POWERTECH (USA) INC.

Attachment D

GDP Comment Responses and Replacement Pages

WWC ENGINEERING
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April 16, 2012

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

Re: Response to Completeness Review
Dewey-Burdock Project Groundwater Discharge Plan Application

Dear Mr. Hicks:

On behalf of Powertech (USA) Inc., this letter is in response to the April 5, 2012 completeness review for the above referenced application for a Groundwater Discharge Plan. For convenience, the comments are provided below along with the responses. Application replacement pages are enclosed (two hard copies and one electronic copy on CD).

Completeness Comment 1: Item No. 8 on the permit application form requires a description of the proposed Perimeter of Operational Pollution (POP). Although a description of the proposed POP zone is included in Section 7 of the application, discussions of the hydrologic and geologic data used to determine the dimensions, and justification of necessary economic or social development for the POP zone could not be located (see ARSD 74:54:02:06(8)). Please update this section to include a brief discussion on the hydrologic and geologic data used to determine the dimensions, and justification of necessary economic or social development of the POP zone.

Response: Section 7 of the application has been revised as requested. The replacement pages (including Section 7 and an update to the references) are enclosed.

Additional Comment: It was noted the submitted application form in Volume 2 did not include names for the people legally responsible for the discharge and the local contact representative. This information is not considered a completeness item as this information is stated elsewhere in the application; however, the form should be updated to correspond with the contact information stated elsewhere in the application.

Response: Page 1 of the application has been revised to indicate the names of the application signatory (Richard Blubaugh) and the local representative (Mark Hollenbeck). The replacement page is enclosed.

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

Sincerely,

Jack L. Fritz

Jack Fritz, P.E.
WWC Project Manager

cc: Richard Blubaugh
Mark Hollenbeck
John Mays
Ronald Burrows, NRC

Encl: as noted

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Ground Water Quality Program
523 East Capital Avenue
Joe Foss Building, Pierre,
South Dakota 57501-3181

Ground Water Discharge Plan Application

(Revised July 1997)

1. Name of discharger or person legally responsible for discharge (owner/ operator), *refer to ARSD 74:54:02:06 (1):*

Powertech (USA), Inc.: Richard Blubaugh, Signatory

Address: 5575 DTC Parkway, Suite #140
Greenwood Village CO 80111

Telephone: (303) 790-7528

Local representative or contact person if different from above:
Name: Powertech (USA), Inc.: Mark Hollenbeck (Local Representative)
Address: 310 2nd Avenue, P.O. Box 812
Edgemont SD 57735

Telephone: (605) 662-8308

2. Legal Location of Discharge Facility, *refer to ARSD 74:54:02:06 (2)*
County Cust. & Fall R., _____1/4 _____1/4, Section _____,
Township 6S and 7S, Range 1E

3. *Refer to ARSD 74:54:02:06 (3)*
Name of facility and/or project Dewey-Burdock Project Land Appl. Systems
Estimated Project life 7 to 20 years

Type of operation, facility or development.

A. ☑ New facility ☐ Modification of existing facility

☐ Concentrated Animal Feeding Operation

☐ Industrial (i.e. chemical manufacture, metal manufacturing wood treatment, photo processing, printing, paper mills, etc.)

☐ Municipal waste

☑ Mining

7.0 PROPOSED PERIMETER OF OPERATIONAL POLLUTION (POP)

The POP zones for the Dewey and Burdock land application areas are proposed to provide protection of groundwater resources in the respective areas in accordance with ARSD 74:54:02:17. Each of the proposed POP zones is within one-quarter mile of the respective land application areas and within the property boundaries of the permitted facility (NRC license boundary). The proposed POP zones in the Dewey and Burdock areas are shown on Figures 6.1-1 and 6.1-2, respectively. No residences or drinking water wells are located within either zone.

ARSD 74:54:02:06(8) requires the applicant to provide, "If applicable, the description of the POP, including the dimensions and hydrologic and geologic data to determine the dimensions, the proposed compliance monitoring point, and justification of necessary economic or social development for the POP." Each of these requirements is addressed below.

