	5.2E-08	100.0	0.001	**1.6E-04**	0.1	**1.8E-05**	0.5	**0.000**	**0.003**	1.4	0.001	0.03	0.008	2.0E-05	5.5E-06
CPP-N	306025	135298	0.022	8.74E-06	3.1E-04	1.2E-07	100.0	0.001	**3.9E-04**	0.2	**3.4E-05**	0.8	**0.000**	**0.006**	2.5	0.003	0.05	0.015	6.0E-05	1.7E-05
CPP-NE	307208	133654	0.047	1.90E-05	2.6E-03	1.0E-06	100.0	0.011	**3.2E-03**	0.3	**6.1E-05**	2.3	**0.000**	**0.014**	6.9	0.022	0.15	0.042	4.8E-04	1.3E-04
CPP-E	308788	132390	7.439	3.00E-03	2.1E-01	8.3E-05	100.0	0.885	**2.6E-01**	67.2	**1.2E-02**	155.6	**0.027**	**2.126**	466.7	1.771	10.11	2.798	3.8E-02	1.1E-02
CPP-SE	307946	130366	0.028	1.14E-05	7.9E-04	3.2E-07	100.0	0.003	**9.7E-04**	0.2	**3.7E-05**	1.3	**0.000**	**0.008**	3.8	0.007	0.08	0.022	1.5E-04	4.2E-05
CPP-S	305899	129580	0.019	7.82E-06	3.8E-04	1.5E-07	100.0	0.002	**4.7E-04**	0.1	**2.5E-05**	0.8	**0.000**	**0.006**	2.5	0.003	0.05	0.015	7.0E-05	1.9E-05
CPP-SW	303824	130435	0.013	5.22E-06	9.7E-04	3.9E-07	100.0	0.004	**1.2E-03**	0.1	**1.6E-05**	0.6	**0.000**	**0.004**	1.9	0.008	0.04	0.011	1.8E-04	5.0E-05
CPP-W	303879	132505	4.390	1.77E-03	1.1E-01	4.6E-05	100.0	0.486	**1.4E-01**	40.1	**7.1E-03**	99.2	**0.017**	**1.254**	297.5	0.972	6.45	1.783	2.1E-02	5.8E-03
CPP-NW	303580	134939	0.031	1.24E-05	4.6E-04	1.9E-07	100.0	0.002	**5.7E-04**	0.2	**3.9E-05**	1.5	**0.000**	**0.009**	4.6	0.004	0.10	0.028	9.0E-05	2.5E-05
B.C. Ranch	299312	136270	0.017	6.77E-06	1.9E-04	7.7E-08	100.0	0.001	**2.3E-04**	0.1	**2.1E-05**	0.8	**0.000**	**0.005**	2.5	0.002	0.05	0.015	3.0E-05	8.3E-06
Burdock School	303704	130499	0.012	4.91E-06	1.1E-03	4.4E-07	100.0	0.005	**1.3E-03**	0.1	**1.6E-05**	0.7	**0.000**	**0.003**	2.1	0.009	0.04	0.012	2.0E-04	5.5E-05
Daniels Ranch	308083	132484	6.469	2.61E-03	1.8E-01	7.2E-05	100.0	0.761	**2.2E-01**	58.5	**1.0E-02**	137.5	**0.024**	**1.848**	412.6	1.522	8.94	2.473	3.3E-02	9.1E-03
LA-2	306091	133708	0.036	1.47E-05	2.5E-03	9.9E-07	100.0	0.010	**3.0E-03**	0.3	**5.1E-05**	2.2	**3.9E-04**	**0.010**	6.6	0.021	0.14	0.039	4.5E-04	1.2E-04
SF	300949	136005	0.018	7.26E-06	2.1E-04	8.5E-08	100.0	0.001	**2.7E-04**	0.1	**2.3E-05**	0.9	**0.000**	**0.005**	2.7	0.002	0.06	0.016	4.0E-05	1.1E-05
Heck Ranch	307686	126075	0.096	3.87E-05	5.5E-03	2.2E-06	100.0	0.024	**6.8E-03**	0.8	**1.4E-04**	6.6	**0.001**	**0.027**	19.7	0.047	0.43	0.118	1.0E-03	2.8E-04
MINING UNIT 5	307788	131905	1.522	6.13E-04	6.1E-02	2.5E-05	100.0	0.261	**7.5E-02**	13.1	**2.3E-03**	33.8	**0.006**	**0.435**	101.5	0.521	2.20	0.608	1.1E-02	3.1E-03
SF-NNE	301387	137016	0.012	4.74E-06	1.3E-04	5.2E-08	100.0	0.001	**1.6E-04**	0.1	**1.8E-05**	0.5	**0.000**	**0.003**	1.5	0.001	0.03	0.009	2.0E-05	5.5E-06
SF-ENE	302768	136702	0.013	5.19E-06	1.5E-04	6.0E-08	100.0	0.001	**1.9E-04**	0.1	**2.0E-05**	0.6	**0.000**	**0.004**	1.8	0.001	0.04	0.011	3.0E-05	8.3E-06
SF-ESE	303140	135057	0.029	1.17E-05	4.2E-04	1.7E-07	100.0	0.002	**5.1E-04**	0.2	**3.7E-05**	1.5	**0.000**	**0.008**	4.4	0.004	0.09	0.026	8.0E-05	2.2E-05
SF-SSE	302260	132693	2.414	9.73E-04	7.0E-02	2.8E-05	100.0	0.299	**8.7E-02**	21.7	**3.8E-03**	50.8	**0.009**	**0.690**	152.3	0.599	3.30	0.913	1.3E-02	3.6E-03
SF-SSW	299980	133764	0.047	1.90E-05	2.8E-03	1.1E-06	100.0	0.012	**3.5E-03**	0.4	**7.1E-05**	2.9	**5.1E-04**	**0.013**	8.6	0.024	0.19	0.052	5.3E-04	1.5E-04
SF-WSW	299918	135608	0.022	8.83E-06	2.8E-04	1.1E-07	100.0	0.001	**3.5E-04**	0.2	**2.8E-05**	1.1	**0.000**	**0.006**	3.3	0.002	0.07	0.020	5.0E-05	1.4E-05
SF-WNW	300567	136174	0.016	6.59E-06	2.0E-04	8.1E-08	100.0	0.001	**2.4E-04**	0.1	**2.1E-05**	0.8	**0.000**	**0.005**	2.4	0.002	0.05	0.015	4.0E-05	1.1E-05
SF-NNW	300745	136536	0.012	4.85E-06	1.6E-04	6.4E-08	100.0	0.001	**2.0E-04**	0.1	**1.9E-05**	0.5	**0.000**	**0.003**	1.6	0.001	0.04	0.010	3.0E-05	8.3E-06
CPP-NNW	304850	135327	0.021	8.59E-06	3.2E-04	1.3E-07	100.0	0.001	**3.9E-04**	0.2	**2.9E-05**	1.0	**0.000**	**0.006**	3.1	0.003	0.07	0.019	6.0E-05	1.7E-05
CPP-NNE	307200	135268	0.023	9.16E-06	3.1E-04	1.2E-07	100.0	0.001	**3.8E-04**	0.2	**3.5E-05**	1.1	**1.9E-04**	**0.006**	3.3	0.003	0.07	0.020	6.0E-05	1.7E-05
CPP-ENE	308810	133561	0.068	2.76E-05	2.9E-03	1.2E-06	100.0	0.013	**3.6E-03**	0.5	**8.8E-05**	3.4	**0.001**	**0.020**	10.1	0.025	0.22	0.060	5.4E-04	1.5E-04
CPP-ESE	308766	131213	0.044	1.76E-05	3.4E-03	1.4E-06	100.0	0.015	**4.3E-03**	0.4	**6.6E-05**	2.8	**0.000**	**0.013**	8.5	0.029	0.18	0.051	6.4E-04	1.8E-04
CPP-SSE	306915	129965	0.023	9.43E-06	5.2E-04	2.1E-07	100.0	0.002	**6.5E-04**	0.2	**3.0E-05**	1.0	**0.000**	**0.007**	3.1	0.004	0.07	0.018	1.0E-04	2.8E-05
CPP-SSW	304685	129603	0.019	7.54E-06	3.9E-04	1.6E-07	100.0	0.002	**4.8E-04**	0.1	**2.3E-05**	0.8	**0.000**	**0.005**	2.4	0.003	0.05	0.014	7.0E-05	1.9E-05
CPP-WSW	304688	131973	2.137	8.61E-04	6.8E-02	2.8E-05	100.0	0.293	**8.5E-02**	19.0	**3.3E-03**	43.5	**0.008**	**0.610**	130.4	0.587	2.83	0.782	1.3E-02	3.5E-03
CPP-WNW	303897	133365	0.105	4.24E-05	6.5E-03	2.6E-06	100.0	0.028	**8.0E-03**	0.9	**1.6E-04**	5.7	**0.001**	**0.030**	17.0	0.056	0.37	0.102	1.2E-03	3.3E-04
Puttman Ranch	300790	139692	0.005	1.89E-06	7.0E-05	2.8E-08	100.0	0.000	**9.0E-05**	0.0	**7.1E-06**	0.1	**2.6E-05**	**0.001**	0.4	0.001	0.01	0.003	1.0E-05	2.8E-06
Background	300698	129462	0.011	4.33E-06	3.6E-04	1.5E-07	100.0	0.002	**4.5E-04**	0.1	**1.3E-05**	0.5	**9.3E-05**	**0.003**	1.6	0.003	0.03	0.009	7.0E-05	1.9E-05
Englebert Ranch	306258	127626	0.040	1.63E-05	4.2E-04	1.7E-07	100.0	0.002	**5.2E-04**	0.3	**6.1E-05**	2.0	**3.5E-04**	**0.012**	5.9	0.004	0.13	0.036	8.0E-05	2.2E-05
LA-1	300328	135918	0.020	7.93E-06	2.3E-04	9.3E-08	100.0	0.001	**2.8E-04**	0.1	**2.5E-05**	1.0	**0.000**	**0.006**	2.9	0.002	0.06	0.018	4.0E-05	1.1E-05
Edgemont	316985	113870	0.150	6.04E-05	8.6E-03	3.5E-06	100.0	0.037	**1.1E-02**	1.6	**2.8E-04**	8.2	**0.001**	**0.043**	24.7	0.074	0.54	0.148	1.6E-03	4.4E-04
Spencer Ranch	303953	133671	0.047	1.90E-05	3.0E-03	1.2E-06	100.0	0.013	**3.7E-03**	0.4	**7.1E-05**	3.0	**5.3E-04**	**0.013**	9.0	0.025	0.20	0.054	5.5E-04	1.5E-04
MINING UNIT 2	302093	135944	0.017	6.76E-06	2.2E-04	8.9E-08	100.0	0.001	**2.7E-04**	0.1	**2.1E-05**	0.8	**0.000**	**0.005**	2.5	0.002	0.05	0.015	4.0E-05	1.1E-05
National Ambient Air Quality Standards				0.14		0.03	98th		53		35		9	150						

Notes:

(1) Not to be exceeded more than once per year

(2) To attain this standard the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor must not exceed 0.100 ppm (effective January 22, 2010)

(3) Not to be exeeced more than once per year on average over 3 years

Powertech (USA) Inc.

ER_RAI Table AQ8.4
Powertech (USA) Inc.
Dewey-Burdock Project

AERMOD Results with National Ambient Air Quality Standards - Decommissioning

			SOx				NOx			CO				PM10	TOC		Aldehydes			
			Maximum 24-hour Mean(1)		Annual Mean		Percentile 1-hour Means Below 100 ppb(2)	Annual Mean		Maximum 8-hour Mean(1)		Maximum 1-hr Mean(1)		Maximum 24-hour mean(3)	Maximum 1-hour Mean	Annual Mean	Maximum 1-hour Mean		Annual Mean	Annual Mean
Receptor	X	Y	µg/m³	ppm	µg/m³	ppm		µg/m³	ppb	µg/m³	ppm	µg/m³	ppm	µg/m³	µg/m³	µg/m³	µg/m³	ppb	µg/m³	ppm
CPP	305954	132461	15.23	6.14E-03	1.4E-01	5.8E-05	100.0	0.616	1.8E-01	65.8	1.2E-02	526.1	0.093	9.14	585	1.232	38.0	10.51	2.7E-02	7.4E-03
SF-NE	301977	137001	0.11	4.26E-05	1.3E-04	5.2E-08	100.0	0.001	1.6E-04	0.6	1.1E-04	4.2	0.001	0.06	5	0.001	0.3	0.08	2.0E-05	5.5E-06
SF-E	303164	135946	24.68	9.95E-03	2.1E-04	8.5E-08	99.9	0.001	2.7E-04	102.8	1.8E-02	822.4	0.145	14.81	914	0.002	59.4	16.43	4.0E-05	1.1E-05
SF-SE	303165	133718	0.07	2.79E-05	2.8E-03	1.1E-06	100.0	0.012	3.4E-03	0.2	4.2E-05	1.5	2.7E-04	0.04	2	0.024	0.1	0.03	5.1E-04	1.4E-04
SF-S	300888	132123	8.41	3.39E-03	7.9E-02	3.2E-05	100.0	0.338	9.8E-02	36.6	6.4E-03	292.6	0.052	5.04	325	0.677	21.1	5.85	1.5E-02	4.1E-03
SF-SW	299901	134989	0.10	4.09E-05	4.7E-04	1.9E-07	100.0	0.002	5.9E-04	0.6	1.0E-04	4.0	0.001	0.06	4	0.004	0.3	0.08	9.0E-05	2.5E-05
SF-W	299929	136031	18.79	7.57E-03	2.1E-04	8.5E-08	100.0	0.001	2.7E-04	83.4	1.5E-02	666.9	0.117	11.27	741	0.002	48.2	13.33	4.0E-05	1.1E-05
SF-NW	300736	136229	16.98	6.84E-03	1.9E-04	7.7E-08	100.0	0.001	2.3E-04	72.0	1.3E-02	575.7	0.101	10.19	640	0.002	41.6	11.50	4.0E-05	1.1E-05
SF-N	300976	137027	0.11	4.61E-05	1.3E-04	5.2E-08	100.0	0.001	1.6E-04	0.6	1.1E-04	4.6	0.001	0.07	5	0.001	0.3	0.09	2.0E-05	5.5E-06
CPP-N	306025	135298	0.17	7.02E-05	3.1E-04	1.2E-07	100.0	0.001	3.9E-04	0.8	1.5E-04	6.8	0.001	0.10	8	0.003	0.5	0.14	6.0E-05	1.7E-05
CPP-NE	307208	133654	0.27	1.09E-04	2.6E-03	1.0E-06	100.0	0.011	3.2E-03	1.1	1.9E-04	8.8	0.002	0.16	10	0.022	0.6	0.18	4.8E-04	1.3E-04
CPP-E	308788	132390	21.46	8.65E-03	2.1E-01	8.3E-05	99.9	0.885	2.6E-01	87.5	1.5E-02	700.1	0.123	12.88	778	1.771	50.6	13.99	3.8E-02	1.1E-02
CPP-SE	307946	130366	0.10	4.00E-05	7.9E-04	3.2E-07	100.0	0.003	9.7E-04	0.5	8.8E-05	3.0	0.001	0.06	3	0.007	0.2	0.06	1.5E-04	4.2E-05
CPP-S	305899	129580	0.36	1.46E-04	3.8E-04	1.5E-07	100.0	0.002	4.7E-04	1.5	2.6E-04	11.7	0.002	0.22	13	0.003	0.8	0.23	7.0E-05	1.9E-05
CPP-SW	303824	130435	0.29	1.18E-04	9.7E-04	3.9E-07	100.0	0.004	1.2E-03	1.2	2.1E-04	9.5	0.002	0.18	11	0.008	0.7	0.19	1.8E-04	5.0E-05
CPP-W	303879	132505	12.07	4.87E-03	1.1E-01	4.6E-05	100.0	0.486	1.4E-01	53.2	9.4E-03	425.6	0.075	7.24	473	0.972	30.7	8.50	2.1E-02	5.8E-03
CPP-NW	303580	134939	0.07	2.98E-05	4.6E-04	1.9E-07	100.0	0.002	5.7E-04	0.3	4.6E-05	1.8	0.000	0.04	2	0.004	0.1	0.04	9.0E-05	2.5E-05
B.C. Ranch	299312	136270	14.08	5.68E-03	1.9E-04	7.7E-08	100.0	0.001	2.3E-04	59.5	1.0E-02	476.4	0.084	8.45	529	0.002	34.4	9.52	3.0E-05	8.3E-06
Burdock School	303704	130499	0.23	9.33E-05	1.1E-03	4.4E-07	100.0	0.005	1.3E-03	0.9	1.7E-04	7.5	0.001	0.14	8	0.009	0.5	0.15	2.0E-04	5.5E-05
Daniels Ranch	308083	132484	18.43	7.43E-03	1.8E-01	7.2E-05	100.0	0.761	2.2E-01	76.4	1.3E-02	611.5	0.108	11.06	679	1.522	44.2	12.22	3.3E-02	9.1E-03
LA-2	306091	133708	0.07	3.00E-05	2.5E-03	9.9E-07	100.0	0.010	3.0E-03	0.3	5.9E-05	2.1	3.8E-04	0.04	2	0.021	0.2	0.04	4.5E-04	1.2E-04
SF	300949	136005	20.51	8.26E-03	2.1E-04	8.5E-08	100.0	0.001	2.7E-04	89.4	1.6E-02	715.2	0.126	12.30	795	0.002	51.7	14.29	4.0E-05	1.1E-05
Heck Ranch	307686	126075	0.20	7.97E-05	5.5E-03	2.2E-06	100.0	0.024	6.8E-03	0.8	1.4E-04	6.4	0.001	0.12	7	0.047	0.5	0.13	1.0E-03	2.8E-04
MINING UNIT 5	307788	131905	5.34	2.15E-03	6.1E-02	2.5E-05	100.0	0.261	7.5E-02	19.0	3.4E-03	152.2	0.027	3.21	169	0.521	11.0	3.04	1.1E-02	3.1E-03
SF-NNE	301387	137016	0.11	4.46E-05	1.3E-04	5.2E-08	100.0	0.001	1.6E-04	0.6	1.1E-04	4.4	0.001	0.07	5	0.001	0.3	0.09	2.0E-05	5.5E-06
SF-ENE	302768	136702	1.80	7.26E-04	1.5E-04	6.0E-08	100.0	0.001	1.9E-04	7.4	1.3E-03	58.9	0.010	1.08	65	0.001	4.3	1.18	3.0E-05	8.3E-06
SF-ESE	303140	135057	0.08	3.24E-05	4.2E-04	1.7E-07	100.0	0.002	5.1E-04	0.5	8.0E-05	3.2	0.001	0.05	4	0.004	0.2	0.06	8.0E-05	2.2E-05
SF-SSE	302260	132693	7.27	2.93E-03	7.0E-02	2.8E-05	100.0	0.299	8.7E-02	28.6	5.0E-03	228.4	0.040	4.36	254	0.599	16.5	4.56	1.3E-02	3.6E-03
SF-SSW	299980	133764	0.07	2.96E-05	2.8E-03	1.1E-06	100.0	0.012	3.5E-03	0.3	5.0E-05	2.0	3.5E-04	0.04	2	0.024	0.1	0.04	5.3E-04	1.5E-04
SF-WSW	299918	135608	7.72	3.11E-03	2.8E-04	1.1E-07	100.0	0.001	3.5E-04	26.8	4.7E-03	214.6	0.038	4.63	238	0.002	15.5	4.29	5.0E-05	1.4E-05
SF-WNW	300567	136174	18.23	7.35E-03	2.0E-04	8.1E-08	100.0	0.001	2.4E-04	78.8	1.4E-02	630.0	0.111	10.94	700	0.002	45.5	12.59	4.0E-05	1.1E-05
SF-NNW	300745	136536	5.98	2.41E-03	1.6E-04	6.4E-08	100.0	0.001	2.0E-04	21.4	3.8E-03	171.1	0.030	3.59	190	0.001	12.4	3.42	3.0E-05	8.3E-06
CPP-NNW	304850	135327	0.52	2.09E-04	3.2E-04	1.3E-07	100.0	0.001	3.9E-04	2.4	4.2E-04	18.9	0.003	0.31	21	0.003	1.4	0.38	6.0E-05	1.7E-05
CPP-NNE	307200	135268	0.16	6.45E-05	3.1E-04	1.2E-07	100.0	0.001	3.8E-04	0.5	9.0E-05	2.4	4.3E-04	0.10	3	0.003	0.2	0.05	6.0E-05	1.7E-05
CPP-ENE	308810	133561	37.08	1.49E-02	2.9E-03	1.2E-06	99.9	0.013	3.6E-03	125.6	2.2E-02	985.7	0.174	22.25	1095	0.025	71.2	19.70	5.4E-04	1.5E-04
CPP-ESE	308766	131213	0.15	5.86E-05	3.4E-03	1.4E-06	100.0	0.015	4.3E-03	0.6	1.0E-04	3.6	0.001	0.09	4	0.029	0.3	0.07	6.4E-04	1.8E-04
CPP-SSE	306915	129965	0.12	4.64E-05	5.2E-04	2.1E-07	100.0	0.002	6.5E-04	0.5	8.2E-05	3.7	0.001	0.07	4	0.004	0.3	0.07	1.0E-04	2.8E-05
CPP-SSW	304685	129603	28.10	1.13E-02	3.9E-04	1.6E-07	99.9	0.002	4.8E-04	110.6	1.9E-02	774.3	0.136	16.86	860	0.003	55.9	15.47	7.0E-05	1.9E-05
CPP-WSW	304688	131973	6.81	2.74E-03	6.8E-02	2.8E-05	100.0	0.293	8.5E-02	24.5	4.3E-03	195.7	0.034	4.08	217	0.587	14.1	3.91	1.3E-02	3.5E-03
CPP-WNW	303897	133365	0.09	3.43E-05	6.5E-03	2.6E-06	100.0	0.028	8.0E-03	0.5	8.5E-05	3.4	0.001	0.05	4	0.056	0.2	0.07	1.2E-03	3.3E-04
Puttman Ranch	300790	139692	0.05	2.17E-05	7.0E-05	2.8E-08	100.0	0.0003	9.0E-05	0.2	3.9E-05	1.3	2.3E-04	0.03	1	0.001	0.1	0.03	1.0E-05	2.8E-06
Background	300698	129462	0.04	1.60E-05	3.6E-04	1.5E-07	100.0	0.002	4.5E-04	0.1	2.2E-05	0.7	1.3E-04	0.02	1	0.003	0.1	0.01	7.0E-05	1.9E-05
Englebert Ranch	306258	127626	0.08	3.30E-05	4.2E-04	1.7E-07	100.0	0.002	5.2E-04	0.4	7.7E-05	2.6	4.6E-04	0.05	3	0.004	0.2	0.05	8.0E-05	2.2E-05
LA-1	300328	135918	18.22	7.35E-03	2.3E-04	9.3E-08	100.0	0.001	2.8E-04	79.2	1.4E-02	633.9	0.112	10.93	704	0.002	45.8	12.67	4.0E-05	1.1E-05
Edgemont	316985	113870	0.26	1.06E-04	8.6E-03	3.5E-06	100.0	0.037	1.1E-02	1.4	2.5E-04	11.4	0.002	0.16	13	0.074	0.8	0.23	1.6E-03	4.4E-04
Spencer Ranch	303953	133671	0.06	2.37E-05	3.0E-03	1.2E-06	100.0	0.013	3.7E-03	0.2	3.9E-05	1.6	2.7E-04	0.04	2	0.025	0.1	0.03	5.5E-04	1.5E-04
MINING UNIT 2	302093	135944	22.05	8.89E-03	2.2E-04	8.9E-08	99.9	0.001	2.7E-04	93.7	1.6E-02	749.4	0.132	13.23	833	0.002	54.1	14.97	4.0E-05	1.1E-05

National Ambient Air Quality Standards		0.14		0.03	98th	100		53		35		9	150	

Notes:

(1) Not to be exceeded more than once per year

(2) To attain this standard the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor must not exceed 0.100 ppm (effective January 22, 2010)

(3) Not to be exeeced more than once per year on average over 3 years

POWERTECH (USA) INC.

ER_RAI Table AQ9.1
Powertech (USA) Inc.
Dewey-Burdock Project

Annual Fugitive Dust Estimates

	Activity	Emission Vehicle	Number of Vehicles	Annual Hours	Round Trip Distance Traveled	Travel Frequency	Mean Vehicle Speed	$PM_{2.5}$					PM_{10}					PM_{30} (TSP)*					EF			Ef_{ext}			Emissions		
								k	a	c	d	C	k	a	c	d	C	k	a	c	d	C	$PM_{2.5}$	PM_{10}	PM_{30}	$PM_{2.5}$	PM_{10}	PM_{30}	$PM_{2.5}$	PM_{10}	PM_{30}
				(hours)	(miles/trip)	(trips/year)	(mph)	lb/VMT	-	-	-	lb/VMT	lb/VMT	-	-	-	lb/VMT	lb/VMT	-	-	-	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	tons/yr	tons/yr	tons/yr
Construction Phase	Earthworks Construction	Scraper	3	433	2167	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	0.8	2	0.26	2.62	6.45
		Bulldozer	1	433	2167	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	0.8	2	0.09	0.87	2.15
		Compactor	1	433	2167	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	0.8	2	0.09	0.87	2.15
		Motor Grader	1	433	2167	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	0.8	2	0.09	0.87	2.15
		Heavy Duty Water Truck (1,500 gal)	2	1040	15600	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	2.18	21.80	53.66
		Fueling Truck	1	130	650	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	0.8	2	0.03	0.26	0.65
		Light Duty pickup	3	173	2600	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	0.54	5.45	13.42
	Facilities Construction	Crane	2	347	NA - trailered	NA	NA																								
		Welding Equipment	8	1040	NA - trailered	NA	NA																								
		Forklift	2	1040	15600	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	2.18	21.80	53.66
		Man lift	4	1040	2080	1	2	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	0.7	1.7	0.1	0.5	1	0.21	2.12	5.22
		Heavy Duty Diesel Truck	2	1040	15600	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	2.18	21.80	53.66
		Light Duty Truck	10	520	7800	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	5.44	54.51	134.15
	Well Field/Electrical Construction 1	HDPE Fusion Equipment	2	1040																											
		Trackhoe	1	1040	5200	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	0.8	2	0.21	2.10	5.16
		Backhoe	1	1040	5200	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	0.8	2	0.21	2.10	5.16
		Welding Equipment	1	520	NA - trailered	NA	NA																								
		Electrical Pole Truck	2	693	10400	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	1.45	14.54	35.77
		Motor Grader	1	347	1733	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	0.8	2	0.07	0.70	1.72
		Forklift	1	1040	15600	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	1.09	10.90	26.83
		Light Duty Truck	6	1040	15600	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	6.53	65.41	160.98
	Drilling	Truck Mount Rotary Drill Rig, Diesel Truck	13	2600	0.04	60	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	0.8	2	0.001	0.01	0.03
		Heavy Duty Water Truck (1,500 gal)	13	1040	15600	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	14.15	141.72	348.80
		Backhoe	1	2080	10400	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	0.8	2	0.42	4.20	10.33
		Forklift	2	2080	31200	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	4.35	43.61	107.32
		Cementer (gas)	4	2080	NA - trailered	NA	NA																								
		Logging Truck	4	2080	31200	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	8.71	87.21	214.64
		Light Duty Truck	15	520	7800	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1.4	3	8.16	81.76	201.23
	Well Field/Electrical Construction 2	HDPE Fusion Equipment - Gas Engine	2	2080	NA - trailered	NA	NA																								
		Hydraulic Excavator	1	2080	NA - trailered	NA	NA																								
		Backhoe	1	2080	17	260	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	1	2	0.18	1.78	4.39
		Welding Equipment	1	1040	NA	NA	NA																								
		Electrical Pole Truck	2	1040	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	0.62	6.18	15.20
		Motor Grader	1	416	17	52	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	1	2	0.04	0.36	0.88
		Forklift	1	2080	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	0.31	3.09	7.60
		Light Duty Truck	6	2080	17	520	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	3.70	37.07	91.22
	Worker+Contractor +Vendors+Reg. Agency Commuting	Light Duty Vehicles	113	164	26	250	40	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.7	4.3	0.1	1	3	48	483	1188
																												Totals (t/yr):	59	587	1445

N/A - Not Applicable
Surface Material Silt Content 32.1
Surface Material Moisture Content 10.4
Days per year with 0.01 inch precipitation (AP-42 Fig. 13.2.2-1) 90
* PM30 is assumed equal to TSP as per AP-42 Section 13.2.2

Powertech (USA) Inc.

ER_RAI Table AQ9.1
Powertech (USA) Inc.
Dewey-Burdock Project

Annual Fugitive Dust Estimates

	Activity	Emission Vehicle	Number of Vehicles	Annual Hours	Round Trip Distance Traveled	Travel Frequency	Mean Vehicle Speed	$PM_{2.5}$					PM_{10}					PM_{30} (TSP)*					EF			Ef_{ext}			Emissions		
								k	a	c	d	C	k	a	c	d	C	k	a	c	d	C	$PM_{2.5}$	PM_{10}	PM_{30}	$PM_{2.5}$	PM_{10}	PM_{30}	$PM_{2.5}$	PM_{10}	PM_{30}
				(hours)	(miles/trip)	(trips/year)	(mph)	lb/VMT	-	-	-	lb/VMT	lb/VMT	-	-	-	lb/VMT	lb/VMT	-	-	-	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	tons/yr	tons/yr	tons/yr
Operations Phase	Drilling*	Truck Mount Rotary Drill Rig, Diesel Truck	13	2600	0.04	260	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	1	2	0.01	0.1	0.1
		Heavy Duty Water Truck (1,500 gal)	13	1040	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	4.01	40.2	98.8
		Backhoe	1	2080	17	260	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	1	2	0.18	1.8	4.4
		Forklift	2	2080	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	0.62	6.2	15.2
		Cementer (gas)	4	2080	NA - trailered	NA	NA																								
		Logging Truck	4	2080	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	1.23	12.4	30.4
		Light Duty Truck	15	520	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	4.63	46.3	114.0
	CPP Operations	Man Lift	1	208	NA -paved surface	NA	NA																								
		Welding Equipment	1	624	NA -paved surface	NA	NA																								
		Forklift	1	1040	NA -paved surface	NA	NA																								
		Forklift	1	1092	NA -paved surface	NA	NA																								
		Light Duty Truck	8	1560	17	520	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	4.93	49.4	121.6
		Light Duty Vehicles	4	2184	17	364	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	1.73	17.3	42.6
	SF/WF Operations	Resin Hauling Semi - Truck	1	1040	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	0.31	3.1	7.6
		Pump pulling truck	4	1560	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	1.23	12.4	30.4
		Motor Grader	1	416	17	52	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1.1	2.6	0.1	1	2	0.04	0.4	0.9
		Logging Truck	1	2080	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	0.31	3.1	7.6
		Light Duty Truck	2	8736	17	2184	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	5.18	51.9	127.7
		Light Duty Vehicles	2	1560	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	0.62	6.2	15.2
	Product Transport	Diesel Semi with Trailer to transport product	1	208	17	26	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	0.03	0.3	0.8
	Worker Commuting	Light Duty Vehicles	60	164	26	250	40	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.3	3.0	7.5	0.2	2	6	45	449	1106
																												Totals (t/yr):	137	1369	3370

N/A - Not Applicable

Surface Material Silt Content	32.1
Surface Material Moisture Content	10.4
Days per year with 0.01 inch precipitation (AP-42 Fig. 13.2.2-1)	90

* PM30 is assumed equal to TSP as per AP-42 Section 13.2.2

Powertech (USA) Inc.

ER_RAI Table AQ9.1
Powertech (USA) Inc.
Dewey-Burdock Project

Annual Fugitive Dust Estimates

	Activity	Emission Vehicle	Number of Vehicles	Annual Hours	Round Trip Distance Traveled	Travel Frequency	Mean Vehicle Speed	$PM_{2.5}$					PM_{10}					PM_{30} (TSP)*					EF			Ef_{ext}			Emissions		
								k	a	c	d	C	k	a	c	d	C	k	a	c	d	C	$PM_{2.5}$	PM_{10}	PM_{30}	$PM_{2.5}$	PM_{10}	PM_{30}	$PM_{2.5}$	PM_{10}	PM_{30}
				(hours)	(miles/trip)	(trips/year)	(mph)	lb/VMT	-	-	-	lb/VMT	lb/VMT	-	-	-	lb/VMT	lb/VMT	-	-	-	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	tons/yr	tons/yr	tons/yr
Aquifer restoration	Restoration Operations	Cementer (gas)	1	347	NA - trailered	NA	NA																								
		Light Duty Truck	2	1560	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	0.6	6	15
		Light Duty Vehicles	1	1560	17	260	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	1.9	4.6	0.1	1	3	0.3	3	8
	Worker Commuting	Light Duty Vehicles	15	164	26	250	40	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.3	3.0	7.5	0.2	2	6	11.2	112	276
																												Totals (t/yr):	12	122	299

	Activity	Emission Vehicle	Number of Vehicles	Annual Hours	Round Trip Distance Traveled	Travel Frequency	Mean Vehicle Speed	$PM_{2.5}$					PM_{10}					PM_{30} (TSP)*					EF			Ef_{ext}			Emissions		
								k	a	c	d	C	k	a	c	d	C	k	a	c	d	C	$PM_{2.5}$	PM_{10}	PM_{30}	$PM_{2.5}$	PM_{10}	PM_{30}	$PM_{2.5}$	PM_{10}	PM_{30}
				(hours)	(miles/trip)	(trips/year)	(mph)	lb/VMT	-	-	-	lb/VMT	lb/VMT	-	-	-	lb/VMT	lb/VMT	-	-	-	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	tons/yr	tons/yr	tons/yr
Decommissioning Phase	Earthwork	Scraper	3	867	4333	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1	3	0.1	1	2	0.5	5	13
		Motor Grader	1	867	4333	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1	3	0.1	1	2	0.2	2	4
		Compactor	1	867	4333	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1	3	0.1	1	2	0.2	2	4
		Bulldozer	1	867	4333	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1	3	0.1	1	2	0.2	2	4
		Hydraulic Excavator	2	650	3250	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1	3	0.1	1	2	0.3	3	6
		Backhoe	2	650	3250	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1	3	0.1	1	2	0.3	3	6
		Loader	1	650	6500	1	10	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	2	4	0.1	1	3	0.4	4	9
		Tractor	1	650	3250	1	5	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1	3	0.1	1	2	0.1	1	3
		Fueling Truck	1	520	7800	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	2	5	0.1	1	3	0.5	5	13
		Light Duty Truck	2	650	9750	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	2	5	0.1	1	3	1.4	14	34
	Demolition	Crane	1	693	NA - trailered	NA	NA																								
		Welding/Cutting Equipment	4	693	NA - trailered	NA	NA																								
		Man Lift	4	693	1387	1	2	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.1	1	2	0.1	1	1	0.1	1	3
		Forklift	3	693	10400	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	2	5	0.1	1	3	2.2	22	54
		Heavy Duty Truck (Diesel)	4	347	5200	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	2	5	0.1	1	3	1.5	15	36
		Light Duty Truck	5	693	10400	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	2	5	0.1	1	3	3.6	36	89
		Light Duty Vehicles	5	1040	15600	1	15	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.2	2	5	0.1	1	3	5.4	55	134
	Worker Commuting	Light Duty Vehicles	15	164	26	250	40	0.18	1	0.2	0.5	0.00036	1.8	1	0.2	0.5	0.0005	6	1	0.3	0.5	0.00047	0.3	3.0	7.5	0.2	2	6	11.2	112	276
																												Totals (t/yr):	17	168	415

N/A - Not Applicable
Surface Material Silt Content 32.1
Surface Material Moisture Content 10.4
Days per year with 0.01 inch precipitation (AP-42 Fig. 13.2.2-1) 90
* PM30 is assumed equal to TSP as per AP-42 Section 13.2.2

RAI LU

Land Use:

RAI LU-1

Clarify and provide information on the location and number of residences and residents.

Response to RAI LU-1:

All occupied dwellings within the proposed project area and the one mile radius of the proposed permit boundary are described in **ER_RAI Table LU-1.1 and ER_RAI Exhibit LU-1.1**. The nearest occupied dwelling is 0.9 miles to the west south-west of the PAA.

ER_RAI Table LU-1.1: Dwellings within the PAA and One Mile of Proposed Boundary of the PAA

Name & Number of Occupants on Exhibit RAI-LU1.1	Township	Range	Section	QrtQrt
Peterson (9)	7	1	16	SESE
Kennobie (2)	7	1	23	NWNW
Spencer (vacant)	7	1	4	NENE
Daniels *	7	1	1	NESW
Anderson (3)	7	1	9	SWSW
Putnam (2)	7	1	5	SWNE
Stodart (vacant)	41	60	22	SWSW
Cook (vacant)	6	1	17	NENW
Beaver Ck Ranch HQ (1)	6	1	30	NWSW

* Seasonal Occupancy

RAI LU-2

Provide additional information on existing, pending, and potential future land leases that overlap the proposed project area.

Response to RAI LU-2:

Oil/Gas– Neither BLM or USFS are aware of any pending nor potential new land leases that overlap the proposed project area. According to the information Powertech has been able to gather, there are no known leases currently, pending, or future. There are three known Plugged and Abandoned wells: API_ 40 047 20065 (P&A 12-26-1975), API_ 40 047 05095 (P&A 08-19-1964), and API_4004720071 (P&A 12-23-1976) see Appendix WR-7 for well records.

Mineral/Limestone - One known potential future land lease overlap; **GCC** – overlaps the tip of the Proposed Project Boundary; Powertech leases this land from GCC. This project is approximately 10 years out.

GCC Dacotah, Inc. (GCC Dacotah)

GCC Dacotah, Inc owns 2,380 acres, designated as a SDGF&P Special Management unit that currently allows hunting. The proposed project is located in Custer County. The area is classified as attainment by the South Dakota DENR for all criteria pollutants. GCC seeks approval of an Application for Transportation and Utility Systems and Facilities on Federal Lands that requires issuing a right-of-way

and a special use permit to cross federal lands associated with the construction of a 6.6 mile long conveyor near Dewey, South Dakota (the Dewey Conveyor Project).
The legal description of the project area includes portions of:
T5S, R1E, Sections 36
T6S, R1E, Sections 1, 2, 9, 10, 11, 12, 15, 16, 17, 18, 19, and 20
T5S, R2E, Sections 31
The proposed route for the conveyor crosses Bureau of Land Management (BLM)-administered public lands, US Forest Service administered National Forest System lands and GCC Dacotah privately owned land (Figure S-1 in BLM, 2009 Attachment A).

Transportation – One known potential future land lease; this lease will not overlap the Dewey-Burdock proposed boundary. This project has been put on hold.
The DM&E Railroad Corporation –As of today, no decision has been made on the whether or not Canadian Pacific--DM&E's parent company--will build the extension. This decision is contingent on several conditions: (1) acquire the necessary right-of-way to build the line, (2) execute agreements with PRB mines on terms for operations by DM&E over their loading tracks and facilities, (3) secure sufficient contractual commitments from prospective coal shippers to route their traffic over the PRB line to justify the investment required to build the line, and (4) arrange financing for the project. Finally, an economic and regulatory environment that would support a long-term investment of this magnitude needs to be present. (Per Herb M. Jones the U.S. Director, State and Local Government Affairs for Canadian Pacific). For more information regarding the above mentioned project go to the link below. (http://www.dmerail.com/About_Us/Powder%20River%20Basin/Project-Background.html) accessed 29-Apr-10.

News Release: November 19, 2001 U.S. Surface Transportation Board's Section of Environmental Analysis (SEA) issued its Final Environmental Impact Statement--recommending project approval. (http://www.dmerail.com/Media/News%20Releases/Media-Release-2001-11-19.html) accessed on: 29 April 2010.

Water: No existing, pending, or proposed overlapping leases.

Wind: The wind project is in the conceptual phase; no new developments have occurred at the time of this submittal.

RAI LU-3
Provide information on access restrictions around buildings, ponds, well fields, monitor wells, potential irrigation areas, and other structures at the proposed project.
Response to RAI LU-3:
Applicant directs the reviewer's attention to ER Section 4.7.3.3 Species Tracked by SDNHP.
Once facilities and infrastructure are in place, and hunting pressures decrease, animals remaining in the PAA could demonstrate an acclimation to those disturbances.
ER Section 7.2.7.2
Fencing is expected to cause some restrictions to wildlife movement.
TR Section 4.2.3.2 Central Processing Plant
Fuel storage tanks will be contained within concrete lined and fenced storage facility to prevent potential impacts to the surface.
TR Section 5.6 Facility Security

As required in 10 CFR 20, Subpart I, Powertech (USA) will secure from unauthorized removal or access licensed materials stored in controlled or unrestricted areas using the following passive and administrative controls:

• All areas where licensed material is stored (e.g. well fields, CPP, SFs will be fenced). Facility fences, gates, and postings will be inspected daily.

• Visitors to the facility will enter through an access point at the main gate entrance where they will sign in and receive training required in Section 5.5.3.

Fencing for the CPP and the SF are located in the figures cited below:

TR_Figure 3.2-2: General Site Plan Central Processing Plant

TR_Figure 3.2-3: General Site Plan - Satellite Facility

Fencing around ponds and well fields are depicted in figures cited below:

Supp: Exhibit 3.1-2: "Proposed Facilities and Well Fields Land Application Option" depicts fencing around ponds and well fields

Supp: Exhibit 3.2-1: "Proposed Well Fields", depicts fencing around well fields.

Additional Information:

All buildings and structures covered under the uranium recovery license will be built completely fenced with controlled access points.

During operations, alteration to habitat may occur due to fencing, however, fencing construction techniques to minimize impediments to large game could be implemented as a preventative measure. Perimeter fencing, and periodic surveys would actually limit potential impacts to avian species around pond areas.

Fencing may be proposed to control livestock access to land application areas. The effluent concentration limits for the release of radionuclides to the environment as contained in 10 CFR Part 20, Appendix B will be met; therefore there are no exposures or health risks that would be associated with radioactive constituents reaching the food chain. All levels of risk will conform to 10 CFR Part 20.

No fencing is proposed for monitoring wells, although each well will be provided with a cover and attached locking device. No fencing is proposed for header houses because they will be within the fenced area of the well fields and individually secured (TR_Plate 3.1-2).

No fencing is proposed for deep disposal well, any buildings or structures associated with well head and pumping equipment will be secured within a locked building.

During decommissioning, temporary surface disturbance e.g., removal of structures and pipe will occur within fenced areas i.e. buildings, ponds, and other structures associated with the source material license.

RAI TR

Transportation:

RAI TR-1

Provide estimate of the expected traffic generated by proposed construction activities.

Response to RAI TR-1:

Public roads used to access the site

Vehicular access to the PAA will primarily be from the direction of Edgemont, SD via Fall River County Highway 6463, which becomes Custer County Highway 769 as it crosses into Custer County; these two county highways that connect Edgemont to the town site of Dewey are referred to as "Dewey Road." The junction of the access road to the Burdock project site with County Highway 6463 will be located approximately 0.5 miles south of the abandoned town site of Burdock. The junction of the access road to the Dewey project site with County Highway 769 will be located approximately 2 miles south of the town site of Dewey. These county highways are improved secondary gravel roads. It is expected that most traffic to the sites will come north on County Highway 6463 from the town of Edgemont and US Highway 18 (**ER_RAI Exhibit PA-1.1**). Some traffic may access the site by coming south from the vicinity of Newcastle, Wyoming along US Highway 85, Old Highway 85 and Custer County Highway 769. Movement of personnel and materials between the Central Processing Plant at the Burdock site and the Satellite Facility at the Dewey site will utilize approximately 4.5 miles of these graveled county highways (6463 and 769).