Dimensions and Hydrologic and Geologic Data to Determine the Dimensions

The areal extents and configuration of the proposed Dewey area POP zone are shown on Figure 6.1-1. The western, northern and northeastern edges of the proposed POP zone are topographically upgradient of the land application areas. These edges also are hydrologically upgradient of the land application areas based on the results of the 2011 alluvial drilling program described in Sections 3.6.2.2 and 8.1.1. The POP zone is proposed just outside of the catchment areas in these areas, since there is no potential for surface water or groundwater flow to the west, north or northeast based on hydrologic and topographic data and therefore no need to extend the POP zone further in these directions. The proposed POP zone was further constrained to the north and west by the NRC license boundary/LSM permit boundary. To the south of the land application areas, the proposed POP zone is up to ¼ mile from the land application areas in the downgradient (topographic and hydrologic) directions, which are southwest, south, and southeast. In the vicinity of compliance well DC-2, the proposed POP zone is less than ¼ mile from the nearest land application area due to an oxbow in Beaver Creek, which would make it impractical to perform compliance monitoring further south. In the vicinity of DC-1, the proposed POP zone is less than ¼ mile from the nearest land application area in order to avoid placing a compliance monitoring well across Beaver Creek from the land application areas and to avoid a residence and domestic wells in the NWSW Sec. 30, T6S, R1E (refer to Figures 6.1-1 and 3.7-9 for the locations of the residence and domestic wells). As shown on Figure 3.6-3, the Dewey land application areas overlay the Graneros Group and Beaver Creek alluvium. As discussed in Section 3.7.2.2, the Graneros Group has a very low permeability; therefore, lateral movement of water is expected to be negligible within the Graneros Group. The proposed POP

zone extends to the south in the alluvium, since the alluvium is the first and only hydrogeologic unit potentially impacted by land application.

In the Burdock area, the topographic and hydrologic downgradient directions from the land application areas are south and west. Since there is no potential for groundwater flow to the north or east, the northern and eastern edges of the proposed POP zone are near the catchment areas. The southern and southwestern edges of the proposed POP zone are up to ¼ mile from the land application areas. In the vicinity of BC-1, the POP zone is less than ¼ mile from the nearest land application area due to an oxbow in Pass Creek, which makes it impractical to perform compliance monitoring further west. To the north of BC-1, the proposed POP zone is less than ¼ mile from the nearest land application area to avoid including a residence and domestic well in the NWNW Sec. 3, T7S, R1E (refer to Figures 6.1-2 and 3.7-10 for the locations of the residence and domestic well). As shown on Figure 3.6-3, the Burdock land application areas overlay the Graneros Group and the Pass Creek alluvium. As with the Dewey area, the proposed POP zone was extended in the downgradient direction in the alluvium, since the alluvium is the first and only hydrogeologic unit potentially impacted by land application.

Proposed Compliance Monitoring Points

Refer to Section 6.1.1.1, which describes the locations of the proposed compliance wells.

Justification of Necessary Economic or Social Development

Support for the Dewey-Burdock Project as benefitting the State of South Dakota is found in SDCL 45-6B-2, which states, “Every effort should be used to promote and encourage the development of mining as an industry, but to prevent the waste and spoilage of the land and the improper disposal of tailings which would deny its future use and productivity.” Powertech (USA)’s commitment to adhering to best professional practices, NRC license conditions and EPA and DENR permit conditions will ensure that facility construction, operation, decommissioning and reclamation will protect DENR-approved postmining land use(s). As required by the NRC license, LSM permit and EPA Class III Underground Injection Control permit, Powertech (USA) will be required to post financial assurance for all aspects of the Dewey-Burdock Project. This will ensure that resources will be available for decommissioning and reclamation such that the site will be released for unrestricted (i.e., DENR-approved postmining) use.

Support for ISR uranium recovery to be considered a mining beneficial use is found in SDCL 45-6B-3(11), which includes *in situ* mining in the definition of "mining operation."

The Dewey-Burdock Project NRC license application (Powertech, 2009) describes how the project benefits include its potential to create approximate 250 new jobs during construction and approximately 150 new jobs during operation, which will contribute direct and indirect benefits to the local economy. In addition, Powertech (USA) estimates that the project will generate some $35 million in state and local tax revenue and approximately $187 million in value added benefits over the life of the project.

12.0 REFERENCES

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June 18, 2012

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Pierre, SD 57501-3182

Re: Response to May 25, 2012 Preliminary Technical Comments
Dewey-Burdock Project Groundwater Discharge Plan Application

Dear Mr. Hicks:

On behalf of Powertech (USA) Inc., this letter is provided in response to the May 25, 2012 preliminary technical comments for the above referenced application for a Groundwater Discharge Plan (GDP). For convenience, the comments are provided below along with the responses. Application replacement pages are enclosed along with an index of changes (two hard copies and one electronic copy on CD).

Please note that responses will be provided at a later date for two of the technical comments and a related typographical issue. Revised alluvial cross sections are being prepared in response to technical comment 1 and typographical issue 2, and conceptual design drawings for the catchment areas are being prepared in response to comment 16. As discussed during our June 14 conference call, these will be provided in approximately 2 weeks.

Technical Comment 1: On Figure 3.6-4, the lithology and water levels depicted on the cross sections do not appear to correspond to the lithology and water levels described on the alluvial drill hole logs in Appendix 3.6-A or the features on the map on Figure 3.6-4. Please correct these discrepancies and submit larger depictions of the two cross sections to include geology/hydrology data from the alluvial drill hole logs. If additional drill hole logs were used to construct these cross sections, please identify them on the cross sections and map, and include the logs with the application.