Personnel for the construction phase of the project are expected to come primarily from Edgemont, Hot Springs and Custer, South Dakota and from Newcastle, Wyoming, as well as from adjacent rural areas. Others may commute from residences further away, but except for traffic from the Newcastle, Wyoming vicinity, all commuter traffic is expected to travel to the site via County Highway 6463 from Edgemont and then to the site access roads. Individuals who reside in the vicinity of Custer, South Dakota could use Pleasant Valley Road or other secondary county or US Forest Service Roads to enter the project area from the north; in most cases, however, this route would require significantly longer commuting times than using paved highways (US Highways 89 and 18) to reach Edgemont, and then County Highway 6463 north to the project.

Traffic to the site - Construction phase

Well field construction activities at both sites will require a number of drill rigs, water trucks, graders, backhoes, scrapers and other heavy vehicles. Most of these vehicles will travel to one or both sites only once and will then remain on site for the duration of the construction period. Others trucks, such as the fuel truck and heavy duty multipurpose trucks, may travel to and from the site several times each week. Construction personnel will commute to the sites in private vehicles. Estimates of these construction and commuter vehicles, presented as one-way trips counted at the entrance to each facility, are shown in **ER_RAI Table TR-1.1**. In converting truck trips required for construction, to trips per workday, it was assumed that construction will be accomplished in one year with five workdays per week.

The number of trucks required for transport of construction materials for the well fields were estimated based on the number of wells that will be constructed in the one-year construction period prior to the commencement of production operations. The primary materials of construction include piping, pond liners, well casing and well cement, with an additional estimate for miscellaneous materials. The results of this estimation are shown in **ER_RAI Table TR-1.2.**

ER_RAI Table TR-1.1: Summary of construction phase truck and light duty traffic to facility sites.

Vehicle type		Total trips to site during Construction	
	Units	Burdock	Dewey
Heavy duty construction trailers & vehicles	Site trips	48	44
Heavy duty construction support vehicles	Site trips	516	512
Building construction materials	Site trips	864	191
Well field construction materials	Site trips	138	108
Total Heavy Duty Vehicles	Site trips	1566	855
	trips/workday	6	3.3
Total Light Duty/Commuting	trips/workday	103*	102*

*Assumes no car pooling

ER_RAI Table TR-1.2: Detail of well field construction material trucks

Well field construction Materials	Weight (est)	No. Truck Loads	
		Burdock	Dewey
Major pipelines	220,000	3	3
Header Houses	NA	6	4
Well field piping	181,000	3	2
Well Casing	1,390,000	21	14
Cement	4,591,000	69	46
Pond liners & Geonet	1,430,000	21	27
Land Appl. Pivots	NA	6	5
Fencing	NA	2	2
Misc. constr. Materials	360,000	7	5
Total No. Truck Loads		138	108
Total No. Truck Loads per workday		0.5	0.4

Process equipment and construction materials will be transported to the building sites via semi trailer trucks and concrete will be transported in concrete mixing trucks. The number of concrete trucks was based on the volumes of concrete required assuming nine cubic yards of concrete per truck. Rock fill trucks were assumed to have a capacity of 17 cubic yards. The number of trucks required to deliver the metal buildings were factored based on an estimate from a metal building contractor. Additional truck loads were added to account for mechanical, electrical, piping, and furnishings, as well as for individual shipments of process vessels and equipment. The results of the construction material shipments are shown in **ER_RAI Table TR-1.3**.

ER_RAI Table TR-1.3: Trucks with construction materials for site facilities

No. Trucks	Burdock	Dewey
Concrete	404	73
Bldg materials		
CPP/SF	328	113
Office	16	
Maint. Shop	106	
By-Product storage	1.6	1.6
Site Misc.	8	3
Total	864	191

RAI TR-2

Provide estimate of the expected frequency of chemical supply shipments during operations.

Response to RAI TR-2:

An estimate of the expected frequency of chemical supply shipments during operations is provided in **ER_RAI Table TR-2.1**.

ER_RAI Table TR-2.1: Frequency of Chemical Shipments during operations

Chemical	Frequency
	Shipments/yr
Burdock	
Oxygen (O_2, liquid)	40
Carbon Dioxide	12
Sodium Chloride	90
Soda Ash (Na_2CO_3)	18
Barium Chloride	1
Sulfuric Acid (98%)	14
Caustic Soda (50% NaOH)	18
Hydrogen Peroxide (40%)	7
Total Burdock Shipments	202
Dewey	
Oxygen (O_2, liquid)	27
Carbon Dioxide	8
Barium Chloride	1
Total Dewey Shipments	36

POWERTECH (USA) INC.

Water Resources:

RAI WR-1

Clarify whether the Minnekahta aquifer is a major or minor aquifer in the Black Hills Area.

1. Please clarify whether the Minnekahta aquifer is a major or minor aquifer in the Black Hills Area

2. Provide its hydraulic properties (transmissivity storativity and thickness)

Response to WR-1.1:

The USGS "Atlas of Water Resources in the Black Hills Area, South Dakota" Hydrologic Investigations Atlas HA-747 and the USGS "Water-Quality Characteristics in the Black Hills Area, South Dakota" Water-Resouces Investigations Report 01-4194 states that the Minnekahta is a major aquifer in the Black Hills.

The Permian-age Minnekahta Limestone is a thin to medium-bedded, fine-grained, and purple to gray laminated limestone, which ranges in thickness from 25 to 65 feet (Driscoll et al., 2002). There are limited hydraulic properties found in the literature.

The Minnekahta is underlain by the Opeche Shale and is overlain by the Spearfish formation and, at the Dewey-Burdock Project, is present at a depth of approximately 1000 to 1500 feet below surface. Although the Minnekahta is considered a major aquifer in parts of the Black Hills area, in the Dewey-Burdock area, it does not supply water for domestic, cattle or agricultural use due to the depth.

Response to WR-1.2:

Minnekahta aquifer wells inventoried by Eisen and others (1980, 1981) in the northeastern part of the basin numbered 29, with an average yield of 7 gpm. Whitcomb and Morris (1964) did not consider the Minnekahta Limestone to have development potential but a the U.S. Geological Survey Madison test well it showed good potential for low-yield development (Blankennagel; et.al, 1977). At this well, the Minnekahta flowed 12 gpm, had a specific capacity of 0.1 gpm/ft of drawdown, and had an effective transmissivity of 330 gpd/ft. The average permeability for the estimated 10 feet of effective porosity was 33 gpd/ft^2. Thickness in the Black Hills ranges from 25 to 65 feet (Strobel et al, 1999).

The Minnekahta hydraulic properties:

- covers 3082 sq miles
- has an effective porosity of .05
- estimated amount of recoverable water in storage is 4.9 (M acre-feet)

References:

Carter, J.M., Driscoll, D.G., and Sawyer, J.F. 2003. "Ground-Water Resources in the Black Hills Area, South Dakota". Water Resources Investigation Report 03-4049; p. 8

Strobel, M.L. and Galloway, J.M., U.S. Geological Survey; and Hamade, G.R., Jarrell, G.J., South Dakota School of Mines and Technology; 1999. U.S. Geological Survey-Hydrologic Investigations Atlas HA-745-B.

RAI WR-2
Provide additional information on confinement of the Lakota and Fall River aquifers across the proposed project area.

1. A map or maps, based on available borehole and hydrological data from the site, showing:
- *a. depth contours to the top of the Fall River aquifer,*
- *b. regions where the Fuson Shale is not an effective confining layer,*
- *c. locations of all wetlands (denoted "W" in ER Plate 6.-1 } and surface impoundments (denoted by "Sub" in ER Plate 6.1-1), and*
- *d. Regions where Fall River aquifer is unconfined.*

2. Based on information provided in 1 above, an analysis on the potential for drawdown induced migration from surface water bodies in the outcrop area of the Fall River aquifer toward unconfined production zones in the Lakota aquifer in the Burdock portion of the project area. This information is needed to complete the description of the affected environment and to determine the environmental impacts of ineffective confinement and groundwater pumping on the proposed project.

Response to RAI WR-2.1:

In order to respond sufficiently to RAI WR-2, Powertech is providing a number of exhibits and accompanying descriptions noted by 2-1(a) through 2-1(d) within the text below. **ER_RAI Table WR-2.1** provides title of exhibits and specific response they address for reviewer's benefit.

ER_RAI Table WR-2.1: Exhibit Index

EXHIBIT TITLE	ER_RAI MAP TOPIC
ER_ RAI Exhibit WR-2.1	Addresses WR-2 -1 (a): "Depth to Fall River"- depth contours to the top of the Fall River aquifer
ER_ RAI Exhibit WR-2.2	Addresses WR-2-1 (a) "Depth to Fall River aquifer-Dewey
ER_ RAI Exhibit WR-2.3	Addresses WR-2-1 (a) "Depth to Fall River aquifer-Burdock
ER RAI_ Exhibit WR-2.4	Addresses WR-2-1 (b) and (c) "Cross-sections A-A' and B-B'"
ER_ RAI Exhibit WR-2.5	Addresses WR-2-1 (d) "Fall River Outcrop"

Response to Opening Statements and RAI WR-2.1:

(1). ***Clarification:*** **to ER Section 3.4.3.2, p. 3-60 "Inyan Kara Group",**

The first sentence of the introductory paragraph of this RAI describes how the ER Section 3.3.4.2 under the subheading "Inyan Kara Group" on p. 3-60 cites an earlier report (TVA, 1979) that 'the Fuson Shale is not an effective confining layer at some locations in the Burdock portion of the project area'. Considering the recent investigations by Powertech and consultants, it is apparent that this particular interpretive conclusion within the 1979 TVA report is incorrect.

Justification that the Fuson Shale is an effective confining layer at the Burdock site is based on the following: (1) present understanding of the geologic distribution of the Fuson Member of the Lakota Formation (see *Clarification 2*, below), and (2) the hydrogeologic response of the Chilson Member (i.e., the Lakota aquifer) during the 2008 pumping test at Burdock as described under **2-1(b)** below).

"Throughout the PAA, the Fuson is expected to be an effective interaquifer confining unit. The Inyan Kara is confined above by the Graneros Group, a thick sequence of dark shale that varies in thickness from zero (0) feet where the Inyan Kara crops out to more than 500 feet thick in the plains, preventing the vertical migration of water between the Inyan Kara and alluvial aquifers."

(2). ***Clarification*****: Hydraulic Connection and Confinement of the Lakota Aquifer at Burdock.**

The second sentence of the introductory paragraph to this RAI refers to "hydraulic connection" associated with lack of "an effective confining layer at some locations in the Burdock portion of the project area". The same corrected ER text displayed above also addresses this issue. Based on recent hydrogeologic investigations, there is no evidence of hydraulic connection between the Fall River and Lakota aquifers due to the Fuson Member existing continuous throughout the Project Area. Additionally, the Lakota aquifer is capped by low permeability Fuson shale (i.e, the lowest mudstones typically demarking the lower boundary of the Fuson Member).

__Descriptions of Exhibits:__

2-1(a) ER_ RAI Exhibit WR-2.1 depicts the depth to the Fall River aquifer. Detailed contouring for the initial proposed well fields is based on the additional close-spaced drill hole data. The two inserts shown on this map correspond to detailed mapping in the Dewey Area (**ER_ RAI Exhibit WR-2.2**) and in the Burdock Area (**ER_ RAI Exhibit WR-2.3**).

2-1(b) As presented in Clarifications 1 & 2, Powertech concludes that the Fuson Member of the Lakota Formation is an effective confining unit throughout the Dewey-Burdock Project area. This unit varies from >20 to 80 feet in thickness, but is commonly about 50 feet thick. Locally, near the center of this unit, very fine-grained, light grey, poorly-cemented silty sandstone is present. This silty sandstone appears to be diagenetically reduced and rarely has been found to contain uranium mineralization. In all subsurface interpretations by TVA and other uranium exploration companies in the area, the lower boundary of the Fuson Member is considered to be the abrupt change from variegated mudstones to fluvial sandstones of the Chilson Member of the Lakota Formation (i.e., the Lakota aquifer). The upper boundary of the Fuson Member is considered to be the contact between the variegated mudstones and the first, thick, overlying sandstone of the Fall River Formation.

An examination of the Fuson isopach map (**Supplemental Exhibit 3.2-3 Revised** described and provided in this response package; also see description in SR Section 2.2 on page 2-6) shows that the minimum thickness of the Fuson within the Dewey-Burdock Project area is >20 to <30 feet. Exploration drilling has recognized a northwest trending channel within the basal Fall River Formation that scours into the underlying Fuson Member. As shown in the Fuson isopach map of the project area, the channeling phenomenon is particularly recognizable in the Burdock area as an approximate mile-wide, northwest trending low in the isopach contours where the thinnest occurrence (30-foot isopach) of Fuson is mapped.

The Fall River isopach map (ER Plate 3.3-8) shows a 20 to 30 foot increase in the thickness of the Fall River Formation along the same northwest trending channel system. This increase in sand thickness has been interpreted as the development of a lower Fall River channel system that has scoured into the underlying Fuson Member. As noted above, the Fuson isopach map shows a corresponding 20 to 30 foot decrease in thickness in this channel area. Although this scouring is prominent, there is no indication from detailed drilling (as indicated by the borehole locations on the isopach maps) that thickness of the confining mudstones within the Fuson Member is less than 20 feet.

To further illustrate the confining qualities of the Fuson Member, the geologic database used to prepare the Fall River, Fuson and Lakota structure contour and isopach maps (i.e., ER Plates 3.3-2 through 3.3-14) has been used to prepare two new hydrogeologic cross-sections. The cross-sections A-A' and B-B' are located on the attached map **ER_ RAI WR-2.4** along with profiles of the potentiometric surfaces of the Lakota and Fall River aquifers from TR Figures 2.7-14 and 2.7-15.

These hydrogeologic cross-sections intersect the major aquifer pumping tests in the Project Area, as follows:

- TVA 1979 Burdock Pumping Tests
  - Lakota Formation: 3 days at 203 gpm
  - Fall River Formation: 49 hours at 8.5 gpm
- TVA 1982 Dewey Pumping Test
  - Lakota Formation: 11 days at 495 gpm
- Powertech 2008 Dewey Pumping Test
  - Fall River Formation: 3 days at 30 gpm
- Powertech 2008 Burdock Pumping Test
  - Lakota Formation: 3 days at 30 gpm

The new cross-sections profile the relationships of the potentiometric surfaces to formation contacts as the units of the Inyan Kara rise onto the Black Hills structural dome and are exposed at the outcrop in the hogback. At the western ends of the cross-sections are projected locations of the approximate centroids of the proposed initial mine units.

Referring to cross-section A-A' through the Dewey pump test area, the potentiometric surface of the Fall River aquifer is more than 500 feet above the top of the aquifer and base of the Graneros Shale, and also the land surface, indicating artesian conditions. At the Dewey test area there is nearly a 40 foot head difference between the Lakota and Fall River aquifers. These relationships are described in further detail in Section 4.1 and Table 4.1 of TR Appendix 2.7-B (Knight Piesold, 2008). To the east (Dewey-Burdock North), the potentiometric surfaces converge to similar elevations near the Triangle Mine open pit where the Fall River is exposed in outcrop.

Referring to cross-section B-B' through the Burdock (South) pump test area, the potentiometric surface of the Fall River and Lakota aquifers are within +/- 3 feet of each other at the test area, where they are both above the base and below the top of the Graneros Shale, indicating confined but non-artesian conditions. These relationships are described in further detail in Section 5.1 and Table 5.1 of TR Appendix 2.7-B (Knight Piesold, 2008).

To the east of the test area and the proposed Burdock mine unit, the potentiometric surfaces of both the Fall River and Lakota aquifers are below the contact of the top of the Fall River/base of Graneros shale, indicating that the Fall River aquifer is unconfined. The cross-section extends to the Fall River outcrop and the Darrow open pit mine, which is the nearest surface mine feature to the proposed Burdock mine unit.

On cross-section B-B', the potentiometric surface of the Lakota aquifer is above the contact of the top of the Lakota /Base of Fuson at the 2008 pump test area, indicating confined aquifer conditions in the Lakota. Confinement of the Lakota was also described by the potentiometric surface elevation relationships in Section 5.1 of TR Appendix 2.7-B (Knight Piesold, 2008). Cross-section B-B' demonstrates that the Lakota potentiometric surface is above the base of the Fuson to the east of the projected extents of the proposed Burdock area Mine Unit 1. These geologic and hydrogeologic relationships indicate that the Lakota is a confined aquifer separated from the Fall River by the Fuson throughout the portion of the Project Area that will be mined.

Section 2.3.2 of TR Appendix 2.7-B (Knight Piesold, 2008) describes how the 1979 TVA aquifer tests at Burdock demonstrated communication between the Fall River and Lakota aquifers through the intervening Fuson Member; leaky behavior was described for the Fall River formation and noted to have possibly occurred in the Lakota, although "leakage effects in the Lakota drawdown data were believed to be masked by the conflicting effect of a decreasing transmissivity in site vicinity" (p. 16 in Boggs and Jenkins, 1980). While the vertical hydraulic conductivity of the Fuson aquitard was determined with the Neuman-Witherspoon ratio method (Neuman and Witherspoon, 1973), the pumping tests were not analyzed assuming leaky confining conditions such as with the Hantush-Jacob method (Hantush and Jacob, 1955).

Section 5.4.2 of TR Appendix 2.7-B (Knight Piesold, 2008), the analysis of the 2008 aquifer test at Burdock, describes automated curve matching of time-drawdown data in the Lakota to fit the Hantush-Jacob leaky-confined conditions model. The Hantush-Jacob model assumes vertical flow through the confining layer.

In summary, geologic and hydrogeologic relationships illustrated in the new cross-sections, and analysis described in TR Appendix 2.7-B (Knight Piesold, 2008) indicate that the Lakota is: (1) separated from the Fall River aquifer by the Fuson Member throughout the Project Area; (2) is a confined aquifer with the potentiometric surface above the base of the Fuson throughout the portion of the PAA that will be mined; and (3) interpretations of both the 1979 and 2008 pumping tests are consistent with the leaky-confined aquifer model. To assure the integrity of the Fuson Member, pump tests will be conducted in each mine unit before mining and the confining qualities of the Fuson will be examined in detail and provided to the NRC for review. Additionally, overlying monitor wells will be placed in the Fall River Formation over each mining unit to monitor for any fluid movement into the Fall River.

2-1(c) All Surface Subimpoundments (SUBs) and Wetlands (W) shown on ER Plate 6.1-1 are located on clays of the Graneros Group (upper confining unit) or on unconfined Fall River formation exposed on outcrop. This latter group of wetlands is associated with historic surface uranium mines. The surface water features pertinent to the RAI are depicted in **ER_ RAI Exhibit WR-2.4.** The reviewer's attention is also directed to ER Section 3.5.5.2 "Wetlands", Plate 3.5-2 "Wetland Assessment", Appendices 3.5 F, G, and H and Section 6.1.4.1.2 "Surface Water Impoundment Sediment Sampling" for the description of impoundments located within the Dewey-Burdock PA. Wetlands on or near the cross-sections A-A' and B-B' are shown on **ER_ RAI Exhibit WR-2.4.**

2-1(d) For the Dewey-Burdock Project area, the upper confinement (shales of the Graneros Group) is present over the Fall River Formation in all areas except the northern and eastern parts of the Burdock area. **ER_ RAI Exhibit WR-2.5** depicts where the Graneros has been eroded and the Fall River is exposed. Additionally, Lakota resource areas are distinguished from Fall River resources. In areas where the Fall River outcrops, Powertech (USA) has no plans to mine Fall River resources. However, Lakota resources may be mined in these outcrop areas due to the presence of the underlying Fuson Member confining unit. In Gott's USGS paper he described an area outside of the Dewey-Burdock project where a Fall River sandstone cut through the Fuson and down into the Lakota. After an examination of over 3000 drill-hole logs across the Dewey-Burdock project, there is no indication that this geologic phenomenon occurs within the proposed project area. The Fuson Shale is present over the entire Dewey-Burdock PAA and, via the 2008 pump tests, the Fuson displayed confinement.

<u>Response to RAI WR-2.2</u>

Potential for Drawdown-induced migration from Surface Water Bodies in the Fall River aquifer.

By inspection of the cross-section B-B', it can be seen that any changes to the confined Fall River potentiometric surface in the production area should not affect the outcrop area where the water table(s) associated with any surface water bodies would either be above the potentiometric surface, or perhaps absent where surface water is absent Therefore, we can see little potential for any increase in migration (transport) in the Fall River Aquifer from the surface-outcrop toward the center of drawdown in the Burdock well field area due to project operations.

<u>RAI WR-3</u>

Provide information on ISR operations in unconfined portions of the Lakota and Fall River aquifers in the Burdock portion of the project area.

1. Whether Powertech plans to conduct ISR operations in unconfined portions of the Lakota and Fall River aquifers in the Burdock area identified during delineation drilling and aquifer pump testing.

2. If the answer is yes to 1 above, information on well field design and construction and how Powertech plans to control and monitor production fluids in unconfined productions zones.

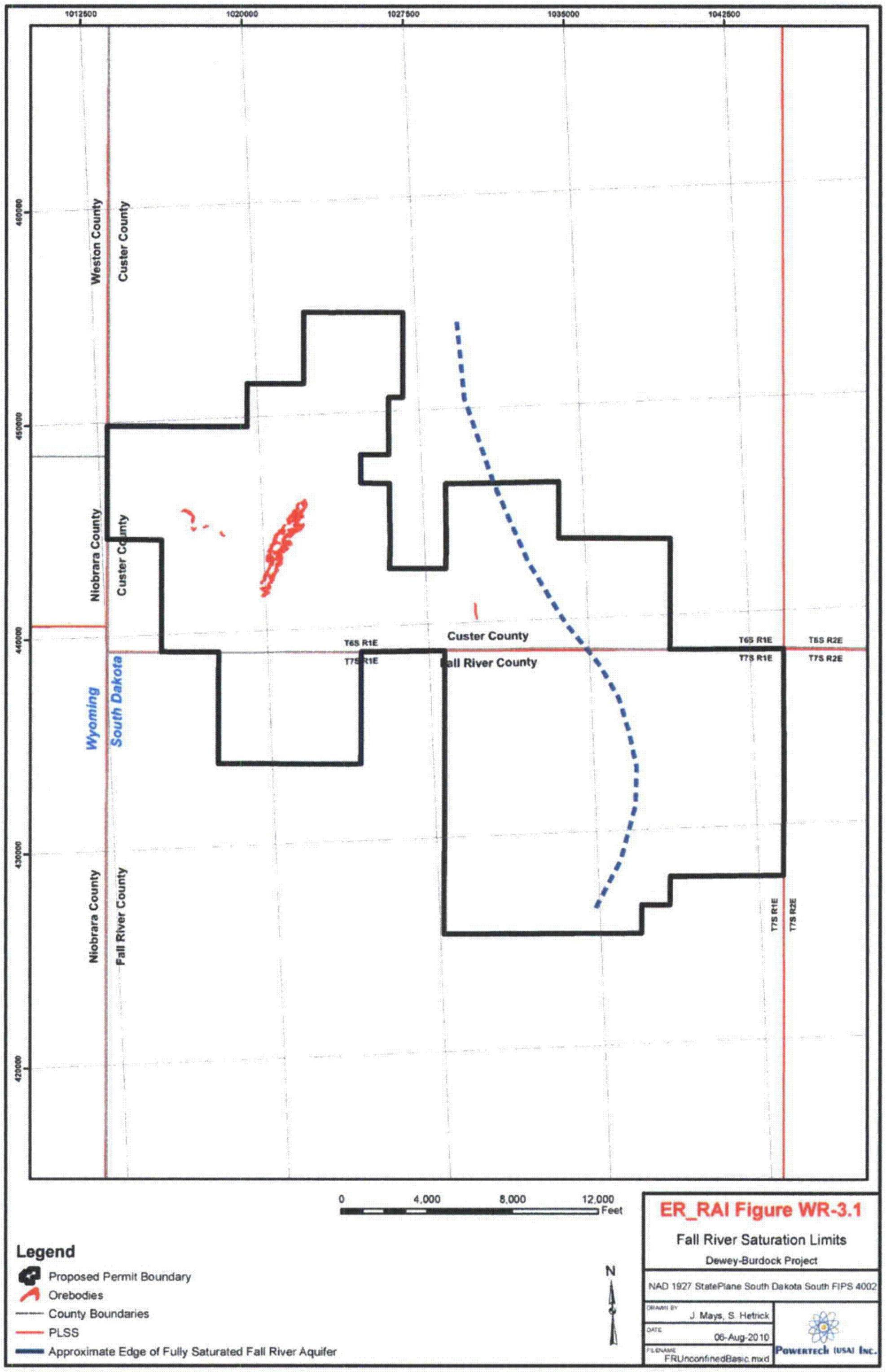
This information should include:
a. Production and injection well patterns and spacing.
b. Production bleed rates.
c. Monitoring well ring layouts and spacing.
d. Well construction, development, completion, and testing methods.

Response to WR3.1:

Clarification: see: **Response WR-2.1; (1).** ***Clarification:*** **to ER Section 3.4.3.2, p. 3-60 "Inyan Kara Group" in regards to the Fuson confining unit.**

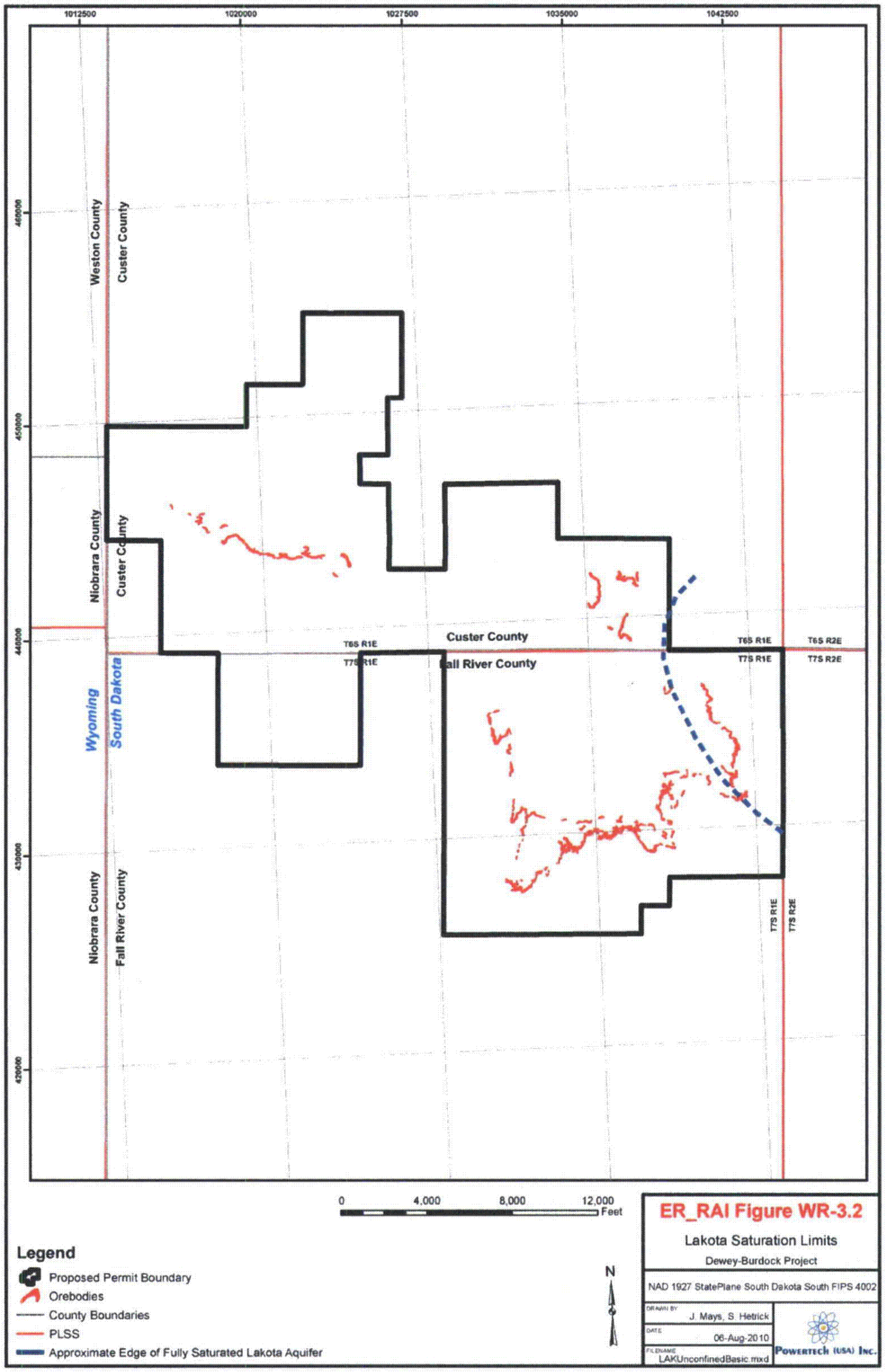
Description of Figures

Proposed activities relative to estimated unconfined zones in the Fall River and Lakota aquifers are depicted in **ER_RAI Figure WR-3.1** and **ER_RAI Figure WR-3.2** respectively. The figures have a dashed-line estimating the approximate location at which each aquifer becomes saturated moving away from the outcrop where the potentiometric surface is at the same elevation as the top of the formation. The estimated boundary is approximated using the intersection of the potentiometric surfaces generated from water level measurements and the top structure contour of each respective aquifer and thus not highly accurate, and not confirmed with many data points. More precise measurement of the unconfined portions will be determined during an additional hydrogeological investigation prior to well field development. For the initially proposed well fields, Burdock Mine Unit I, and Dewey Mine Unit I, conditions are well confined with water levels several hundred feet above the top of each aquifer and confined conditions measured in aquifer pump tests.



ER_RAI Figure WR-3.1: Location of Confined Portion of the Fall River Aquifer

POWERTECH (USA) INC.



ER_RAI Figure WR-3.2: Location of the Confined Portion of the Lakota Aquifer

Response Continued to RAI WR-3.1

Powertech (USA) plans for ISL operations within potentially unconfined portions are limited to the eastern side of the project in portions of Burdock Mine Unit II and Burdock Mine Unit IV in the Lakota Formation. Though ore bodies are present in unconfined portions of the Fall River formation on the eastern side of the permit area, Powertech (USA) does not propose to mine in those Fall River ore bodies in this license application. Furthermore, Powertech (USA) has limited its proposed operations in the Fall River Formation to the Dewey portion of the project. **Supplement Exhibit 3.1-4 Revised** "Future Mine Units" depicts ore bodies which Powertech (USA) plans to mine in the project.

Response to RAI WR-3.2

Criteria and designs of ISL operations for these unconfined portions are expected to be similar to those described for confined ISL operations. However, Powertech (USA) intends to only develop the mine units after more detailed collection and evaluation of hydrogeological data at those locations including installation of additional wells for more detailed mapping of the potentiometric surface and additional aquifer pumping tests to determine aquifer properties in the potentially unconfined conditions. Operation of the ISL mining activities will be conditional upon additional ore body delineation and additional hydrogeological investigations. Upon completion of these activities Powertech (USA) will present the operational design and plan of the mine units for review and approval by NRC and other appropriate agencies.

RAI WR-4

Provide information on expected consumptive use of groundwater during construction of the proposed Dewey-Burdock Project.

Response to RAI WR-4:

During the pre-production construction period, assumed to be one year, groundwater will be consumed for dust control, cement mixing, pump tests, as well as for delineation drilling and well drilling/completion. Initially, this water will be drawn from existing wells completed in the Inyan Kara aquifer. Wells completed within the Madison aquifer will be constructed early in the construction phase. Once those wells are available, Madison water will become the primary water source for the construction-phase. The quantity of groundwater consumed during the construction phase has been estimated as summarized in **ER_RAI Table WR-4.1**. For dust control, it was assumed that water application rates of 1.2 gallons per square yard per day will be used for 30 days of facility and pond construction and 180 days for the facility access roads. Water used for dust control will be discharged on the surface of the ground and will evaporate or infiltrate into the alluvial strata.

For well field drilling and well completion operations, groundwater will be consumed in formulating drilling muds and cement formulations within excavated pits. The quantity of water used for these purposes was estimated based on the drill-hole diameter and the number of hole volumes of water required for drill mud, cement formulation, and well completion activities. Water used in drilling will remain in the ground as part of the cement or drilling mud formulations. Water used in well completion operations will be discharged to the surface where it will dissipate through infiltration and evaporation.

For purposes of estimation of water consumption, one aquifer pump test per year during the construction period was assumed. The volume of Inyan Kara water consumed during each test was estimated assuming a constant flow rate of 50 gpm over a 72 hour period.

The total groundwater consumption for both sites during the construction period is estimated to be 161 ac-ft, which on an annualized basis represents a continuous flow rate of 0.22 cfs.

ER_RAI Table WR-4.1: Estimation of Groundwater Consumption During the One-year Construction Phase of the Dewey-Burdock Project.

Groundwater Consumption During one-year Construction Period		
Use	Groundwater consumed (Ac-ft)	
	Burdock	Dewey
Dust Control		
Facility site work	1.2	0.5
Roads	43.1	31.4
Pond construction	23.9	17.7
Delineation drilling	1.3	0.9
Well drilling/completion	23.4	15.6
Pump Test	0.7	0.7
Totals	94	67

RAI WR-5

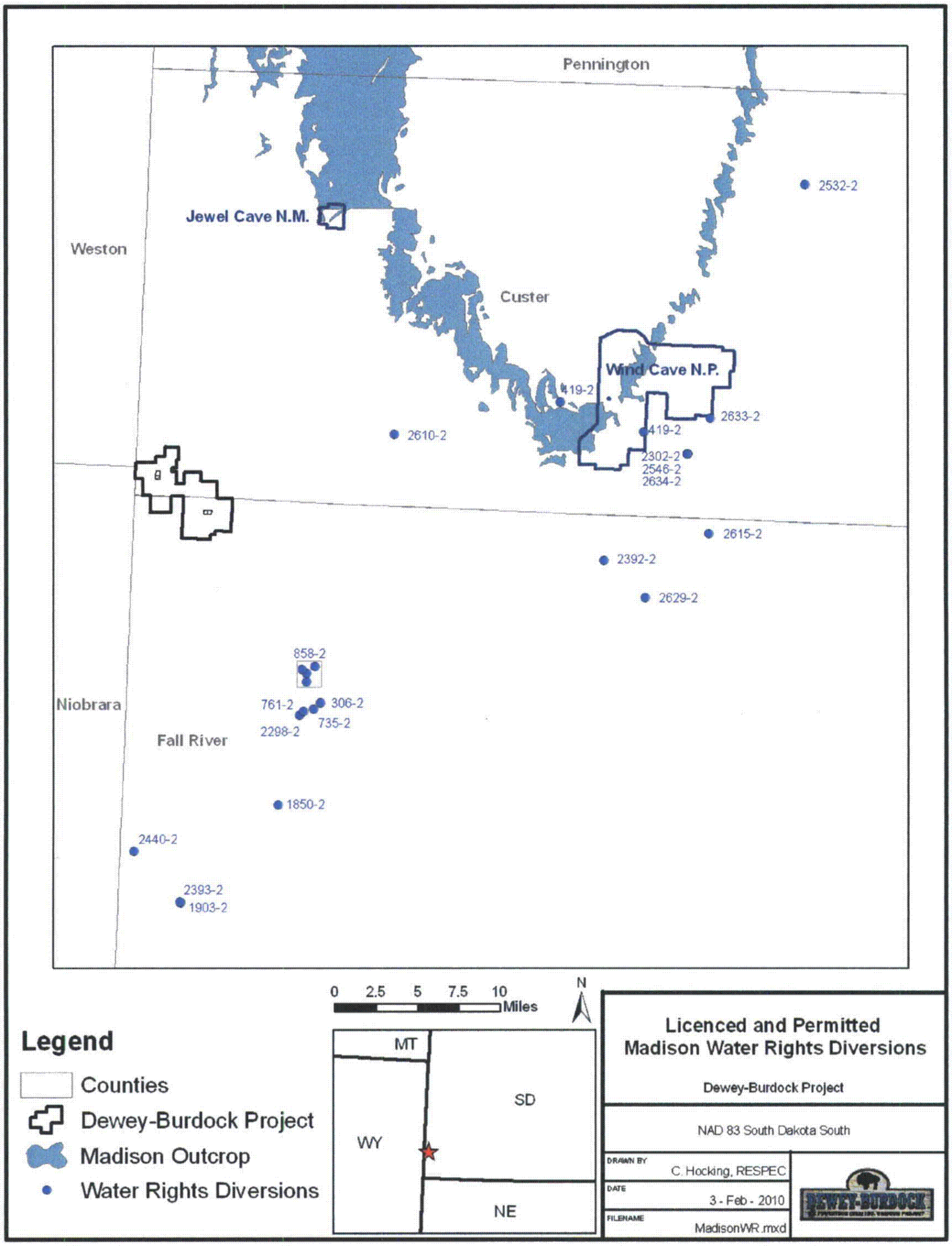
Provide information on the status of obtaining water appropriation permits for use of water from the Madison aquifer.

1. *Please provide information on the status of obtaining a water appropriation for use of Madison aquifer water during operations and aquifer restoration.*

2. *If water rights permit cannot be secured for the Madison aquifer provide information on the potential alternatives to meet water requirements during operations and aquifer restoration and how each alternative would impact groundwater levels, flow rates, and flow directions.*

Response to RAI WR-5.1:

The water rights application is planned to be submitted to DENR during 2010. There is currently limited use of the Madison water within the immediate vicinity of the project area and sufficient availability to meet the needs of the project. There are no reasons to expect that the permit would not be accepted and it is believed that the proposed project meets all acceptable criteria for obtaining a permit.



ER_RAI Figure WR-5.1: Distribution of Water Rights within the Madison Aquifer.

Response to RAI WR-5.2:

If water rights for the application cannot be secured, options are limited to use of water from the Inyan Kara aquifer. Estimated use of water from the Inyan Kara is expected as described in ER Section 4.6.2.7 "Potential Impacts from Simultaneous Operational and Restorational Groundwater Consumption". This use is estimated to be normally sustained at about 40 gpm, for the life of the project.

Effects of not securing a Madison water right would result in a combined net withdrawal (production and restoration) to be limited to availability of water within the Inyan Kara aquifer. Because the availability of this water is limited, the result is expected to extend the restoration schedule out farther in time or cause the need to schedule restoration to follow completion of mining operations.

With a deep disposal well option, restoration activities can utilize reverse-osmosis and re-inject permeate. If maximum withdrawal for restoration alone is estimated at 40 gpm from the Inyan Kara, then restoration could proceed at a nominal overall project flow rate of 120 gpm. For the land application option, reverse osmosis cannot be used, and an estimated nominal overall restoration flow rate of 40 gpm would be used. In comparison, use of an external water supply from the Madison allows a 500 gpm restoration design for both options.

RAI WR-6

Provide information on all known exploratory wells that extend below the Lakota Formation in the proposed project area.

Response to RAI WR-6:

In this response, the NRC's term of "exploratory wells" is interpreted to be the exploration drill holes used to describe subsurface geology and delineate resources within the Dewey-Burdock Project area. As shown in **ER_RAI Exhibit WR-6.1 "Dewey-Burdock Morrison Structure"** there are several hundred such exploratory drill holes throughout the project area that penetrate the entire Inyan Kara sequence and bottom in the Morrison Formation. **ER_RAI Exhibit WR-6.1** is a project-wide structure contour map on the top of the Morrison Formation, showing a northwesterly strike and an approximate two degree dip to the southwest. Also shown on this exhibit are two inserts, representing the locations of larger-scale structure contour maps on top of the Morrison within the initial well fields at Dewey (**ER_RAI Exhibit WR-6.2**) and Burdock (**ER_RAI Exhibit WR-6.3**). As shown on these larger-scale plates, depths to the top of the Morrison are represented by elevations above sea level. To the best of Powertech's knowledge, all exploratory drill holes used in this mapping have been plugged and abandoned.

For a listing of exploration drill holes within one mile of the PAA, refer to ER **Appendix 3.3-A**.

For a listing of all water wells that penetrate the Morrison Formation, refer to ER **Appendix 3.4-A**.

RAI WR-7

Provide information on deep aquifers below the Morrison Formation that could be used for deep well disposal of wastewater at the proposed project and status of UIC permit.

Response to RAI WR-7:

A complete description of the aquifers below the Morrison Formation is provided in the attached **Appendix WR-7** which contains the "UIC Permit Application Class V Injection Wells." Appendix WR-7 also presents all available information for the determination of potential impacts to groundwater quality from deep well disposal of liquid wastewaters at the Dewey-Burdock Project.

Clarification of Section 3.4.3.1.7

The description of the hydraulic connection described herein, while true for some areas within the region of the Black Hills, does not apply to the PAA. The following replacement text is provided.

Sufficient information exists to support confinement of the proposed zones of injection of liquid waste waters within the Deadwood and Minnelusa and is detailed in Appendix WR-7.

Pumping test results and mapping of the Graneros, Fuson, and Morrison confining units in the project area confirm that the Fall River and Lakota aquifers are locally confined at the project area and are not hydraulically connected with other any other aquifers in the project area.

No breccia pipes are known to exist within the PAA. Breccia pipes do exists upgradient and within the outcrop of various formations going towards the uplift. There is no evidence of hydraulic connections within the project area within the PAA as evidenced by pumping test results.

RAI ECOLOGY

Ecology:

RAI Ecology-1
Provide the basis and supporting documentation for the statement in ER Section 3.5.5.3.2, Big Game, that the South Dakota Game, Fish and Parks (SDGFP) does not recognize any crucial big game habitats or migration corridors in the permit area or surrounding 1.6-km [1-mi] perimeter.

Response to *RAI Ecology-1*:
The source of the statement that SDGFP does not recognize any crucial big game habitats or migration corridors in the permit area or surrounding 1.6-km [1-mi] perimeter was through personal communication with Mr. Stan Michals, SDGFP, Energy and Minerals Coordinator. Mr. Michals conducted the SDGFP's approval and site review of the baseline wildlife studies conducted in 2007-2008. Mr. Michals has provided to Powertech (USA) a letter from the SDGFP confirming the statement and updating the status of big game species as of May 2010. A copy is included in this submittal as **ER_RAI Exhibit Ecology-1.**

Noise:

RAI Noise-1

Provide information on the frequency and noise levels of freight trains passing through the project area.

Response to RAI Noise-1:

The frequency of freight trains passing through the project area on the Burlington Northern Santa Fe Railroad was reported by the local Edgemont Train Master to be 50 per day. The hourly rate is variable. The noise levels typically reported for a freight train traveling at approximately 50 mph on grade from a distance of 50 feet is approximately 80 dB, with a range from about 55 to 90 dB, depending on a number of factors, including condition and type of track, length of train, number of engines, condition of engines, speed, grade, etc. (Surface Transportation Board, CN-Control-EJ&E DEIS, Appendix L, 2008) and (Surface Transportation Board, Alaska Railroad - Northern Rail Extension DEIS, Appendix J, 2008) See the ER_RAI Table Noise1.1 below for a comparison of noise levels. The noise level for a train's horn, dictated by the Federal Railroad Administration (FRA) Train Horn Rule, is between 96 and 110 dB for 15 to 20 seconds at railroad crossings. Trains are required to comply with the rule which is attached hereto as **ER_RAI Exhibit Noise-1.**

ER_RAI Table Noise-1: Comparative Examples of Noise Sources, Decibels & Their Effects

Noise Source	Decibel Level	Decibel Effect
Jet take-off (at 25 meters)	150	Eardrum rupture
Aircraft carrier deck	140	
Military jet aircraft take-off from aircraft carrier with afterburner at 50 ft (130 dB).	130	
Thunderclap, chain saw. Oxygen torch (121 dB).	120	Painful. 32 times as loud as 70 dB.
Steel mill, auto horn at 1 meter. Turbo-fan aircraft at takeoff power at 200 ft (118 dB). Riveting machine (110 dB); live rock music (108 - 114 dB).	110	Average human pain threshold. 16 times as loud as 70 dB.
Jet take-off (at 305 meters), use of outboard motor, power lawn mower, motorcycle, farm tractor, jackhammer, garbage truck. Boeing 707 or DC-8 aircraft at one nautical mile (6080 ft) before landing (106 dB); jet flyover at 1000 feet (103 dB); Bell J-2A helicopter at 100 ft (100 dB).	100	8 times as loud as 70 dB. Serious damage possible in 8 hr exposure
Boeing 737 or DC-9 aircraft at one nautical mile (6080 ft) before landing (97 dB); power mower (96 dB); motorcycle at 25 ft (90 dB). Newspaper press (97 dB).	90	4 times as loud as 70 dB. Likely damage 8 hr exp
Garbage disposal, dishwasher, average factory, freight train (at 15 meters). Car wash at 20 ft (89 dB); propeller plane flyover at 1000 ft (88 dB); diesel truck 40 mph at 50 ft (84 dB); diesel train at 45 mph at 100 ft (83 dB). Food blender (88 dB); milling machine (85 dB); garbage disposal (80 dB).	80	2 times as loud as 70 dB. Possible damage in 8 hr exposure.
Passenger car at 65 mph at 25 ft (77 dB); freeway at 50 ft from pavement edge 10 a.m. (76 dB). Living room music (76 dB); radio or TV-audio, vacuum cleaner (70 dB).	70	Arbitrary base of comparison. Upper 70s are annoyingly loud to some people.
Conversation in restaurant, office, background music, Air conditioning unit at 100 ft	60	Half as loud as 70 dB. Fairly quiet
Quiet suburb, conversation at home. Large electrical transformers at 100 ft	50	One-fourth as loud as 70 dB.