Response: The response to this comment will be provided by approximately July 2. Powertech (USA) will present a revised cross section plate to replace Figure 3.6-4.

Technical Comment 2: Sections 3.7.2.3.1 and 3.7.2.3.2 state that the existing domestic wells (13, 40 and 4002) will be removed from domestic use and replaced as needed. Please elaborate as to the proposed locations (approximate in relation to the land application areas and POP zones) and construction of any replacement domestic wells.

Response: As described in the GDP application, Powertech (USA) will remove all domestic wells within the project area from private use prior to ISR operations. This includes wells 13, 40 and 4002. Powertech (USA) will work with each well owner to determine a) whether water

supply replacement is necessary, and b) the appropriate replacement water supply alternative, if needed. The two water supply replacement alternatives include drilling a new domestic well or extending a water supply pipeline to the residence. In the first option, Powertech (USA) would drill a new well near the residence. All replacement wells will be constructed in accordance with South Dakota well construction standards in ARSD 74:02:04. This will ensure that the wells will not create a pathway for vertical migration of potential contaminants. Further, all replacement wells will target formations outside of the ore zone of the nearest well fields, which will occur in the Fall River Formation and/or Chilson Member of the Lakota Formation. In the case of wells 13, 40 and 4002, replacement wells, if required, will be further restricted to locations outside of the POP zones and formations outside of the alluvium in order to eliminate potential impacts from the proposed land application systems.

The second water supply replacement alternative is to extend a pipeline from one of the proposed Dewey-Burdock Project Madison aquifer supply wells to the residence. The Madison wells are currently being permitted through the Water Rights Program with the option to provide domestic and stock water to locations inside and near the project area. Replacement pages for Sections 3.7.2.3.1 and 3.7.2.3.2 have been included to describe domestic well replacement procedures.

Technical Comment 3: As replacement domestic wells for existing wells 13, 40 and 4002 could be drilled, please include a discussion on protective, mitigation and corrective action plans in regards to area drinking water wells in Section 6 and in the contingency plan discussion under Section 8.1.

Response: Powertech (USA) will protect domestic wells in and near the project area throughout all phases of the Dewey-Burdock Project. As previously described, Powertech (USA) will remove all domestic wells within the project area from private use prior to ISR operations. Domestic well replacement procedures are described in the previous response and will include drilling a new domestic well or extending a Madison water supply pipeline to the residence. Replacement wells will be protected from potential impacts by locating wells outside of the POP zones, constructing them in accordance with ARSD 74:02:04, and completing them in formations outside of the ore zone targeted in the nearest well fields. This will ensure that there is no plausible pathway for contamination of domestic wells from the proposed land application systems. This will be verified through operational monitoring as described below.

Domestic wells within 1.2 miles (2 km) of the project area will be monitored prior to and during ISR operations, including operation of the proposed land application systems. In accordance with NRC license conditions, samples will be collected quarterly for four quarters prior to operations and annually during operations. Samples will be analyzed for the constituents in Table 6.1-3. To demonstrate protection of drinking water wells during operation of the proposed land application systems, Powertech (USA) will provide the sample results to DENR. The GDP application has been updated to reflect this commitment.

Technical Comment 4: Section 5.3 includes a very brief discussion of leak detection systems for facility ponds. Please expand on this discussion by verifying which of the ponds that are

located either wholly or partially within the proposed POP zones will have leak detection systems, and actions to be taken to differentiate land application water from potential pond seepage/leakage.

Response: Additional text has been added to Section 5.3 to include more detail about the leak detection systems and clarify which ponds will be located either wholly or partially within the proposed POP zones. The radium settling ponds, spare ponds, and central plant ponds will include dual geosynthetic liners with leak detection systems. The storage ponds and outlet ponds will store treated water and will therefore contain a single geosynthetic liner without a leak detection system. All ponds and leak detection systems will be routinely inspected and monitored to protect against potential leakage.

Technical Comment 5: Section 5.8 and Table 5.8-1 present the "estimated end-of-production water quality in the ISR well fields…" Please clarify if this is the water quality at the start of the final restoration phase of the well field/mine, or if this is the treated effluent water quality being sent to the irrigation systems. Is the water quality at this stage of the operation anticipated to represent the worst water quality encountered during operation?

Response: The values shown in Table 5.8-1 represent the estimated ore zone groundwater quality at the completion of uranium recovery. This represents the untreated water quality extracted from the ore zone at the end of uranium recovery and at the beginning of aquifer restoration. This table estimates the worst-case water quality encountered in the ISR well fields, and it was used to estimate the range of concentrations of the treated effluent proposed for land application. However, Table 5.8-1 does not consider treatment or blending and therefore is not directly representative of the effluent proposed for land application. Text has been added to Section 5.8 to clarify the purpose of Table 5.8-1.