Noise Source	Decibel Level	Decibel Effect
Library, bird calls (44 dB); lowest limit of urban ambient sound	40	One-eighth as loud as 70 dB.
Quiet rural area	30	One-sixteenth as loud as 70 dB. Very Quiet
Whisper, rustling leaves	20	
Breathing	10	Barely audible

Table modified from http://www.wenet.net/~hpb/dblevels.html] on 2/2000.
SOURCES: Temple University Department of Civil/Environmental Engineering (www.temple.edu/departments/CETP/environ10.html), and Federal Agency Review of Selected Airport Noise Analysis Issues, Federal Interagency Committee on Noise (August 1992). Source of the information is attributed to Outdoor Noise and the Metropolitan Environment, M.C. Branch et al., Department of City Planning, City of Los Angeles, 1970.

ER_RAI Noise - References

Surface Transportation Board (STB), Section of Environmental Analysis (SEA), Canadian National Railway and affiliates (CN) – Control – Elgin, Joliet and Eastern Railroad, Appendix L, Noise and Vibration Analysis, Draft Environmental Impact Statement, July, 2008

Surface Transportation Board (STB), Section of Environmental Analysis (SEA), Alaska Railroad – Northern Extension, Appendix J, Noise and Vibration, Draft Environmental Impact Statement, December 2008

ER_RAI Exhibit Noise-1

FRA Train Horn Rule Fact Sheet

Train Horn Rule Fact Sheet (PDF , 24Kb)

Purpose: The goal of the Federal Railroad Administration (FRA) in developing the train horn rule is to ensure safety for motorists at highway-rail grade crossings while allowing communities the opportunity to preserve or enhance quality of life for their residents by establishing areas/times in which train horns are silenced.

Historical Background: Since their inception, railroads have sounded locomotive horns or whistles in advance of grade crossings and under other circumstances as a universal safety precaution. During the 20th century, nearly every state in the nation enacted laws requiring railroads to do so. Some states allowed local communities to create whistle bans where the train horn was not routinely sounded.

In the early 1990's, the FRA observed a significant increase in train-vehicle collisions at certain gated grade crossings in Florida which coincided with a statewide whistle ban on the Florida East Coast Railroad (FECR). In 1993, FRA issued Emergency Order #15 requiring trains on the FECR to sound their horns again, pre-empting the 1984 Florida statute that created the ban. The number and rate of collisions at affected crossings returned to pre-whistle ban levels.

In 1994, Congress mandated that the FRA issue a federal regulation requiring the sounding of locomotive horns or whistles at all public highway-rail grade crossings; and to provide for exceptions to that requirement by allowing communities to establish "quiet zones." In 1996, Congress added that special consideration be given to communities with long-standing or legacy whistle bans.

Before finalizing the rule, FRA held public meetings around the country and solicited comment from scores of affected communities and stakeholders. Based upon the voluminous input received, FRA published an Interim Final Rule in December 2003, refining its original proposal and inviting additional public comment. The final federal train horn rule became effective on June 24, 2005.

The rule provides the first opportunity ever for many local communities around the country affected by train horn noise the option of silencing horns by establishing quiet zones.

Sounding the Locomotive Horn: Under the Train Horn Rule, locomotive engineers must sound train horns for a minimum of 15 seconds, and a maximum of 20 seconds, in advance of all public grade crossings, except:

- If a train is traveling faster than 45mph, engineers will not sound the horn until it is within ¼ mile of the crossing, even if the advance warning is less than 15 seconds.
- If a train stops in close proximity to a crossing, the horn does not have to be sounded when the train begins to move again.
- There is a "good faith" exception for locations where engineers can't precisely estimate their arrival at a crossing.

Wherever feasible, train horns must be sounded in a standardized pattern of 2 long, 1 short and 1 long. The horn must continue to sound until the lead locomotive or train car occupies the grade crossing.
For the first time, a maximum volume level for the train horn has been established at 110 decibels. The minimum sound level remains 96 decibels. Railroads have until 2010 to fully comply with the maximum volume level requirement.

Establishing a New Quiet Zone: A new quiet zone must be at least ½ mile in length and have at least one public highway-rail grade crossing. Every public grade crossing in a new quiet zone must be equipped at minimum with the standard or conventional flashing light and gate automatic warning system. A quiet zone may be established to cover a full 24-hour period or only during the overnight period from 10:00 P.M. to 7:00 A.M.

Local governments must work in cooperation with the railroad that owns the track, and the appropriate state transportation authority to form a diagnostic team to assess the risk of collision at each grade crossing where they wish to silence the horn. An objective determination is made about where and what type of additional safety engineering improvements are necessary to effectively reduce the risk associated with silencing the horns based on localized conditions such as highway traffic volumes, train traffic volumes, the accident history and physical characteristics of the crossing, including existing safety measures.

Examples of additional safety engineering improvements that may be necessary to reduce the risk of collisions include: medians on one or both sides of the tracks to prevent a motorist from driving around a lowered gate; a four-quadrant gate system to block all lanes of highway traffic; converting a two-way street into a one-way street; permanent closure of the crossing to highway traffic; or use of wayside horns posted at the crossing directed at highway traffic only.

Once all necessary safety engineering improvements are made, the local community must certify to FRA that the required level of risk reduction has been achieved. A quiet zone becomes effective and train horns go silent only when all necessary additional safety measures are installed and operational.

Quiet Zone Exceptions: In a quiet zone, engineers have no legal duty to sound the horn, but do have discretion to do so during emergency situations (i.e. the presence of a vehicle or a person on the track).

Under federal regulations, engineers must sound the horn to warn railroad maintenance employees or contractors working on the tracks.

Monitoring Quiet Zones: If a railroad or particular engineer is observed failing to sound horns as required or is repeatedly and unnecessarily sounding the horn in an established quiet zone, FRA will seek to remedy the situation or take enforcement action.

Effect of the Rule on Pre-Existing Whistle Bans: Legacy whistle bans were established by local ordinance or through agreements with specific railroads in accordance with existing state law, or through informal agreements honored or abided by a railroad. The new rule required communities with whistle bans to affirmatively state their intention to preserve it by submitting specific paperwork converting the ban to a "pre-rule quiet zone." Those that failed to do so by a specified deadline lost their special status and railroads resumed routine sounding of horns.

Pre-rule quiet zone communities that completed the required paperwork have been granted an extended grace period (from 5 to 8 years) to achieve compliance with certain rule requirements. During the grace period, local communities must periodically file paperwork to demonstrate their progress toward compliance or the horns will start sounding again.

The Chicago area's numerous pre-existing whistle bans are temporarily excepted from compliance with the rule because of their unique experience with this issue. After an ongoing collaborative review is completed, the FRA will determine the final status of the Chicago pre-rule quiet zones.

For a list of key terms and definitions click here
To view the Federal Register posting of the Train Horn Rule click here
For more detailed information about the Train Horn Rule click here

For additional information, please contact **FRA Public Affairs** (202) 493-6024 or www.fra.dot.gov .

December 2006

RAI CH

Cultural and Historic Resources:

RAI CH-1

Provide a single map showing the location and boundaries of documented archaeological sites and historic structures with respect to proposed facilities to be constructed within and beyond the next five years at the proposed Dewey-Burdock project.

1. Please provide a single map showing the location and boundaries of documented archaeological sites and historic structures with respect to proposed facilities (i.e., central processing plant, satellite plant, well fields, ponds, potential irrigation areas) to be constructed within the proposed Dewey-Burdock project area.

2. The map should include all facilities to be constructed over the proposed life of the project (i.e., within and beyond the next 5 years).

3. The map should include archeological sites and historic structures that are:
a. Currently listed on the National Register of Historic Places (NRHP).
b. Potentially eligible for listing on the NRHP.
c. Documented but unevaluated in terms of NRHP-eligibility.

Response to RAI CH-1:

The Applicant directs the reviewer's attention to **ER_RAI Exhibit CH-1** that describes the map features requested in ER_RAI CH-1.1 through 1.3. **ER_RAI Exhibit CH-1** is considered CONFIDENTIAL and not available to the public pursuant to 10 CFR § 2.390(a)(4).

RAI CH-2

Provide additional information on sites 39CU3592 and 39CU560 and/or explain why these sites were included in evaluative testing but were not documented in the Level III cultural resource inventory reports.

Response to RAI CH-2:

Site 39CU3592

Site 39CU3592 is addressed in the survey report (Kruse et al, 2008) on pages 5.203 through 5.205.

Site 39CU560

The cultural resource investigator, Augustana College Archaeology Lab, reports that Site 39CU560 was initially recorded during the TVA work in the 1980s. It was not relocated during the 2007 survey due to its nature (a small cobblestone foundation) and went undetected (transects are 30 meters apart which is the distance allowed by State Guidelines). It was only partially intact and partially silted in when it was relocated in the fall of 2008.

In communication from Kruse (May 13, 2010), he further states, "However, I believe it was during the meeting in Edgemont in Feb. of 2008 that we were asked to evaluate any site in proximity to a satellite plant or ore location. This was done so that all of the sites within the proposed first phase of the construction were thoroughly investigated."

RAI CH-3

Provide information or plans that describe agreements and measures to be undertaken to meet federal compliance with handling of cultural resources in the event cultural resources are encountered during construction, operation, aquifer restoration, and decommissioning activities at the proposed Dewey-Burdock project.

Response to RAI CH-3:

Powertech (USA) contracted with Augustana College's Archaeology Laboratory to conduct a Level III inventory survey at the proposed Dewey-Burdock Project and coordinated the review of the findings with the South Dakota State Archaeologist. The Assistant State Archaeologist became familiar with the report's findings. Powertech's understanding of the review process associated with federal undertakings is that the federal agency responsible for the "undertaking" is also responsible for initiating contact with the State Historical Preservation Office (SHPO) and for compliance with the National Historic Preservation Act (NHPA). Consequently, Powertech did not initiate any discussions with the South Dakota State Historical Preservation Office. Also, it was understood that communication between the SD State Archaeologist and the SD State Historical Preservation Office would occur if there was a regulatory necessity.

The decision to request an MOA (ER Appendix 4.10B) with the State Archaeologist was viewed as a natural progression of actions necessary to protect the historic and cultural resources associated with the proposed Dewey-Burdock Project, particularly since the SD State Archaeologist was knowledgeable, conscientious and willing to enter into such an agreement with Powertech. The MOA, executed September 15, 2008, establishes procedures to avoid or mitigate potential effects on archaeological and historic sites pursuant to South Dakota statutes 45-6D-14 and 45-6B.

The first stipulation of the MOA states "Archaeological or historic sites threatened or potentially threatened by proposed ground disturbing activity in the current and projected phases of the Project will be investigated prior to the proposed activity to determine their significance or research potential." Stipulation VI – UNANTICIPATED DISCOVERIES states, "If historic or archaeological sites are discovered or unanticipated effects on historic or archeological sites are found during any phase of the Project, Powertech shall temporarily halt any surface disturbing activities in the immediate vicinity and contact ARC. Powertech will not resume its activities in the area until and unless the unanticipated effects or sites are investigated and clearance to proceed is granted by ARC." ARC is the acronym for the South Dakota State Archaeologist's Archaeological Research Center.

These two stipulations of the MOA coupled with the phased approach to project development and cultural investigation provide the key components to Powertech's plans for meeting both state and federal compliance requirements for handling of cultural resources in the event cultural resources are encountered during all phases of the proposed Dewey-Burdock Project.

RAI SOC

Socioeconomics:

RAI SOC-1

Provide additional data from the most recent source available on demographic and socioeconomic parameters for the counties and towns surrounding the proposed project location.

1. Provide updated race characteristics (e.g., 2008 data) for Fall River and Custer Counties in South Dakota (similar to ER Table 3.10.3) and Niobrara and Weston Counties in Wyoming (similar to ER Table 3.10.4), if available.

2. Provide annual average labor, employment, and income characteristics for direct social zones within the region of interest for Wyoming, similar to data provided in ER Section 3.10.3 for South Dakota.

3. Provide school information for the direct social zones of influence for Wyoming, similar to school information for the direct social zones of influence for South Dakota provided in ER Section 3.10.2.2.

4. Provide tax information for the direct social zones of influence for Wyoming, similar to tax information for the direct social zones of influence for South Dakota provided in ER Section 3.10.3.5.

5. Provide updated housing unit statistics (e.g., 2008 data) for Fall River, Custer, Niobrara, and Weston Counties (similar to ER_RAI Table 3.10-16), if available. In addition, provide housing unit statistics for affected towns within the region of interest, if available.

Response to RAI SOC1.1:

Updated gender and race characteristics were obtained from the U.S. Census Bureau (USCB) for each county and state. **ER_RAI Table SOC-1.1** provides the statistics for Custer County, Fall River County, and the State of South Dakota, based on 2008 data. **ER_RAI Table SOC-1.2** provides the statistics for Niobrara County, Weston County, and the State of Wyoming, based on 2008 data.

ER_RAI Table SOC-1.1
Updated 2008 Gender and Race Characteristics for South Dakota

Data Type	Custer County	Fall River County	South Dakota
Male / female ratio, %	51.1 / 48.9	51.1 / 48.9	49.8 / 50.2
Race, %			
White	93.9	90.3	88.2
Black / African American	0.3	0.3	1.1
American Indian / Alaskan Native	3.8	6.5	8.5
Asian	0.2	0.2	0.7
Native Hawaiian / Pacific Islander	Z	0.1	0.1
Other or two or more races	1.8	2.6	1.4
Hispanic / Latino (of any race)	2.0	2.3	2.6

Data from US Census Bureau QuickFacts: http://quickfacts.census.gov
Notes: Z= Value greater than zero but less than half unit of measure shown

ER_RAI Table SOC-1.2
Updated 2008 Gender and Race Characteristics for Wyoming

Data Type	Niobrara County	Weston County	Wyoming
Male / female ratio, %	47.4 / 52.6	51.6 / 48.4	50.7 / 49.3
Race, %			
White	98.4	96.6	93.9
Black / African American	0.2	0.3	1.3
American Indian / Alaskan Native	0.6	1.5	2.5
Asian	0.1	0.2	0.7
Native Hawaiian / Pacific Islander	0.0	Z	0.1
Other or two or more races	0.7	1.4	1.5
Hispanic / Latino (of any race)	2.6	2.7	7.7

Data from US Census Bureau QuickFacts: http://quickfacts.census.gov
Note: Z= Value greater than zero but less than half unit of measure shown

Response to RAI SOC-1.2:

Labor Characteristics

The annual average labor and employment statistics were obtained from the Wyoming Department of Employment (WDE), Research and Planning division. The statistics provided in **ER_RAI Table SOC-1.3** below are based on data from 2009.

ER_RAI Table SOC-1.3
Labor Statistics for Niobrara and Weston Counties, and Wyoming (2009)

Data Type	Niobrara County	Weston County	Wyoming
Population Estimate, 2009	2,366	7,009	544,270
Labor force, persons	1,261	3,236	293,927
Labor force, % of total population	53.3*	46.2*	54.0*
Employed, persons	1,195	3,029	275,217
Unemployed, persons	66	207	18,710
Unemployment rate, annual %	5.2	6.4	6.4
Labor supply, persons	ND	ND	ND
Labor supply, % of labor force	ND	ND	ND

* Percentages based on total estimated population for 2009, provided by US Census Bureau.
ND = No data provided by WDE

ER_RAI Table SOC-1.4 below presents the educational attainment statistics for the year 2000 for Niobrara and Weston Counties as well as for the State of Wyoming. Statistics are based on percentages of persons, age 25 and older, that fall under each attainment category. In Niobrara County, 38.9 percent of people age 25 and older have at least 12 years of formal education (high school level) and in Weston County, 40.2 percent have at least 12 years of formal education. Both counties have a higher percentage of high school graduates than the State average of 31 percent. In Niobrara County, 33.1 percent of people age 25 and older have some college, and in Weston County, 30.5 percent have some college, as compared to 35 percent for the State as a whole.

ER_RAI Table SOC-1.4
Educational Attainment for Niobrara and Weston Counties, and the State of Wyoming

Level of Schooling Completed	Niobrara County, %	Weston County, %	Wyoming, %
Less than high school	12.7	14.8	12.1
High school (12 years of school)	38.9	40.2	31.0
Some college (no degree)	33.1	30.5	35.0
College degree	15.3	14.5	21.9

Data provided by USDA Economic Research Service
http://www:ers.usda.gov/Data/Education/EducListpct.asp?ST=WY&view=Percent

Employment Characteristics

Unemployment trends for Niobrara and Weston Counties and Wyoming's state-wide rate over the last decade are presented in **Figure SOC-1.1**, which plots the average unemployment rate for each year determined from monthly county and state data provided by the WDE's Local Area Unemployment Statistics (LAUS).

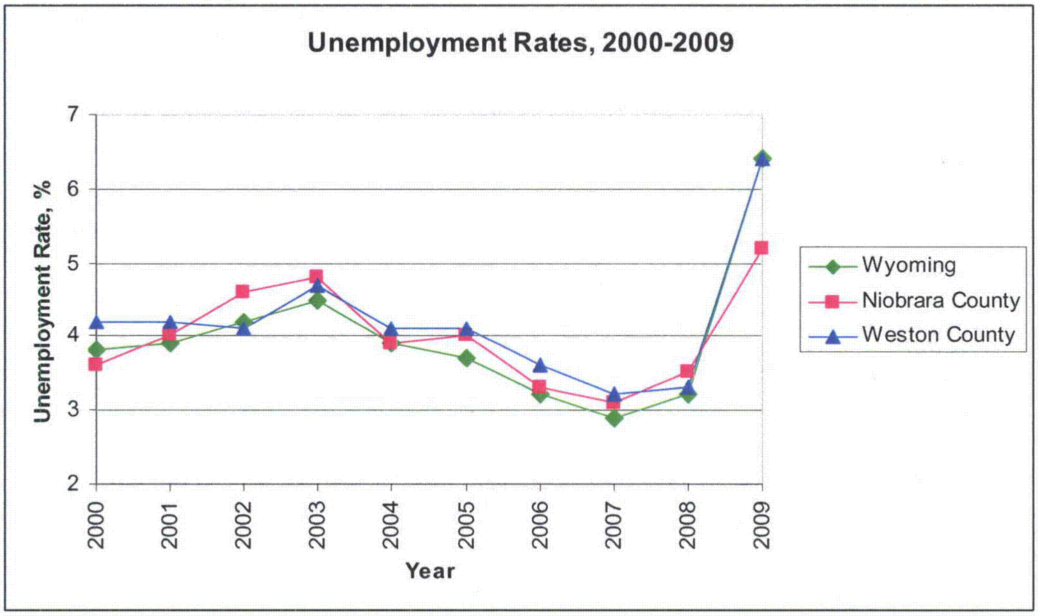


Figure SOC-1.1: Unemployment Rates, Wyoming, 2000 – 2009

As the figure shows, the average unemployment rates have remained similar between the Counties of Niobrara and Weston and the State of Wyoming. No major disparities between county and state trends have occurred in the last decade.

ER_RAI Table SOC-1.5 below presents statistics on covered worker employment by sector for Niobrara and Weston Counties for the 3rd quarter of 2009, and **ER_RAI Table SOC-1.6** presents statistics for the State of Wyoming. Covered workers are defined by the WDE as workers who have access to unemployment insurance benefits.

ER_RAI Table SOC-1.5
Covered Worker Employment by Sector, Niobrara and Weston Counties

NAICS* Sub Sectors	Niobrara County 3rd QTR 2009 Avg. Monthly # Employed	Weston County 3rd QTR 2009 Avg. Monthly # Employed
Total Employed	913	2,289
Total, Private	472	1,471
Agriculture, Forestry, Fishing, & Hunting	ND	27
Mining	20	143
-Support activities for mining	ND	76
Utilities	ND	33
Construction	40	91
-Construction of buildings	ND	23
-Heavy & civil engineering construction	ND	49
-Specialty trade contractors	17	19
Manufacturing	ND	124
Wholesale Trade	ND	35
Retail Trade	114	254
-Motor vehicle & parts dealers	ND	31
-Food & beverage stores	ND	98
-Gasoline stations	66	43
-Miscellaneous store retailers	ND	11
Transportation & Warehousing	7	98
-Truck transportation	ND	84
Information	ND	36
Finance & Insurance	20	63
-Credit intermediation & related activities	ND	46
Real Estate & Rental & Leasing	9	20
-Real estate	ND	5
-Rental & leasing services	ND	15
Professional & Technical Services	8	42
Management of Companies & Enterprises	ND	5
Administrative & Waste Services	6	11
Health Care & Social Assistance	58	206
-Social assistance	ND	102
Accommodation & Food Services	93	241
-Accommodation	47	43
-Food services & drinking places	46	198
Other Services, Except Public Admin.	41	34

NAICS* Sub Sectors	Niobrara County 3rd QTR 2009 Avg. Monthly # Employed	Weston County 3rd QTR 2009 Avg. Monthly # Employed
-Repair & maintenance	ND	24
Total Government	441	818
--Federal Government	15	58
--State Government	126	154
--Local Government	300	606

* NAICS = North American Industry Classification System
ND – Not Disclosable

ER_RAI Table SOC-1.6
Covered Worker Employment by Sector, State of Wyoming

NAICS* Sub Sectors	Wyoming 3rd Quarter 2009 Average Monthly # Employed
Total, Statewide	278,234
Private (NAICS)	216,425
--Agriculture, Forestry, Fishing, & Hunting	2,626
--Mining	24,387
--Utilities	2,489
--Construction	25,571
--Manufacturing	9,104
--Wholesale Trade	8,598
--Retail Trade	31,414
--Transportation & Warehousing	9,001
--Information	3,952
--Finance & Insurance	7,105
--Real Estate & Rental & Leasing	4,159
--Professional & Technical Services	9,163
--Management of Companies & Enterprises	724
--Administrative & Waste Services	7,893
--Educational Services	1,637
--Health Care & Social Assistance	22,936
---Ambulatory health care services	8,481
---Hospitals	3,326
---Nursing & residential care facilities	4,544
---Social assistance	6,585
--Arts, Entertainment, & Recreation	3,506
--Accommodation & Food Services	33,953
--Other Services, Except Public Administration	8,207

NAICS* Sub Sectors	Wyoming 3rd Quarter 2009 Average Monthly # Employed
Total Government	61,809
--Federal Government	8,431
--State Government	13,471
----State Government Education	3,991
--Local Government	39,907
----Local Government Education	17,213
----Hospitals	6,623

* NAICS = North American Industry Classification System

ER_RAI Table SOC-1.7 presents a list of major employers, number of employees and the type of product or service for each major employer listed for Niobrara and Weston Counties. The data was provided by the Northeast Wyoming Economic Development Coalition.

ER_RAI Table SOC-1.7
Major Employers, Niobrara and Weston Counties, 2007

	Company	No. of Employees	Product/Service
Niobrara County	Niobrara School District	120	Education
	Union Pacific Railroad	100	Railroad
	Wyoming Women's Center	83	Correction Facility
	Niobrara County	53	Government Services
	Town of Lusk	22	Government Services
	Niobrara Rural Electric Association	18	Utility
Weston County	Weston Co School Dist 1	200	Education
	Weston Co Hospital & Manor	138	Health Care
	Jacobs Ranch Mine	130	Coal Mining
	Weston Co School Dist 7	86	Education
	Wyoming Refining Company	75	Gas/Oil/Diesel
	Weston County	58	Government Services
	Dixon Brothers	35	Trucking
	City of Newcastle	33	Government Services
	Union State Bank	9	Financial Services
	Town of Upton	7	Government Services

Data provided by Wyoming Business Council County Profiles, www.whywyoming.org

Income Characteristics

ER_RAI Table SOC-1.8 below provides statistics on median and per capita incomes and poverty levels for Niobrara and Weston Counties and the State of Wyoming.

ER_RAI Table SOC-1.8
Income Statistics for Cities and Counties of Wyoming near the PAA

Location	Covered Workers, Annual Average Pay (2)	Median Household Income(6)		Median Family Income(6)		Per Capita Income	
		Original Data (1)	Adjusted for Inflation (5)	Original Data (1)	Adjusted for Inflation (5)	Original Data	Adjusted for Inflation (5)
Niobrara County	$28,548	$29,701	$37,600	$33,714	$42,700	$33,486 (4)	$34,600
Lance Creek		$36,250	$45,900	$36,250	$45,900	$14,419 (1)	$18,200
Lusk		$29,760	$37,600	$37,583	$47,500	$15,847 (1)	$20,000
Manville		$15,833	$20,000	$28,750	$36,400	$11,386 (1)	$14,400
Van Tassell		$53,750	$68,000	$53,750	$68,000	$17,686 (1)	$22,000
Weston County	$30,680	$32,348	$40,900	$40,472	$51,200	$38,749 (4)	$40,000
Hill View Heights		$50,469	$63,800	$52,031	$65,800	$24,424 (1)	$30,900
Newcastle		$29,873	$37,800	$36,929	$46,700	$15,378 (1)	$19,500
Osage		$25,096	$31,700	$28,000	$35,400	$24,974 (1)	$31,600
Upton		$31,053	$39,300	$39,091	$49,500	$15,165 (1)	$19,200
Wyoming	$39,312	$37,892	$47,900	$45,685	$57,800	$40,560 (3)	$41,000

(1) Data from US Census Bureau QuickFacts: http://quickfacts.census.gov, based on 1999 dollars
(2) Covered workers annual average pay is based on data provided by WDE for 3rd Quarter, 2009
(3) Data provided by Wyoming Department of Employment, Research & Planning, 2008 dollars
(4) Data supplied by US Bureau of Economic Analysis, 2007 dollars
(5) Original data adjusted for inflation to 2009 dollars using http://measuringworth.com/calculators/uscompare
(6) According to US Census Bureau, household income takes all households into account, while family income takes only households with two or more persons related through blood, marriage or adoption into account.

Response to RAI SOC-1.3:

Public schools (kindergarten through 12th grade) in Wyoming are generally organized at the county or sub-county level by school district. The three Wyoming public school districts in the project area and their attendant schools and age levels are:

- Niobrara County School District #1:
    - Lance Creek Elementary, K – 8th
    - Lusk Elementary, K – 5th
    - Lusk Middle, 6th – 8th
    - Niobrara County, 9th – 12th
- Weston County School District #1:
    - Newcastle Elementary, K – 2nd
    - Newcastle Elementary, 3rd – 5th
    - Newcastle Middle, 6th – 8th
    - Newcastle High, 9th – 12th
- Weston County School District #7:
    - Upton Elementary, K – 5th
    - Upton Middle, 6th – 8th
    - Upton High, 9th – 12th

There are no private or charter primary or secondary schools located within the direct social zones within the region of interest in Wyoming. **ER_RAI Table SOC-1.9** presents general educational statistics for Niobrara and Weston Counties

ER_RAI Table SOC-1.9
Educational Statistics, Niobrara and Weston Counties, 2006-2007

Parameter	Niobrara County	Weston County
County School Districts Enrollment	364	1,079
Average Student Teacher Ratio	10.7:1	12.12:1
Graduation Rate	85.30%	85.95%

Data obtained from Wyoming Department of Education

The closest post-secondary schools, in Wyoming, to the PAA are Casper College, located 170 miles southwest in Casper, WY and Gillette College, located 125 miles northwest in Gillette, WY. The Oglala Lakota College is a tribally controlled college, located in Eagle Butte, on the Pine Ridge Indian Reservation and in Rapid City, South Dakota, offering baccalaureate degrees and a master's degree in Lakota Leadership as well as certificates and associates of arts (A.A.) degrees.

Response to RAI SOC-1.4:

The municipal tax rates for cities and towns located within Niobrara and Weston Counties, for 2009, as provided by the Wyoming Department of Revenue (WDR) are listed in **ER_RAI Table SOC-1.10**. The sales and use tax total distributions for the 2009 fiscal year by county, city and/or town in the vicinity of the proposed project are provided in **ER_RAI Table SOC-1.11**. The locally assessed valuations for various property types in Niobrara and Weston Counties for 2009 are provided in **ER_RAI Table SOC-1.12** .

ER_RAI Table SOC-1.10
Municipal Tax Rates for Cities and Towns in Niobrara and Weston Counties

City or Town	County Name	State Tax Rate	General Purpose Option	Specific Purpose Option	Economic Dev. Option	Total Sales Tax Rate
Hat Creek	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Keeline	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Kirtley	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Lance Creek	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Lusk	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Manville	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Mule Creek Junction	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Node	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Redbird	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Riverview	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Van Tassell	Niobrara County	4.00%	1.00%	1.00%	0.00%	6.00%
Bentley	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%
Buckhorn	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%
Clareton	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%
Clifton	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%
Colloid	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%
Four Corners	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%
Morrisey	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%
Newcastle	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%
Osage	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%
Thorton	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%
Upton	Weston County	4.00%	1.00%	0.00%	0.00%	5.00%

Tax rates effective 07/01/09
Table adapted from data provided by Wyoming Department of Revenue

ER_RAI Table SOC-1.11
Total Sales and Use Tax Distribution for 2009 Fiscal Year

County/City/Town	Total Distribution, 2009
Niobrara County	$759,021.26
Lusk	$618,396.70
Manville	$40,778.53
Van Tassell	$7,267.43
Weston County	$1,191,752.55
Newcastle	$1,268,374.55
Upton	$340,419.41

Data obtained from Wyoming Department of Revenue

ER_RAI Table SOC-1.12
Locally Assessed Valuations, 2009

Property Type	Niobrara	Weston
Total Agricultural Land Valuation	$6,246,145	$4,192,152
Total Residential Land, Improvements & Personal Property	$9,801,942	$32,958,352
Total Commercial Land, Improvements & Personal Property	$2,709,441	$4,837,830
Total Industrial Property	$3,496,426	$8,362,567
Total Locally Assessed	$22,253,954	$50,350,901

Data provided by Wyoming Department of Revenue in the annual report for 2009.

<u>Response to RAI SOC-1.5</u>:
Updated housing unit statistics are not available from the US Census Bureau as of May, 2010. The most current information on housing unit statistics, based on Census 2000 data, for cities, towns, and counties within the region of interest are provided in ER Table 3.10-16.

RAI SOC-2
Provide additional data on mining and mineral resource development in the vicinity of the proposed project area.
Response to RAI SOC-2:
Although ER Section 3.10.3 includes information regarding worker employment and sales and use taxes for the Natural Resources/Mining Sector in Custer and Fall River Counties, there are currently no active mining operations or mineral resource projects in the vicinity of the proposed project. Small scale mining operations do exist near Custer, South Dakota (approximately 45 miles to the north) where Pacer Corporation mines muscovite, mica and potash feldspar for domestic and international customers. Closer to the project area, GCC Dacotah, Inc. (Rapid City, SD) is seeking approval to cross federal lands with a 6.6 mile long conveyor to transport limestone from a proposed quarry site near Hell Canyon

(approximately 10 miles north of the Dewey-Burdock project site) to a rail loadout facility two miles southeast of Dewey. The Bureau of Land Management (BLM) issued a draft environmental impact statement in January 2009 and has not issued the final EIS as of May 2010 (BLM, 2009).

Both the State of Wyoming and the State of South Dakota levy taxes on mineral extraction activities. Wyoming levies a uranium mining severance tax of 4.0%, while South Dakota levies an energy minerals severance tax on uranium of 4.5% and an additional conservation tax of 0.24% on the taxable value of any mineral produced from mining operations. Powertech (USA) Inc. used these tax rates to project state and local tax revenues for the proposed project in the cost-benefit analysis (ER, Section 7). The results are provided in Table 7.3-3 of the ER.

Reference:
Bureau of Land Management (BLM), 2009. Draft Environmental Impact Statement. Dewey Conveyor Project, DOI-BLM-MT-040-2009-0002-EIS, January 2009.

RAI SOC-3
Provide information on medical treatment personnel, facilities, and emergency services.

Response to RAI SOC-3:
There are several existing medical and emergency facilities that would be capable of handling a potential incident at the project site. **ER_RAI Table SOC-3.1** below provides the medical facilities located near the proposed project and their capabilities and locations.

ER_RAI Table SOC-3.1
Medical Facilities Located near the Proposed Project

Facility	Services	Contact Information	Distance from the Project
Edgemont Regional Medical Clinic	Non life-threatening medical services, open 3 days/week	908 H Street PO Box 687 Edgemont, SD 57735	Approximately 18 miles southwest
Weston County Health Services	24-hour emergency services	1124 Washington Blvd. Newcastle WY 82701	Approximately 40 miles north
Custer Regional Hospital	16 bed acute care facility with 24-hour emergency service, and inpatient/outpatient care	1039 Montgomery Street Custer, SD 57730	Approximately 50 miles northeast
Fall River Hospital	25 bed facility; 24-hour emergency services; capable of ground and air ambulatory transportation	1201 Hwy 71 South Hot Springs, SD 57747	Approximately 40 miles east

RAI SOC-4

Provide labor force and employment information for the aquifer restoration and decommissioning phases of the proposed project.

Response to RAI SOC-4:

Aquifer restoration will occur during both the operation and decommissioning phases of the project. **ER_RAI Table SOC-4.1** below provides the breakdown of the anticipated labor force required during the aquifer restoration and decommissioning phases of the project:

ER_RAI Table SOC-4.1
Labor Force for Aquifer Restoration/Decommissioning Phases

	Labor Type	No of Employees
Aquifer Restoration (Operations and Decommissioning Phases)	Restoration engineer	1
	Restoration operator	1
	GW sampling technician	2
	Central plant operations supervisor	1
	Central plant operator	1
	Lab technician	1
	General maintenance Technician	1
	Electrical/Instrumentation	1
	Total	9
Decommissioning Labor	Construction management	2
	General construction technicians	4
	Heavy equipment	2
	Construction engineer	1
	Total	9

RAI SOC-5

Provide information on impacts to socioeconomic parameters from the proposed project.

1. Provide information on impacts to local finance for counties and towns surrounding the proposed project location (see ER RAI SOC-1). ER Section 4.12 does not include expected impacts to local finance for the surrounding counties and towns.

2. Provide information on impacts to housing for counties and towns surrounding the proposed project location. ER Section 4.12.3 mentions potential housing impacts during the operational phase of the *project, but no information on the expected impacts is provided. In addition, housing impacts during the construction, aquifer restoration, and decommissioning phases of the proposed project are not provided.*

3. Provide information on educational impacts for counties and towns surrounding the proposed project location. ER Section 4.12.4 mentions potential educational impacts during the operational phase of the project, but no information on the expected impacts is provided. In addition, educational impacts during the construction, aquifer restoration, and decommissioning phases of the proposed project are not provided.

4. Provide information on impacts to health and social services for counties and towns surrounding the proposed project location. ER Section 4.12.4 mentions potential impacts to health and social services during the operational phase of the project, but no information on the expected impacts is provided. In addition, impacts to health and social services during the construction, aquifer restoration, and decommissioning phases of the proposed project are not provided.

Response to RAI SOC-5.1:

The Cost-Benefit Analysis in ER Section 7.0 contains information regarding the potential impacts to employment and local and state tax revenue benefits. As discussed in ER Section 7.3.3, the construction, operation and reclamation stages of the project are expected to generate a net present value of approximately $13.54 million in total business tax revenue over the life of the project as shown in **ER_RAI Table SOC-5.1**.

ER_RAI Table SO-5.1
Projections of State and Local Tax Revenue

	Construction 2 years	Operation 7 years	Reclamation 7 years	Total
Indirect Business Tax Revenue	**Net Present Value ($)***			
Motor Vehicle License (per annum)	$10,800	$6,107	$552	
Other Taxes (per annum)	$51,351	$29,037	$2,627	
Property Tax1 (per annum)	$334,485	$334,485	$334,485	
State/Local Non Taxes (per annum)	$28,602	$16,173	$1,463	
Sales Tax2 (per annum)	$1,374,000	$636,000	$60,000	
Total Indirect Business Taxes per Year	$1,799,238	$1,021,802	$399,127	
Total Indirect Business Taxes	$3,598,476	$7,152,614	$2,793,889	$13,544,979

*2008 Dollar Equivalents
1Property Tax was calculated using the value generated by the IMPLAN model for construction, $334,485.
2Sales Tax was calculated by applying 3 percent to the total non-payroll expenditures"

In addition, the economic analysis also indicates that the construction, operation and reclamation stages of the project are expected to generate approximately $186.7 million in value added benefits over the life of the project, as stated in ER Section 7.3.4.

Response to RAI SOC-5.2:
ER Section 7.4.1.1 contains information regarding the potential impacts to housing. It is assumed that much of the project workforce will come from surrounding communities including Custer City and Hot Springs, South Dakota and Newcastle, Wyoming. The remaining necessary workforce would likely relocate from surrounding areas within South Dakota, Nebraska and Wyoming. In the unlikely event that the entire direct payroll and non-payroll workforce relocated to Custer and Fall River counties, the population increase for the three stages of operations would be 6.9 percent, as described in ER Section 7.4.1.1 based on the average family size in South Dakota of 2.41 as of 2006. The impacts associated with an increase in population are expected to be dispersed because of the remoteness of the project site and the phased nature of construction, operation, aquifer restoration and decommissioning. While this is a moderate increase in the overall percentage of the local population, this influx of immigration would be partially mitigated by implementing a preferential hiring scheme and using regional educational/training institutions to help train workers and to ensure that as many of the local residents are hired as possible.

The amount of workforce needed during the construction, aquifer restoration, and decommissioning phases of the project will be less than the workforce required during operations. Therefore, potential impacts to housing will be insignificant and even less than any potential impacts to housing associated with the project during the operations phase, as described above.

Response to RAI SOC-5.3:
ER Section 7.4.1.2 contains information regarding the potential impacts to education. The student teacher ratio in the Custer School District is 12.1 to 1, in the Hot Springs District it is 12.9 to 1, and in the Edgemont School District, it is 8.8 to 1. The South Dakota State wide average is 13.4 to 1. In the Niobrara County District, the ratio is 10.7 to 1, and in the Weston County District, the ratio is 12.12 to 1. In all districts, the student teacher ratio is under the national average of 15.7 students to each teacher. Therefore, potential impacts associated with the added population in these schools are not expected to strain the current school systems.

The amount of workforce needed during the construction, aquifer restoration, and decommissioning phases of the project is less than the workforce needed during operations. Therefore, potential impacts to education will be insignificant and even less than any potential impacts to education associated with the project during the operations phase, as described above.

Response to RAI SOC-5.4:
ER Section 7.4.1.2 contains information regarding the potential impacts to health and social services. Existing emergency response and medical treatment facilities are capable of responding to any possible incident at the project site; therefore the basic services required to support the project already exist and will not be stressed as a result of the project.

See the response to Comment RAI SOC3 above, for a more detailed discussion of the existing health services capabilities.

The State of South Dakota Social Services has offices located throughout the state, including one in Custer, one in Hot Springs, and one in Rapid City. The State of Wyoming has numerous social services offices located throughout the state as well. There is an office for Niobrara and Weston Counties, as well as other local offices including one in Newcastle and one in Lusk. It is not anticipated that the additional population will stress the current social services capabilities, due to the multiple offices located within a short distance of the proposed project location.

The amount of workforce needed during the construction, aquifer restoration, and decommissioning phases of the project is less than the workforce needed during operations. Therefore, potential impacts to emergency and social services will be insignificant and even less than any potential impacts to emergency and social services associated with the project during the operations phase, as described above.

Environmental Justice:

RAI EJ-1

Provide additional data from the most recent source available on low-income characteristics for counties surrounding the proposed project location.

1. Provide updated characteristics on low-income populations (e.g., 2008 data) for Fall River and Custer Counties in South Dakota (similar to ER Table 4.13-1), if available.

2. Provide the most recent low-income characteristics for Niobrara and Weston Counties in Wyoming (similar to ER Table 4.13-1 for Fall River and Custer Counties in South Dakota), if available.

Response RAI EJ-1.1 and RAI EJ-1.2:

No updated characteristics on low-income populations were available for Fall River and Custer Counties in South Dakota as of May, 2010. Table 4.13-1 of the ER provides the most current data for Fall River and Custer Counties in South Dakota. **ER_RAI Table EJ-1.1** below provides low-income and minority statistics for Niobrara and Weston Counties as obtained from the US Census Bureau. The data is from the American Community Survey conducted in 2006-2008. As shown in the table below, the racial minority population was below the state average of 8.4 percent in all communities listed in the table that are near the proposed project site. The median household income, in 1999 dollars, is below the state average in all locations but the Town of Van Tassell, where the median household income is 42% higher than the state average of $37,892. All locations with the exception of the town of Van Tassell have a greater percentage of population below state poverty level of 8.9 percent.

ER_RAI Table EJ-1.1 Race and Poverty Statistics for Areas Surrounding the Proposed Project

City/Town/County	Total Population	White, non-Hispanic population %	Total racial minority population %	Hispanic Population %	Native American population %	Median Household Income in 1999 dollars	Percent below poverty level
Niobrara County	2,407	98	2	1.5	0.5	$29,701	13.4
Lusk(Town of Niobrara County)	1,447	97.9	2.1	1.6	0.6	$29,760	14.2
Manville(Town of Niobrara County)	101	100	0	0	0	$28,750	13.6
Van Tassell (Town ofNiobrara County)	18	94.4	5.6	0	0	$53,750	0
Weston County	6,644	95.9	4.1	2.1	1.3	$32,348	9.9
Newcastle (City of Weston County)	3,065	95.8	4.2	1.7	1.4	$29,873	11.4
Upton (Town of Weston County)	872	96	4	1.8	0.7	$31,053	11.1
State of Wyoming	522,833	91.6	8.4	7.5	2.2	$37,892	8.9

Data based on fact sheets obtained from the US Census Bureau - American Community Survey, 2006-2008for areas of significance to the proposed project

Public and Occupational Health and Safety:

RAI PO-1

Discuss and provide references for previous public health studies (radiological or chemical) that may have been performed at and within the vicinity of the proposed project.

Response to RAI PO-1:

Powertech is providing the available data concerning radiological or chemical studies or investigations that have been performed with in the PAA or the vicinity of the proposed project area within the last 5 years:

1) A concerned citizen met with Senator Adelstein expressing a concern with radioactive pollution in South Dakota (Attachment I, in SD DENR Ltr., May 15, 2006). The SD DENR was requested to look into the matter by Sen. Adelstein. The SD DENR enlisted the assistance of the State Health Department to evaluate cancer rates in SD.

SD Health Department Response to SD DENR:

The information provided from the requested Adelstein investigation concerning the immediate area and vicinity of the PAA is summarized below:

SD DENR response to Sen. Adelstein:

Tennessee Valley Authority (TVA)'s "uranium mill was constructed at Edgemont in the 1950s. The mill operated until 1974, when it was closed by the owner, the TVA. The U.S. Nuclear Regulatory Commission approved TVA's closure plan for the mill, with work beginning in 1986 and reclamation completed by 1989" (SD DENR Ltr., May 15, 2006). The document contains information regarding the Cave Hills Region; this region is not considered within the "vicinity" of the proposed project area.