Technical Comment 6: Table 5.8-2 presents the estimated quality of the water being land applied. As water quality may change throughout the life of the mine with initially most of the water being production phase bleed water, changing to a mixture of production bleed and restoration water, to finally all restoration water; for what stage is this table representative, and does this represent the estimated worst water quality being land applied? If not, provide an estimated worst-case scenario land application water quality.

Response: The column in Table 5.8-2 called "Estimate Land Application Water Quality" shows the estimated range of water quality proposed for land application. The upper values shown in this table represent the estimated worst-case water quality to be land applied. The typical land application water quality will be better than the upper values, since multiple well fields will typically be in various stages of production and aquifer restoration at one time, with water quality gradually degrading toward the worst case during production and gradually improving to approximately baseline water quality during restoration. In addition, Madison water may be used at any time to improve the land application water quality. Section 5.8 has been revised to include this information.

Technical Comment 7: Wells 15 and 43 are both located within land application areas, however, depending on the condition of these wells, they could potentially act as conduits for land application waste water to enter ground water. Please submit well completion logs for well 15 and 43 and a discussion of the condition of the wells, and measures to protect these wells from potential damage. The application states that well 43 is to be converted to a monitoring well. Is well 15 going to remain a stock well, or will it be converted to a monitoring well or abandoned?

Response: Well completion reports are not available for wells 15 and 43. Based on TVA records, both wells were constructed prior to 1977. Due to the uncertainty in the well construction methods and existing condition of these wells, the GDP application has been revised to show that Powertech (USA) commits to plugging and abandoning wells 15 and 43 prior to operation of the Burdock land application system. The wells will be plugged in accordance with ARSD 74:02:04:67 with bentonite or cement grout. Sections 3.5, 3.7.2.3.2 and 8.1.1 have been updated to reflect this commitment.

Technical Comment 8: Please submit the well logs and construction information for the existing wells listed in Tables 6.1-1 and 6.1-2.

Response: Appendices 3.7-A, Well Inventory Summary Tables, and 3.7-B, Well Inventory, have been added to the GDP application in response to this comment. Appendix 3.7-A contains a list of all wells within 1.2 miles (2 km) of the project area, including location, completion interval, well depth, and use. Appendix 3.7-B contains available well completion reports and construction information.

Technical Comment 9: Section 6.2.1 states samples collected from the sampling locations in Table 6.2-1 will be analyzed for constituents listed in Table 4.1-2. However, Section 6.2.1 also states samples collected from the sampling locations in Table 6.2-1 will be analyzed for parameters presented in Table 6.2-2. Please clarify which parameter list, or both, will be used for analyses on samples collected from locations listed in Table 6.2-1.

Response: Both parameter lists will be used for the operational stream sampling locations listed in Table 6.2-1. Prior to ISR operations, Powertech (USA) will sample stream sampling sites listed in Table 6.2-1 monthly for 12 consecutive months. These pre-operational samples will be analyzed for the list of parameters in Table 4.1-2. This extensive parameter list will comprehensively characterize pre-operational (ambient) water quality, including temporal variations. The list was developed in accordance with NRC regulatory guidance and in consultation with NRC and the DENR Minerals & Mining Program. During ISR operations, including operation of the proposed land application systems, Powertech (USA) will collect quarterly operational samples, which will be analyzed for the abbreviated parameter list in Table 6.2-2. This sample list was prepared in accordance with NRC regulatory guidance and is designed to detect potential impacts from the Dewey-Burdock Project. As described on page 146 of the GDP application, additional field parameters will be analyzed during operational sample

collection, including pH, conductivity and temperature. No changes were made to the GDP application in response to this comment.

Technical Comment 10: Please submit a map showing the location of the sampling locations listed in Table 6.2-1.

Response: Figure 6.2-1, Operational Surface Water Sampling Locations, has been added to the GDP application. The new figure shows the locations of the operational stream and impoundment sampling sites.

Technical Comment 11: Section 8.3 includes an introduction to a discussion on trigger levels for metals and metalloids and the potential for buildup of metals and metalloids over time in the land application areas. However, the discussion of these trigger levels includes only the metalloids arsenic and selenium. What are the soil trigger levels for metals and other metalloids?

Response: As described in Section 8.3, Powertech (USA) anticipates that concentrations of metals and metalloids will be low in the land application water. Nevertheless, Powertech (USA) recognizes the potential for buildup over time and proposes to sample an extensive list of metals and other trace elements as described in Section 6.4 and Table 6.4-1. Trigger values are proposed for arsenic and selenium, since these are the two parameters for which DENR expressed concern in the August 2010 review of the Dewey-Burdock Project groundwater discharge permit draft monitoring plan proposal. Section 8.3 has been updated to reflect a commitment to analyze the results of monitoring for all parameters in Table 6.4-1 and propose additional trigger values if increasing trends are observed. This will be provided in the written report submitted to DENR following each land application cycle described in Section 11.

Technical Comment 12: Appendix 3.6-A does not appear to include all of the logs from alluvial wells discussed in the application and associated figures. Please provide the logs for all alluvial wells discussed in the application.

Response: Well logs and well completion reports are provided in Appendix 3.7-B, which is described in the response to Technical Comment 8. Well completion reports are available for all existing alluvial wells. No changes were made to the application in response to this comment.

Technical Comment 13: Appendix 4.2-A, the Table of Contents for this appendix list several data qualifiers, however the data tables do not indicate in which data set these qualifiers were encountered. Please update the application accordingly.

Response: The data qualifiers are used throughout Appendix 4.2-A in the individual well summary tables. For example, in the well 676 summary table, “b” was reported with the May 2010 laboratory conductivity result, “d” was reported with the June 2010 TDS result, “h” was reported with the March 2010 alkalinity result, and “j” was reported with the January 2010 dissolved lead-210 result. The remaining data qualifier, “l”, was reported on various summary tables, e.g., the October 2008 total arsenic result. The Table of Contents in Appendix 4.2-A has

been updated to reflect that the data qualifiers are used throughout the individual well summary tables.

Technical Comment 14: Appendix 5.7-A has values that are unreadable on several tables, please resubmit these tables so that all of the values can be clearly read.

Response: Attached are replacement pages for the Dewey and Burdock monthly runoff water balance tables, which previously contained several shaded values that were difficult to read. When regenerating the monthly water balance tables, several minor discrepancies were located and corrected. These include the following:

- Corrected land application area from 314.5 to 315 acres
- Corrected monthly average PET value for February from 1.28 to 1.23 inches (where applicable)
- Corrected monthly average PET value for November from 2.02 to 2.03 inches (where applicable)
- Corrected monthly seepage estimates to account for the number of days in each month (where applicable)
- Correct shading to correspond to the maximum estimated catchment area water depth for each modeled time period

Technical Comment 15: Please submit a map showing the proposed ISR well fields in relation to the land application areas, bermed catchment areas and proposed POP zones.

Response: The proposed POP zones, catchment areas, and potential well field areas have been added to Figure 2.3-2, Proposed Land Application Systems. The revised figure shows limited overlap between the potential well field areas and the proposed land application systems. These are described below for the proposed Dewey and Burdock land application systems. The GDP application has been updated to include this information.

In the Dewey area, the only land application areas that will potentially overlap with well fields are designated for standby operation. These standby areas generally will not be used at the same time as the underlying well fields, but there is potential for simultaneous operation of the standby land application systems and overlapping well fields. Potential impacts will be mitigated as described below.

In the Burdock area, there will be very limited potential overlap between the proposed land application systems and potential well field areas. In this case overlap will likely be limited to perimeter monitor wells, which are shown as rings 400 feet from the ore bodies on Figure 2.3-2.

Although overlap between active land application areas and potential well field areas will be limited, there may be times that production, injection and monitor wells are operated within active land application areas. Powertech (USA) will design and construct the well fields and land application systems to avoid any potential conflicts and minimize potential risks. The irrigation nozzles will be suspended above the well head covers, and wells and fences will be positioned to

avoid the center pivot wheel pathways. Injection, production and monitor wells will have sealed well heads to prevent entry of the land application water. The well heads also will have sufficient aboveground casing to ensure that surface water cannot enter the wells. Injection and production pipelines will be buried and will not conflict with land application systems. Perimeter monitor wells will have pressure transducers that will allow remote monitoring of water levels. If necessary, discharge piping and pressure transducer cable will be installed from the monitor wells to remote sampling locations outside of the land application area. This would allow Powertech personnel to measure water levels and sample monitor wells without traveling through active land application areas.

Technical Comment 16: Several sections and figures in the application discuss collection areas, berms and catchment areas; however, the application is not very clear about these areas. Please elaborate and include discussions on the locations of collection areas, catchment areas, land application berms and catchment area berms; construction of the berms around both the catchment areas and land application areas (include a typical cross section construction design that traverses the land application berms, land application area, catchment area, catchment area berms and collection area); and how water is to be conveyed to the collection and catchment areas. Please also include a discussion of berm elevation and design freeboard.

Additionally, as the SPAW model is a one-dimensional model that does not include flow routing or channel descriptors, please include a discussion and map indicating where in the collection or catchment areas, standing water likely is to occur, how much standing water may be anticipated during normal operations and during heavy precipitation events, the impacts this standing water would have on groundwater, and what threshold levels of runoff and/or standing water would trigger land application rates to be adjusted to mitigate and eliminate ponding or standing water.

Response: The response to this technical comment will be provided by approximately July 2.