SD Health Department response to the SD DENR inquiry:

Summary of Ltr., 04May2006 from Doneen B. Hollinsworth the Secretary of Health to Steve Pirner, the Secretary of SD DENR follows:

This review of cancer rates in nine South Dakota counties shows:

- These counties have 20% of the state's population and account for 17% of the state's cancer deaths;
- Increased cancer death rates in Pennington and Dewey counties compared to the state, but not increased over the national cancer death rate;
- Increased cancer incidence in Pennington County compared to state and national rates;
- Increased respiratory system cancer death rate in Dewey compared to the state rate, but not higher than the national death rate;
- Increased bone/joint cancer death rate in Corson County compared to state and national rates;
- these data do not indicate an association between uranium mines and cancer deaths;
- A more detailed study would be necessary to account for tobacco use, access to health care, obesity, lifestyle and other contributions to the local cancer burden.

2) "Cancer in South Dakota, 2006," is the fourteenth annual report from the South Dakota Cancer Registry (SDCR) in the Office of Health Promotion in the Division of Health and Medical Services within the South Dakota Department of Health (DOH). The report contains 2006 incidence and mortality data of South Dakota residents.

In conclusion: Powertech has performed a reasonable search for information regarding previous public health studies (radiological or chemical) that may have been performed at and within the vicinity of the proposed project for the past 5 calendar years. Powertech's search resulted in one document that contained some information specific to the proposed project area (SD DENR Ltr., May 15, 2006). The SD Health Department's response obtained from SD DENR does state that their investigation does not indicate an association between uranium mines and cancer deaths. Powertech has also attached the fourteenth annual report from the South Dakota Cancer Registry published in 2009 for an overview of South Dakota's incidence and mortality data. Most other research (not within the vicinity of the PAA and not included in this response) has occurred within the North Cave Hills area part of the Sioux Ranger District, Custer National Forest, Region 1 of the USFS. The complex is located approximately 25 miles north of Buffalo, South Dakota (Harding County Seat) and 150 miles north-northwest of Rapid City, South Dakota. Harding County is approximately 215 miles north of Edgemont.

RAI PO-2

Provide information on occupational incident rates and lost-time incident rates for the ISR industry.

Response to RAI PO-2:

Powertech (USA) contacted the U.S. Department of Labor, both the Mine Safety and Health Administration (MSHA) and the Occupational Safety and Health Administration (OSHA) to obtain the requested information. However, either the requested data does not exist in a database exclusive to the Uranium ISL industry, or the party with such data was not located. The statistics for fatalities, injuries and illnesses for this industry are included in either the category "Other Metal Ore Mining" or "Metal Ore Mining." Apparently, Uranium ISL mining is too small a subset of metal ore mining to have its own set of statistical records. Metal ore mining includes precious metals, copper, lead, nickel, zinc and others, in addition to uranium, vanadium and radium. Metal ore mining does not include coal or industrial minerals. The North American Industry Classification System (NAICS) code for the subset of uranium, vanadium and radium ore mining is 212291, which is found under the "Other Metal Ore Mining" subcategory that also includes both underground and surface (open pit) uranium mines. There are two subcategories for this NAICS code, 1) uranium ores mining and/or beneficiating and 2) uranium-radium-vanadium ores mining and/or beneficiating.

The injury and illness incidence rate data for years 2003 through 2008 available under "Other Metal Ore Mining," while not specific to Uranium ISL mining, is included in **ER_RAI Table PO-2.1**, below. The data for 2005 is the only data specific to the NAICS code 212291.

ER_RAI Table PO-2.1:[1] Injury & Illness Incidence Rates for "Other Metal Ore Mining"[2]

Year	Recordable Incidence Rate (per 100 employees)	Total Lost Time Incidents (per 100 employees)
2008[2]	3.6	2.2
2007[2]	3.5	2.0
2006[2]	3.8	2.6
2005[3]	6.0	4.4
2004[4]	< 15 cases total	
2003[4]	< 15 cases total	

[1] Source: Occupational Safety & Health Administration (OSHA), Summary Reports, Summary Tables 1, Incidence Rates of Nonfatal Occupational Injuries and Illnesses by Industry and Case Types; [2] This subcategory, NAICS code 21229, includes underground and surface mining for uranium, vanadium and radium and some additional commodities; [3] The year 2005 data is for NAICS code 212291, which includes underground and surface mines for uranium, vanadium and radium; [4] For the NAICS code 212291 in the years 2003 and 2004, the records show less than 15 cases total.

The data on fatalities for the Uranium ISL industry is included with data from the category, "Metal Ore Mining," which includes most hard rock metals, such as gold, silver, copper, lead, nickel, molybdenum and zinc, as well as uranium, vanadium and radium. The **ER_RAI Table PO-2.2** below shows the number of fatalities and the percentage of fatalities of employees in the private sector. There is no listing for Uranium ISL. Fatalities recorded here are those shown for the private sector wage and salary workers.

ER_RAI Table RAI PO-2.2:[1] Fatalities by Year for "Metal Ore Mining"[2]

Year	Fatalities	Percent
2008	8[3]	0.2
2007	8[4]	0.2
2006	4	0.1
2005	5	0.1
2004	5	0.1
2003	3	0.1

[1]Source: Occupational Safety & Health Administration (OSHA), Summary Reports, Summary Tables A-3, Fatal Occupational Injuries to Private Sector Wage & Salary Workers

[2] Includes all metal ore mining, e.g., gold, silver, copper, nickel, lead, zinc, uranium, vanadium, radium, etc.

[3] 4 attributed to Gold Ore Mining, 4 attributed to Copper, Nickel, Lead and Zinc mining

[4] 3 attributed to Gold and Silver Ore Mining; nothing shown for remainder

While ISL industry-specific data from the U.S. Department of Labor is not available, one licensed ISL facility in Texas provided some operation-specific information. Over the four year period from 2006 through 2009, the operating ISR facility, with about 100 employees, experienced 36 injuries/illnesses requiring medical attention (not all OSHA Recordable), or an average of 9/yr. Over the same four year period, there were 4 lost time cases, or an average of 1/yr, and 1 fatality (contractor) (Personal communication; Mark Pelizza, Uranium Resources Inc., Lewisville, Texas 75067, May 18, 2010).

<u>RAI PO-3</u>

Provide an analysis or discussion of how the accident assumptions and scenarios presented in the ER are applicable to the Dewey-Burdock project, and discuss the particular mitigation measures employed to minimize accident impacts on occupational health.

Response to RAI PO-3:

Powertech discussed an accident analysis of a catastrophic tank failure involving the yellowcake thickener, included in NUREG/CR-6733 (Mackin, et al, 2001), as a worst case accident scenario at the central processing plant (CPP) that could potentially present a radiation exposure risk to nearby residents and/or employees (occupational workers). The accident evaluation discussed in NUREG/CR-6733 stated that the thickener contained 278 m^3 (73,500 gal) of yellowcake slurry. Powertech's proposed yellowcake thickener is sized for 143 m^3 (to top of weir). The plans for the CPP include a large concrete berm sized to contain 100% of the contents of the yellowcake thickener. The capacity of the bermed area is 166 m^3 and would prevent the release of the yellowcake slurry to the outdoor environment and the subsequent drying and blowing discussed in the example evaluated in NUREG/CR-6733. See Section 4.2.3.2 of the Technical Report (TR), which states, "The CPP will be designed such that any release of liquid waste would be contained within the structure. A concrete curb will be built around the entire process building and will be designed to contain the contents of the largest tank (the yellowcake thickener) within the building in the event of a rupture." Regardless of other mitigation and emergency response actions, this fact alone should provide the bounding of exposure risk from the Dewey-Burdock Project. The solutions would be flushed to a sump from which the solution could be directed back to the circuit or to disposal.

The emergency spill procedures require immediate response to a spill of this magnitude. Assuming that there would be no response and no mitigation is not realistic. However, even if there was no response, there would be no desiccation due to wind because the spill would be contained within the building. As the slurry would not desiccate to dryness, it would not present a breathing hazard to occupational workers. NUREG/CR-6733 states that "during normal operations, most of the uranium progeny [in yellowcake slurry] is removed and the slurry poses no substantial radiation hazard, because the primary source of radiation is alpha emissions that are attenuated by the liquid slurry."

This discussion is intended to clarify that the yellowcake thickener incident evaluated in NUREG/CR-6733 is clearly a bounding worst-case accident and that a similar accident at the proposed Dewey-Burdock Project would be smaller, would be contained in the CPP structure, and that residents and workers would not receive potential radiation exposures equivalent to those calculated in NUREG/CR-6733.

Waste Management:

***RAI WM-1:* Clarify the constituents and treatment methods for other waste streams.**

Response to RAI WM-1:

Liquid waste streams that have the potential to contain radiologic materials include the elution brines that will be removed from the process as a decant stream from the thickener, laboratory chemical waste streams from the chemical sinks in the laboratory, laundry grey water, and plant wash-down water. Of these streams, the waste brine stream has the largest flow rate, expected to be 11 gpm. The other streams are expected to contribute less than 1 gpm to give a total flow of CPP wastewater of 12 gpm. These streams contain dissolved sodium chloride and sodium carbonate, as well as potentially significant levels of both dissolved and suspended uranium and radium. The concentration of total dissolved solids of the combined CPP wastewater is expected to be in the range of 100,000-140,000 mg/L.

Under the deep well disposal option, this combined CPP wastewater stream will be mixed with the well field bleed and restoration reject streams as they are directed to the radium removal ponds. Following radium removal, the combined waste streams will be injected in the deep disposal wells.

Under the land application option, this combined CPP wastewater stream will be directed to the CPP brine pond. Waste will be temporarily stored in the brine pond. Liquid waste from the pond will be pumped back to the CPP to be treated by ion exchange and subsequently directed to the radium removal ponds for further treatment. Once the liquid waste meets the disposal criteria it will be sent for land application. The pond contents will eventually be dried to a sludge that will be removed and transported to a licensed 11e.(2) byproduct disposal facility.

***RAI WM-2:* Describe the types and expected volume of solid wastes generated during construction.**

Response to *RAI WM-2*:

Construction activities will generate non-hazardous, non-radioactive wastes consisting primarily of excess construction materials and packaging. The construction of the site buildings are expected to be the primary source of this waste, with lesser amounts generated from well field construction activities. These construction wastes will be loaded into standard 40-(cubic) yard roll-off containers and transported via truck to a licensed solid waste landfill for disposal. An estimate of the number of roll-offs associated with the construction of the site facility buildings was obtained by using factors for the weight of solid waste per square foot of building constructed (EPA, 2003) for different types of buildings and applying those factors to the site facility buildings. A summary of these estimates for the year 1 construction activity appears in **ER_RAI Table WM-2.1**. The number of roll-offs was estimated assuming that roll-offs are loaded to 80% of their maximum weight capacity.

Reference: "Estimating 2003 Building-related Construction and Demolition Materials Amounts", US EPA.

ER_RAI Table WM-2.1: Estimated amounts of solid waste generated during construction.

Solid waste source		Burdock		Dewey	
Building construction		tons	# roll-offs	tons	# roll-offs
	CPP/SF	74	7	40.5	4
	Office bldg	20.5	2		
	Maintenance/Shop	35.5	3		
	Byproduct storage	1.5	0	1.5	0
Well Field construction		17	2	12	1
Total Solid Waste		149	14	54	5

<u>RAI WM-3</u>

Clarify solid waste disposal plans.

<u>Response to RAI WM-3:</u>

Non-hazardous, non-radiological solid waste generated at the Dewey-Burdock project will be transported for disposal in the Custer-Fall River Waste Management District landfill located at Edgemont, South Dakota. Newcastle Solid Waste Facility may also be utilized for disposal if needed in order to meet the disposal capacity for the life of the project.

<u>RAI WM-4</u>

Describe the types and expected volume of solid wastes generated during operations.

<u>Response to RAI WM-4:</u>

During operations, the PAA will generate non-hazardous, non-radioactive solid wastes typical of ISR office and mine operations. These wastes include paper, wood products, plastic, metal and biodegradable items. The overall impact of these wastes is expected to be SMALL (NRC, NUREG-1910) and has been estimated to be less than 3000 lb/week (2200 lb at the Burdock site and 600 lb/week at the Dewey site) based on the number of employees at the project and a set of factors for estimating the waste generated per employee at various types of facilities (Guliani, 2001). These wastes will be accumulated in appropriately-sized dumpsters at each facility site and will generally be emptied on a weekly or bi-weekly basis.

References:

- NUREG 1910, Vol 1. NRC (2009)
- City Environmental Quality Review Technical Report, Rudolph Giuliani, Mayor, The City of New York, 2001

<u>RAI WM-5</u>

Provide additional information clarifying the characteristics of byproduct wastes generated during operations including packaging and transportation.

1. Powertech should provide an estimate of the activity concentration of radium (e.g., Ci of radium per gram of this waste material) in the settling pond bottom waste material.

2. *Powertech should clarify how this waste material would be classified for transportation (e.g., low specific activity), the type of packaging that would be used, and the approximate amounts of the waste material that would be included in a typical waste shipment.*

Response to RAI WM-5.1:
The radium settling pond bottoms will primarily contain precipitated barium sulfate, resulting from the treatment of the production bleed and the restoration reject streams with a solution of barium chloride. Assuming that barium is added to these waste streams at a rate of 20 mg/L barium chloride, it is estimated that the total quantity of barium sulfate precipitate generated from production operations will be 32 lb/day. Treatment of the CPP brine will produce a precipitate of 3 lb/day. In the groundwater restoration operations, 40 lb/day of precipitate will be formed with the deep well disposal option and 135 lb/day of precipitate will be formed with the land application option. Assuming 40% solids content and a specific gravity of 1.4 for the wet solid, an estimated 760 cubic feet (28 yd^3) of pond bottoms will be generated per year of combined production and restoration operations for the deep disposal well option and 1710 cubic feet (63 yd^3) per year of pond solids will be generated with the land application option.

The radium activity in the streams treated with barium chloride is estimated to be as high as 100 pCi/L (NUREG 1910, Table 2.7-3), which along with an assumed 100% removal of radium through the formation of barium radium sulfate precipitate, will produce a radium (Ra-226) activity in the precipitate of 4,500 pCi/g (dry basis).

Response to RAI WM-5.2:
Powertech is committed to developing procedures before licensed materials would be transported within the facility and/or before transporting to a public road. Powertech will ensure proper shipment of any licensed material by complying with Department of Transportation (DOT) regulations despite whether Powertech ships the material or utilizes a third party for shipment. The 11 e.(2) byproduct waste will be classified as Radioactive Material according to DOT classification process; radiation levels will meet the DOT requirements for low specific activity (LSA). Packaging most likely will be a Type A package. Typical waste shipment would consist of approximately 40 yd^3 of material. All radioactive waste shipments will be shipped in accordance with the applicable NRC safety requirements in 10 CFR Part 71 and DOT 49 CFR 171.1.

10 CFR 71.5 requires licensed material transported on public highways or licensees who deliver licensed material to a carrier for transport, shall comply with requirements of the DOT regulations in 49 CFR Parts 107, 171 through 180, and 390 through 397.

49 CFR 171.1 states the regulations apply to each person who offers radioactive material for transportation, causes a radioactive material to be transported, or transports radioactive material, and who performs or is responsible for performing a pre-transportation function.

Powertech will implement the following 49 CFR 171.1 (b) Pre-transportation functions:

1) Determine the hazard class
2) Select packaging
3) Filling a package (container)
4) Securing a closure on a filled or partially filled package or container
5) Mark the package(s) to indicate that it contains radioactive material
6) Label the package(s) to indicate that it contains radioactive material
7) Prepare shipping papers
8) Provide and maintain emergency response information.
9) Review shipping papers to verify compliance with the DOT regulations.
10) Certifying radioactive material is in proper condition for transportation in conformance with the DOT requirements
11) Load, block, and brace a radioactive materials package(s) in a container or transport vehicle
12) Segregate radioactive materials package(s) in a freight container or transport vehicle from incompatible cargo
13) Select, provide, or affix placards for a transport vehicle to indicate that it contains radioactive material

Powertech will implement the following 49 CFR 171(c), transportation functions for radioactive materials. Possession begins with Powertech (USA) and whether Powertech (USA) transports the material or utilizes a third party company to transport the radioactive material, Powertech (USA) will ensure that as soon as the transporter takes physical possession of the material until the package containing the radioactive material is relinquished to the destination indicated on the shipping document the regulations in 49 CFR 171(c) are applicable and complied with.

Transportation includes the following:

1) Movement of radioactive material by rail car, aircraft, or motor vehicle.
2) Loading of packaged or containerized radioactive material onto a transport vehicle or for transporting it, including blocking and bracing a package in a transport vehicle.
3) Removing a package or containerized radioactive material from a transport vehicle.

Additionally, 49 CFR 172 subpart H requires an employer, i.e. the licensee, to ensure each hazmat employees is trained in the requirements prescribed in the subpart, that an employee may not perform functions associated with hazmat unless trained, and that each hazmat employee is tested by appropriate means on the training subjects covered in 49 CFR 172.704.

The training of transporter will include the following of subpart H - Training:

(1) General awareness/familiarization training. Each hazmat employee shall be provided general awareness/familiarization training designed to provide familiarity with the requirements of this subchapter, and to enable the employee to recognize and identify hazardous materials consistent with the hazard communication standards of this subchapter.

(2) Function-specific training. (i) Each hazmat employee must be provided function-specific training concerning requirements of this subchapter, or exemptions or special permits issued under subchapter A of this chapter, that are specifically applicable to the functions the employee performs.

(3) Safety training. Each hazmat employee shall receive safety training concerning—

(i) Emergency response information required by subpart G of part 172;

(ii) Measures to protect the employee from the hazards associated with hazardous materials to which they may be exposed in the work place, including specific measures the hazmat employer has implemented to protect employees from exposure; and

(iii) Methods and procedures for avoiding accidents, such as the proper procedures for handling packages containing hazardous materials.

4) Security awareness training. Each hazmat employee must receive training that provides an awareness of security risks associated with hazardous materials transportation and methods designed to enhance transportation security. This training must also include a component covering how to recognize and respond to possible security threats.

(5) In-depth security training. Each hazmat employee is required to be trained concerning the security plan and its implementation. Security training must include company security objectives, specific security procedures, employee responsibilities, actions to take in the event of a security breach, and the organizational security structure.

(b) OSHA, EPA, and other training. Training conducted by employers to comply with the hazard communication programs required by the Occupational Safety and Health Administration of the Department of Labor (29 CFR 1910.120 or 1910.1200) or the Environmental Protection Agency (40 CFR 311.1), or training conducted by employers to comply with security training programs required by other Federal or international agencies, may be used to satisfy the training requirements in paragraph (a) of this section to the extent that such training addresses the training components specified in paragraph (a) of this section.

<u>RAI WM-6</u>

Clarify the estimated quantity of byproduct material generated during decommissioning.

1. Powertech should clarify whether the aforementioned estimate of byproduct material includes excavated soil and, if soil is not included in that estimate, Powertech should provide the expected amount of excavated soil from decommissioning that would need to be disposed of as 11e.(2) byproduct waste and the basis for the estimate, or explain why such an estimate cannot be reliably calculated.

2. If the estimate is zero, then Powertech should provide the basis for that conclusion.

3. If this information has already been provided, Powertech should note where the information is located as the response to this request.

Response to RAI WM-6.1:

Refer to TR Appendix 6.6-A; Table titled "Restoration Costs by Year." The table has been prepared to represent one year of production operations and one year of restoration operations for bonding purposes. Given this scenario, under the column year 2011 production would cease at the end of that year and restoration would begin in 2012. Under the 2012 column under Operations there is a Byproduct disposal line item. This is cost for soil disposal. Applicant directs the reviewer's attention to Table titled "Restoration Costs ... Byproduct Waste During Operations." Refer to the "Well Field waste" line item; this is the estimated quantity and associated cost for soil disposal that may result from well field leaks and/or spills.

Response to RAI WM-6.2:

There is no soil disposal cost within the reclamation/decommissioning cost estimate. The basis for this is described below:

Radiological Effects of Land Application

a. Refer to ER section "4.14.2.4 Exposure to Flora and Fauna"; "Table 4.14-7: Highest Surface Concentrations of Radium-226 and its Decay Products." Summary of the conclusions of the MILDOS-AREA estimates surface deposition rates of Ra-226 and its decay products as a function of distance from the source and calculates surface concentrations. Assuming the most important pathways to flora and fauna exposure start with radionuclide concentrations in soil, the impacts from normal site operations would be minimal and probably not distinguishable from background.
b. Refer to TR section "7.3.3.8 Determination of Land Application Effects"; RESRAD Version 6.4 computer code (RESRAD) was used to model the site and calculate the maximum annual dose rate from the land application processes for a resident farmer scenario. The dose figures generated with RESRAD are in Attachments 4.0 and 4.1 of Appendix 6.4-A and a full printout of the final RESRAD modeling results is in Attachments 3.0 and 3.1 of Appendix 6.4-A. This shows that the radiological impacts of the land application process are minimal and meet the license termination for unrestricted use criteria in 10 CFR 20.1402 of 25 mrem per year.

Non-radiological Effects of Land Application

a. Refer to TR section "7.3.3.8.2 Potential Non-radiological Effects" and "Table 7.3-8: Steady-State Metals Concentrations and Respective SSLs in Land Application Area Surface Soils". Summary of conclusions from the steady-state soil concentration of metals evaluation is that no metals with steady state surface soil concentrations exceed their respective SSL at either Dewey or Burdock land application areas.
b. The mineral-water distribution (or fractionation) coefficient (Kd) for each metal was either adopted from default values in RESRAD v.6.4, Data Collection Handbook to Support Modeling Impacts of Radioactive Material in Soil (Argonne 1993) or, if unavailable, the soil retention

fraction (Rs in Equation 7.4) was conservatively assumed to be one. The EPA's "Soil Screening Guidance: User's Guide," EPA/540/R-018, 1996 was also utilize during the assessment.