Technical Comment 17: An additional compliance point monitoring well will be required to be drilled along the proposed POP zone in the NW1/4 of the NW1/4 of Section 3, Township 7S, and Range 1E, between the land application area and the residence located in Section 3.

Response: An additional compliance well has been added as requested. In addition, a corresponding interior well has been added. Table 6.1-1 and Figure 6.1-2 have been updated to reflect these changes.

Typographical Issue 1: On Table 3.2-2, the sum of the “Acreage” column does not match the value listed for totals. Please correct this table as necessary or provide an explanation for the discrepancies.

Response: The sum of values did not match the listed total due to rounding. This has been addressed by modifying Tables 3.2-1 and 3.2-2 to show acreage to two significant digits.

Typographical Issue 2: On Figure 3.6-4, the cross sections show a feature with grey shading, but do not identify it. Please identify or otherwise label this feature. Please also identify the light green circles that are shown on the map, in the legend.

Response: As indicated in the response to technical comment 1, a revised alluvial cross section plate will be provided by approximately July 2. The revise plate will include a legend for all features depicted on the cross section location map.

Typographical Issue 3: Sections 3.7.2.3.2 and 7.0, Table 3.7-4 and Figure 3.7-10 all discuss a domestic well (well 43) within the proposed POP zone and land application area, but there are discrepancies between these sections, table and figure as to the existence and/or status of this well. Please correct the application as needed.

Response: The text, figures and tables have been updated to make it clear that well 43, which is a former domestic well associated with an uninhabitable residence, will be plugged and abandoned prior to operation of the Burdock land application system.

Typographical Issue 4: Section 5.6 discusses data in Tables 5.1-1 and 5.1-2. Table 5.1-2 could not be located in the application materials, please update the application accordingly.

Response: The reference to Table 5.1-2 has been corrected to reference Table 5.2-1.

Typographical Issue 5: Section 5.7.2.2 discusses locations shown on Figure 3.2-4. Figure 3.2-4 could not be located in the application materials, please update the application accordingly.

Response: The reference to Figure 3.2-4 has been corrected to reference Figure 3.2-1.

Typographical Issue 6: On Plates 3.6-5 through 3.6-9, please indicate the location on the corresponding reference maps, the logs that were used to generate the cross sections. Please also identify the boundaries of the land application and catchment areas on the cross sections.

Response: The locations of the logs that were used to generate the cross sections have been added to the index maps on Plates 3.6-5 through 3.6-9. The cross sections have also been revised to show the catchment area boundaries on the index maps and cross sections.

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

Sincerely,

Jack W. Fritz

Jack Fritz, P.E.
WWC Project Manager

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

Encl: Change Index
Replacement Pages

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Dewey-Burdock Project
Groundwater Discharge Plan
Revision Index

May 25, 2012 Technical Comments

Volume	Page, Map or other Permit Entry to be Removed	Page, Map or other Permit Entry to be Added	Description of Change
1	p. 92-93, 95	p. 92-93, 95	Technical Comment 2 - Updated text with additional discussion on domestic well replacement procedures.
1	p. iv-ix, 145, 157, 175	p. iv-ix, 145-145a, 157-157a, 175	Technical Comment 3 - Added Section 6.1.4, Domestic Wells, with commitment to provide domestic well monitoring results to DENR in Section 11. Added Section 8.1.3, Domestic Wells. Changed previous Section 8.1.3 to 8.1.4.
1	p. iii, 120	p. iii, 120-120a	Technical Comment 4 - Updated text with more detailed discussion of liners and leak detection systems for facility ponds.
1	p. 133	p. 133-133a	Technical Comment 5 - Revised text to clarify purpose of Table 5.8-1.
1	p. 133	p. 133-133a	Technical Comment 6 - Revised text to clarify purpose of Table 5.8-2.
1	p. 66, 95, 96 (Table 3.7-4), 97 (Fig. 3.7-10), 152	p. 66, 95, 96 (Table 3.7-4), 97 (Fig. 3.7-10), 152-153,	Technical Comment 7 - Revised text to address wells 15 and 43 within proposed land application areas.
1	p. xi, 92	p. xi, 92, App. 3.7-A, App. 3.7-B	Technical Comment 8 - Added Appendices 3.7-A, Well Inventory Summary Tables, and Appendix 3.7-B, Well Inventory, and added reference to the appendices in text.
1	p. ix, 145	p. ix, 145, 145b, Fig. 6.2-1 (p. 145a)	Technical Comment 10 - Added new Figure 6.2-1 to show operational surface water sampling locations.
1	p. 168, 175	p. 168-168a, 175	Technical Comment 11 - Added commitment in Sections 8.3 and 11 to analyze annual soil sampling results for all parameters and propose additional trigger values if increasing trends are observed.
1	p. 4.2-A-2 (App. 4.2-A)	p. 4.2-A-2 (App. 4.2-A)	Technical Comment 13 - Added note to Table of Contents describing that data qualifiers are used throughout individual well summary tables.
1	App. 5.7-A, p. 5.7-A-102-133	App. 5.7-A, p. 5.7-A-102-133	Technical Comment 14 - Replaced Dewey and Burdock monthly runoff water balance tables, which were difficult to read.
1	p. 6 (Fig. 2.3-2), 153	p. 6 (Fig. 2.3-2), 153-153a	Technical Comment 15 - Added proposed POP zones, catchment areas, and potential well field boundaries to figure. Added discussion in Section 8.1.1 on designing and constructing well fields and land application systems to avoid any potential conflicts and minimize potential risks.
1	p. 138, 140 (Figure 6.1-2)	p. 138, 140 (Figure 6.1-2)	Technical Comment 17 - Added new compliance well and interior well for Burdock land application system.
1	p. 49	p. 49	Typographical Technical Comment 1 - Revised Tables 3.2-1 and 3.2-2 to include two significant digits for acreage.
1	p. 66, 95, 96 (Table 3.7-4), 97 (Fig. 3.7-10), 152	p. 66, 95, 96 (Table 3.7-4), 97 (Fig. 3.7-10), 152-153,	Typographical Technical Comment 3 - Revised text, table and figure to make it clear that well 43 (former domestic well) will be plugged and abandoned.

Dewey-Burdock Project
Groundwater Discharge Plan
Revision Index

May 25, 2012 Technical Comments

Volume	Page, Map or other Permit Entry to be Removed	Page, Map or other Permit Entry to be Added	Description of Change
1	p. 121-122	p. 121-122	Typographical Technical Comment 4 - Corrected references to Table 5.2-1.
1	p. 124	p. 124	Typographical Technical Comment 5 - Corrected reference to Figure 3.2-1.
2	Plate 3.6-5	Plate 3.6-5	Typographical Technical Comment 6 - Added land application and catchment area boundaries to plan view and catchment area boundaries to cross section.
2	Plate 3.6-6	Plate 3.6-6	Typographical Technical Comment 6 - Added land application and catchment area boundaries to plan view and catchment area boundaries to cross section.
2	Plate 3.6-7	Plate 3.6-7	Typographical Technical Comment 6 - Added land application and catchment area boundaries to plan view and catchment area boundaries to cross section.
2	Plate 3.6-8	Plate 3.6-8	Typographical Technical Comment 6 - Added land application and catchment area boundaries to plan view and catchment area boundaries to cross section.
2	Plate 3.6-9	Plate 3.6-9	Typographical Technical Comment 6 - Added land application and catchment area boundaries to plan view and catchment area boundaries to cross section.

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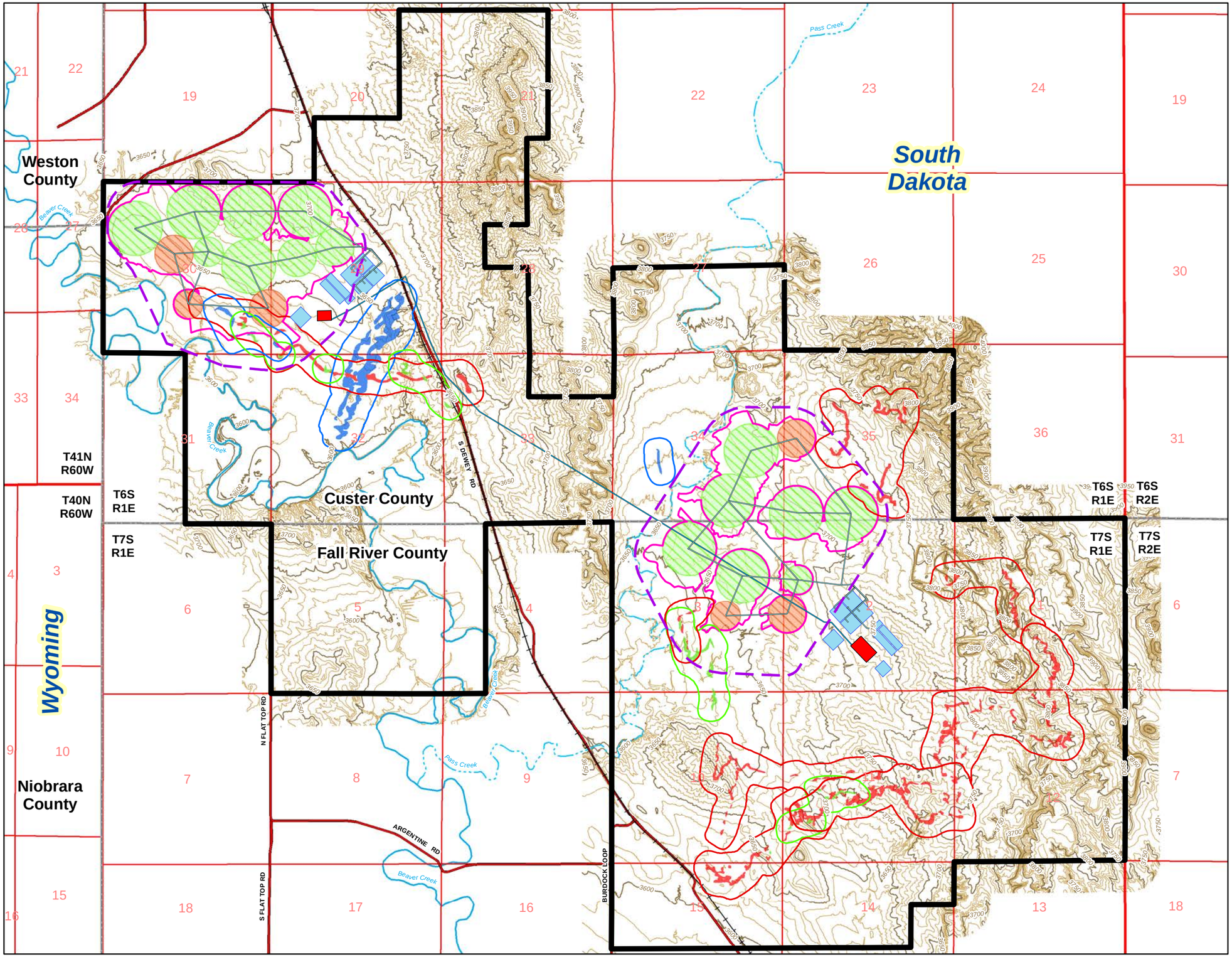
Appendix 4.2-B	Groundwater Quality Analytical Results
Appendix 5.7-A	SPAW Model