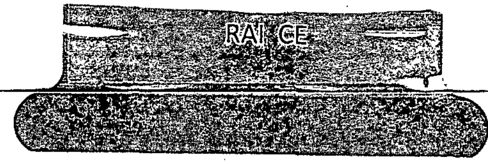
c. Refer to TR section "7.8 Potential Non-Radiological Effects". While one scenario proposed for waste management includes the use of both evaporation ponds and land application the other scenario involves less number of ponds and deep well disposal. As the project moves forward and a determination of the permitted option is reached, the feasibility of either of the options or a combination of the options will be evaluated and determinations of effectiveness and costs will be further assessed.

Land Application Monitoring and Design

a. Further justification of no soil disposal cost for land application includes the on-going monitoring of constituent deposition within land application areas and if it should be determined that build up is occurring that could result in concentrations above the allowable limits, Powertech will transfer water to additional areas built into the design.
b. Powertech has included within the land application design additional backup areas to use for disposal of water as to prevent excessive land application buildup of constituents.

Response to RAI WM-6.3:

Applicant directs the reviewer's attention back to response to **RAI WM-6-1** above.


RAI CE

<u>**Cumulative Effects:**</u>

<u>RAI CE-1</u>

Provide information on historical (closed or abandoned), currently active, and proposed future projects related to mineral resource (uranium, coal, coal bed methane, oil, and natural gas) or wind farm facilities and land development activities located in the vicinity of the proposed Dewey-Burdock Project area.

1. Please provide information on historical (closed or abandoned), currently active, and proposed future projects related to mineral resource (uranium, coal, coal bed methane, oil, and natural gas) facilities located in the vicinity of the proposed Dewey-Burdock Project area. The response should define the geographic boundaries for studying each facility. These boundaries may be airsheds, watersheds, aquifer zones, census boundaries, or habitat areas depending on the type of resource. For each facility identified, the response should include information regarding areas of disturbance, groundwater and surface water impacts, grazing range impacts, socioeconomic impacts, air quality and noise impacts, threatened and endangered species impacts, and cultural resource impacts.

2. Please provide information on wind farm facilities located in the vicinity of the proposed Dewey-Burdock project area. The response should define the geographic boundaries for studying each facility. These boundaries may be airsheds, watersheds, aquifer zones, census boundaries, or habitat areas depending on the type of resource. For each facility identified, the response should include information regarding areas of disturbance, groundwater and surface water impacts, grazing range impacts, socioeconomic impacts, air quality and noise impacts, threatened and endangered species impacts, and cultural resource impacts.

3. Please provide information on any other land development facilities located in the vicinity of the proposed Dewey-Burdock project area. The response should define the geographic boundaries for studying each facility. These boundaries may be airsheds, watersheds, aquifer zones, census boundaries, or habitat areas depending on the type of resource. For each facility identified, the response should include information regarding areas of disturbance, groundwater and surface water impacts, grazing range impacts, socioeconomic impacts, air quality and noise impacts, threatened and endangered species impacts, and cultural resource impacts. This information is needed to provide the bases for assessing potential indirect and cumulative impacts.

<u>**Response to RAI CE-1.1:**</u>

<u>Oil and Gas</u> – Per communications with the Forest Service and the BLM, the known leases in the vicinity of the proposed project area are designated on **ER_RAI Exhibit CE-1.1**. These areas are currently not available for bid. There are three known oil/gas P& A wells: API_ 40 047 20065 (P&A 12-26-1975), API_ 40 047 05095 (P&A 08-19-1964) and API_4004720071 (P&A 12-23-1976) see **Appendix WR-7** for well records and for the potential geographical boundaries **see ER_RAI Exhibit CE-1.1**.

<u>Coal bed methane –</u> There are no known leases for coal bed methane projects currently, pending or future that are within the vicinity or that would overlap the proposed action.

<u>Limestone –</u> One known proposed project is the GCC Dacotah project.

Currently there is no mineral production in the area. 6 miles north east of the project boundary there is a possible limestone quarry for GCC Dakota, a cement manufacturing company. Commencement of this project is approximately 10 years out. See BLM, 2009 regarding Potential effects of existing, pending and future projects.

The GCC Dacotah project should have no effect upon the Dewey – Burdock proposed project as the GCC project boundary just crosses the most northern and eastern boundary in section 20 resulting in minor overlap of the Powertech lease; there is no activity anticipated for this area concerning Powertech's ISL proposed project.

Water Resource, Usage and Water Quality

Surface Water

GCC Dacotah, Inc.

GCC Dacotah's possible quarry site and trace of the proposed conveyor are located in the Pass Creek drainage, a tributary to the Cheyenne River and in the Lime Creek drainage, a tributary to Pass Creek. The water quality impact would be primarily from suspended sediment or dissolved solids and increases in turbidity and regulated by a state stormwater permit and implementation of a stormwater pollution prevention plan. Runoff would likely occur during construction and mining operation phases. By implementing BMPs and mandated construction practices runoff and floodplain disturbances would be prevented and mitigated (BLM, 2009 Attachment A).

Groundwater - Madison is the proposed aquifer water resource for PWE and the GCC project.

GCC Dacotah, Inc.

No adverse effects are anticipated for existing users from other aquifers as the Madison is a deep aquifer not commonly utilized for domestic, cattle or agricultural purposes. The Madison aquifer also appears to be hydrologically separated from other aquifers in this area. Groundwater resources are proposed to be utilized during construction activities, mining and conveyor operations.

Water usage (when utilized) during construction is estimated at 30,000 gpd. An estimation of a water truck operating 100 days/yr, would equate to approximately 9.2 acre-feet of water usage a year. The usage after construction would decline and usage would be limited to dust control and reclamation activities. Dust suppression during conveyor operations is estimated to be 2 million gallons a year or 6.1 acre-feet. GCC proposed the option of utilizing groundwater from the Madison Limestone aquifer with a peak demand of 25 gpm (BLM, 2009).

Air

GCC Dacotah, Inc.

GCC will obtain all necessary state and federal air quality and reclamation permits governing mitigation of fugitive dust emissions and implement dust control measures as necessary to meet the air quality standards during construction and operations and reclamation. See Table S-2 "Comparison of Effects by Alternative" in BLM, 2009.

GCC's design is fully enclosed preventing material from escaping into the atmosphere. Transfer points would also be enclosed and dust inhibiting designs, treatments or collection systems sufficient to meet SD DENR air quality standards. It is estimated that enclosing a structure such as a conveyor results in a 99 percent reduction in dust generation (BLM, 2009).

Vegetation

GCC Dacotah, Inc.

Under the Proposed Action, both temporary and permanent impacts on existing vegetation would result from construction activities such as blading, grading, and trenching of the ROW, or superficial damage from vehicles and foot traffic in the ROW. Direct effects would occur primarily in grassland communities, consisting of removing and reducing growth and productivity.

Reclamation would occur in disturbed areas surrounding the project area after construction. Reestablished vegetation communities in semiarid climates in the first couple of years often consist of annual forbs and native cool season grasses with little shrub establishment (BLM, 2009).

GCC Dacotah, Inc.

See Sections 3.9.2 Threatened and Endangered Species and 3.9.3 Direct and Indirect Effects; See Table 3-10 "Direct Impacts to Wildlife Associated with the Proposed Project" in (BLM, 2009).

Social and Economic Conditions

GCC Dacotah, Inc.

"Details have not yet been finalized regarding the size of the construction labor force, the length of the construction period, the amount of construction expenditures, and the assessed valuation of the finished project. For this reason, it is not possible to identify precise and specific quantitative impacts. However, a qualitative assessment of potential impacts is provided, based on the following assumptions. Construction of the conveyor would involve approximately 50 workers and take one construction season and cost approximately $7 million in 2007 dollars".

"Only small impacts to human population would be anticipated. This is due to the short duration of the construction project, little or no requirement for construction worker relocation, and the small size of the operational workforce anticipated. It is estimated that about 25 people (principally operations workers and their families) could migrate into the ROI. No predictions can be made about where they would choose to reside. Population increases are generally considered to be beneficial, especially in areas of static or declining population such as the two rural counties". Also see Table S-2 Comparison of Effects by Alternative in (BLM, 2009).

Cultural Resources

GCC Dacotah, Inc.

See Section 3.16 "Native American and Cultural Resources"; See Table S-2"Comparison of Effects by Alternative" in (BLM, 2009).

Open Pit Mining - The Edgemont Disposal Site was a uranium processing site addressed by Title II of the Uranium Mill Tailings Radiation Control Act (UMTRCA). The site transferred to the Office of Legacy Management in 2003 and is administered under the provisions of a general NRC license. The site requires routine inspection and maintenance, records-related activities, and stakeholder support.

Response to RAI CE-1.2:

There are currently no known wind farms in the vicinity. There is a landowners group that is exploring the possibility of a wind farm. Most of the landowners involved are also involved with the Powertech Dewey-Burdock Project, and therefore will not jeopardize the uranium project for the wind project **ER_RAI Exhibit CE-1.1**. Also the uranium deposits tend to be in the lower elevations in the area and the wind project if it were to develop would be using the ridges to get the best wind. The wind farm is still in the conceptual phase as of 04 August, 2010.

Response to RAI CE-1.3:

DM&E Railroad – See response to ER_RAI LU-2.

ARC GIS for geographic boundaries and description of facilities located in within the PAA and the vicinity of the proposed Dewey-Burdock project area:

The reviewer is directed to all existing, pending and potential future land leases that may potentially at sometime in the future overlap the proposed project area: Existing, Pending and Future Projects within the Dewey-Burdock PAA (**ER_RAI Exhibit CE-1.1**).

RAI CE-2

Provide information on currently active and proposed future projects related to water resource and water development activities located in the vicinity of the proposed Dewey-Burdock Project area.

Response to CE-2:

Currently there is no active water projects located in the vicinity of the proposed Dewey-Burdock Project area. There are no known future water projects at this time.

RAI CE-3

Provide information on currently active and proposed future transportation development activities located in the vicinity of the proposed Dewey-Burdock Project area.

Response to CE-3:

See ER_RAI LU-2 concerning the DM&E Railroad Corporation's project status and **ER_RAI Exhibit CE-1.1**.

RAI EMM

Environmental Measurements and Monitoring:

RAI EMM-1

Provide information to justify excluding multiple major and trace elements from the proposed baseline and operational groundwater monitoring analyte list.

Response to RAI EMM-1:

The number of groundwater sampling locations that will be assessed for inclusion into a comprehensive groundwater monitoring program implemented during production operations is depicted in TR_Figure 5.7-10. Several of the wells depicted in Figure 5.7-10 relative to the initial well field monitoring will be selected for quarterly monitoring and will include the constituent list provided in **ER_RAI Table EMM-1.1**. These same parameters will be sampled for and analyzed during baseline characterization of each well field.

ER_RAI Table RAI EMM-1.1: Baseline Water Quality Parameter List

Test Analyte/Parameter	Units	Method
	Physical Properties	
pH ≠	pH Units	A4500-H B
Total Dissolved Solids (TDS) +	mg/L	A2540 C
Conductivity	µmhos/cm	A2510B
	Common Elements and Ions	
Alkalinity (as $CaCO_3$)	mg/L	A2320 B
Anion/Cation Balance		A1030 E
Bicarbonate Alkalinity (as $CaCO_3$)	mg/L	A2320 B (as HCO3)
Calcium	mg/L	E200.7
Carbonate Alkalinity (as $CaCO_3$)	mg/L	A2320 B
Chloride	mg/L	A4500-Cl B; E300.0
Magnesium	mg/L	E200.7
Nitrate, NO_3- (as Nitrogen)	mg/L	E300.0
Potassium	mg/L	E200.7
Sodium	mg/L	E200.7
Sulfate	mg/L	A4500-SO4 E; E300.0
	Trace and Minor Elements	
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	mg/L	E300.0
Iron, Fe	mg/L	E200.7
Lead, Pb	mg/L	E200.8

Test Analyte/Parameter	Units	Method
Manganese, Mn	mg/L	E200.8
Mercury, Hg	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_8
Radiological Parameters		
Gross Alpha††	pCi/L	E900.0
Gross Beta	pCi/L	E900.0
Lead, Pb-210	pCi/L	E200.8
Radium, Ra-226§	pCi/L	E903.0

*Based on U.S. Nuclear Regulatory Commission (NRC). NUREG-1569, "Standard Review Plan for In-Situ Leach Uranium Extraction License Applications--Final Report." Table 2.7.3-1. Washington, DC: NRC. June 2003. The licensee may provide the rationale for the exclusion of water quality indicators\parameters in a license application or amendment request if operational experience or site-specific data demonstrate that concentrations of constituents such as radium-228 are not significantly affected by in situ leach operations.

‡ Field and Laboratory

+ Laboratory only

††Excluding radon, radium, and uranium

§ If initial analysis indicates presence of Th-232, then Ra-228 will be considered within the baseline sampling program or an alternative may be proposed.

POWERTECH (USA) INC.

ADDITIONAL REFERENCES

Bureau of Land Management, 2009; *Dewey Conveyor Project Draft* Environmental Impact Statement, *Custer County, South Dakota.* Report No. DOI-BLM-MT-040-2009-0002-EIS. BLM Field Office, 310 Roundup Street, Belle Fourche, SD 57717-1698.

Dakota, Minnesota & Eastern Railroad Corporation; 140 N. Phillips Ave. Sioux Falls, SD 57104; Toll free Phone Number: Toll free: (866) 202-2495 Webpage: ttp://www.dmerail.com/Contacts/General-Office.html

South Dakota Department of Environment and Natural Resources, May 15, 2006. Letter addressed to The Honorable Stan Adelstein. PMB 2020 Joe Foss Building 523 East Capitol, Pierre, South Dakota 571-3182.

South Dakota Department of Health, December 2009; *Cancer in South Dakota, 2006.* South Dakota Cancer Registry; 615 East 4th Street, Pierre, SD 57501-9971.

South Dakota Department of Health; May 04, 2006. Letter addressed to Steve Pimer, Secretary of the Department of Environment and Natural Resources; *RE: Uranium mining: concerns on cancer mortality and incidence.* 600 East Capitol Avenue, Pierre, South Dakota 57501-2536.

EXHIBITS

POWERTECH (USA) INC.

ER_RAI Exhibit Ecology-1

DEPARTMENT OF GAME, FISH AND PARKS
Cleghorn Fish Hatchery
4725 Jackson Boulevard
Rapid City, South Dakota 57702-4804

received
5/12/10

May 7, 2010

Powertech (USA), Inc.
Attn. Richard Blubaugh
5575 DTC Parkway, Suite 140
Greenwood Village, Colorado 80111

Subject: Dewey-Burdock crucial big game habitats and migration corridors

Dear Richard,

By this letter South Dakota Department of Game, Fish and Parks (GFP) declares no designated crucial big game habitats or migration corridors on the Dewey Burdock Project Area or in the one mile buffer.
The Dewey Burdock project and surrounding area does contribute habitat for a variety of big game including deer, antelope, turkeys, elk and only recently a herd of big horn sheep. Your permitting surveys conducted for baseline studies provided a realistic assessment of big game use on the project and surrounding buffer area. However, resulting from the recent occurrence of big horn sheep on and surrounding the project area we now consider management strategies that include this herd.

Please do not hesitate to contact me at any of the numbers listed below if you desire more information regarding wildlife interactions with the Dewey Burdock project

Sincerely,

Stan Michals -Energy and Minerals Coordinator
SD/Game, Fish and Parks
4725 Jackson Blvd.
Rapid City, SD 57702
Office (605)394-2589
Fax (605)394-1760
Stan.Michals@state.sd.us

Cc: G. Mckee, Thunderbird Wildlife Consulting, Inc.

POWERTECH (USA) INC.

ER_RAI Exhibit Noise-1

FRA Train Horn Rule Fact Sheet

Train Horn Rule Fact Sheet (PDF , 24Kb)

Purpose: The goal of the Federal Railroad Administration (FRA) in developing the train horn rule is to ensure safety for motorists at highway-rail grade crossings while allowing communities the opportunity to preserve or enhance quality of life for their residents by establishing areas/times in which train horns are silenced.

Historical Background: Since their inception, railroads have sounded locomotive horns or whistles in advance of grade crossings and under other circumstances as a universal safety precaution. During the 20th century, nearly every state in the nation enacted laws requiring railroads to do so. Some states allowed local communities to create whistle bans where the train horn was not routinely sounded.

In the early 1990's, the FRA observed a significant increase in train-vehicle collisions at certain gated grade crossings in Florida which coincided with a statewide whistle ban on the Florida East Coast Railroad (FECR). In 1993, FRA issued Emergency Order #15 requiring trains on the FECR to sound their horns again, pre-empting the 1984 Florida statute that created the ban. The number and rate of collisions at affected crossings returned to pre-whistle ban levels.

In 1994, Congress mandated that the FRA issue a federal regulation requiring the sounding of locomotive horns or whistles at all public highway-rail grade crossings; and to provide for exceptions to that requirement by allowing communities to establish "quiet zones." In 1996, Congress added that special consideration be given to communities with long-standing or legacy whistle bans.

Before finalizing the rule, FRA held public meetings around the country and solicited comment from scores of affected communities and stakeholders. Based upon the voluminous input received, FRA published an Interim Final Rule in December 2003, refining its original proposal and inviting additional public comment. The final federal train horn rule became effective on June 24, 2005.

The rule provides the first opportunity ever for many local communities around the country affected by train horn noise the option of silencing horns by establishing quiet zones.

Sounding the Locomotive Horn: Under the Train Horn Rule, locomotive engineers must sound train horns for a minimum of 15 seconds, and a maximum of 20 seconds, in advance of all public grade crossings, except:

If a train is traveling faster than 45mph, engineers will not sound the horn until it is within ¼ mile of the crossing, even if the advance warning is less than 15 seconds.

If a train stops in close proximity to a crossing, the horn does not have to be sounded when the train begins to move again.

There is a "good faith" exception for locations where engineers can't precisely estimate their arrival at a crossing.

Wherever feasible, train horns must be sounded in a standardized pattern of 2 long, 1 short and 1 long. The horn must continue to sound until the lead locomotive or train car occupies the grade crossing.
For the first time, a maximum volume level for the train horn has been established at 110 decibels. The minimum sound level remains 96 decibels. Railroads have until 2010 to fully comply with the maximum volume level requirement.

Establishing a New Quiet Zone: A new quiet zone must be at least ½ mile in length and have at least one public highway-rail grade crossing. Every public grade crossing in a new quiet zone must be equipped at minimum with the standard or conventional flashing light and gate automatic warning system. A quiet zone may be established to cover a full 24-hour period or only during the overnight period from 10:00 P.M. to 7:00 A.M.

Local governments must work in cooperation with the railroad that owns the track, and the appropriate state transportation authority to form a diagnostic team to assess the risk of collision at each grade crossing where they wish to silence the horn. An objective determination is made about where and what type of additional safety engineering improvements are necessary to effectively reduce the risk associated with silencing the horns based on localized conditions such as highway traffic volumes, train traffic volumes, the accident history and physical characteristics of the crossing, including existing safety measures.

Examples of additional safety engineering improvements that may be necessary to reduce the risk of collisions include: medians on one or both sides of the tracks to prevent a motorist from driving around a lowered gate; a four-quadrant gate system to block all lanes of highway traffic; converting a two-way street into a one-way street; permanent closure of the crossing to highway traffic; or use of wayside horns posted at the crossing directed at highway traffic only.

Once all necessary safety engineering improvements are made, the local community must certify to FRA that the required level of risk reduction has been achieved. A quiet zone becomes effective and train horns go silent only when all necessary additional safety measures are installed and operational.

Quiet Zone Exceptions: In a quiet zone, engineers have no legal duty to sound the horn, but do have discretion to do so during emergency situations (i.e. the presence of a vehicle or a person on the track).

Under federal regulations, engineers must sound the horn to warn railroad maintenance employees or contractors working on the tracks.

Monitoring Quiet Zones: If a railroad or particular engineer is observed failing to sound horns as required or is repeatedly and unnecessarily sounding the horn in an established quiet zone, FRA will seek to remedy the situation or take enforcement action.

Effect of the Rule on Pre-Existing Whistle Bans: Legacy whistle bans were established by local ordinance or through agreements with specific railroads in accordance with existing state law, or through informal agreements honored or abided by a railroad. The new rule required communities with whistle bans to affirmatively state their intention to preserve it by submitting specific paperwork converting the ban to a "pre-rule quiet zone." Those that failed to do so by a specified deadline lost their special status and railroads resumed routine sounding of horns.

Pre-rule quiet zone communities that completed the required paperwork have been granted an extended grace period (from 5 to 8 years) to achieve compliance with certain rule requirements. During the grace period, local communities must periodically file paperwork to demonstrate their progress toward compliance or the horns will start sounding again.

The Chicago area's numerous pre-existing whistle bans are temporarily excepted from compliance with the rule because of their unique experience with this issue. After an ongoing collaborative review is completed, the FRA will determine the final status of the Chicago pre-rule quiet zones.

For a list of key terms and definitions click here
To view the Federal Register posting of the Train Horn Rule click here
For more detailed information about the Train Horn Rule click here

For additional information, please contact **FRA Public Affairs** (202) 493-6024 or www.fra.dot.gov .

December 2006

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLE:

POWERTECH (USA) INC.
ER_RAI EXHIBIT PA-1.1

POSSIBLE WORKER ACCESS ROUTES FROM SURROUNDING AREAS INCLUDING NEWCASTLE, WY AND CUSTER, SD

WITHIN THIS PACKAGE...OR BY SEARCHING USING THIS NO.

D-01

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POWERTECH (USA) INC.
EXHIBIT RAI LU-1

DEWEY-BURDOCK PROJECT
AREA OF REIEW MAP

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RAI_ER EXHIBIT WR-2.1

DEPTH TO FALL RIVER AQUIFER
DEWEY-BURDOCK PROJECT
CUSTER & FALL RIVER COUNTIES

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RAI_ER EXHIBIT WR-2.2

DEPTH TO FALL RIVER AQUIFER
DEWEY AREA
CUSTER COUNTY

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RAI_ER EXHIBIT WR-2.3

DEPTH TO FALL RIVER AQUIFER BURDOCK AREA FALL RIVER COUNTY

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