Legend

- Project Boundary
- POP Zones
- Processing Plants
- Ponds
- Pipelines
- BNSF Railroad
- County Roads
- Ephemeral Streams
- Perennial Streams
- Catchment Areas
- Land Application
- Standby Land Application

Potential Well Field Areas

- Lower Fall River
- Upper Chilson
- Middle/Lower Chilson

Ore Bodies

- Lower Fall River
- Upper Chilson
- Middle/Lower Chilson

Note: 10' topographic contours generated by Merrick & Co., 2008 aerial topographic survey.

Feet: 0 1,500 3,000 6,000
Meters: 0 1,000 2,000

N

Figure 2.3-2

Proposed Land Application Systems

Dewey-Burdock Project

DRAWN BY	S. Hetrick
DATE	18-Jun-2012
FILENAME	LandApp-Systems.mxd

POWERTECH (USA) INC.

Table 3.2-1: Soil Mapping Unit Acreage within Proposed Dewey POP Zone

Map Symbol	Map Unit Description	Acreage	% Total Acreage
Ar	Arvada, 0 to 6 percent slopes	153.40	18.43
ArV	Arvada Variant Loam, 0 to 6 percent slope	3.64	0.44
Ar-SS	Arvada-Slickspots Complex, 0 to 6 percent slopes	80.46	9.67
Dg	Demar, 0 to 6 percent slopes	38.82	4.67
DA	Disturbed-Ag	0.20	0.02
GrA	Grummit, 0 to 6 percent slopes	47.95	5.76
GrB	Grummit, 6 to 15 percent slopes	16.24	1.95
GrB-RO	Grummit-Rock Outcrop Complex, 6 to 15 percent slopes	19.38	2.33
Ha	Haverson, 0 to 6 percent slopes	21.89	2.63
PeA	Pierre, 0 to 6 percent slopes	206.99	24.87
RO	Rock Outcrop	0.35	0.04
Sc-Ar	Satanta-Arvada Complex, 0 to 6 percent slopes	85.04	10.22
SS	Slickspots	131.62	15.82
ZnB	Zigweid, 6 to 15 percent slopes	17.17	2.07
ZnB-NF	Zigweid-Nihill Complex, 6 to 15 percent slopes	8.98	1.08
Total		**832.13**	**100.00**

Table 3.2-2: Soil Mapping Unit Acreage within Proposed Burdock POP Zone

Map Symbol	Map Unit Description	Acreage	% Total Acreage
Ar	Arvada, 0 to 6 percent slopes	47.31	4.51
Bc	Barnum, 0 to 6 percent slopes	176.57	16.82
Cy	Cushman, 6 to 15 percent slopes	73.17	6.97
DA	Disturbed-Ag	9.07	0.86
GrA	Grummit, 0 to 6 percent slopes	70.53	6.72
GrB	Grummit, 6 to 15 percent slopes	26.85	2.56
GrC	Grummit, 15 to 60 percent slopes	0.14	0.01
He	Hisle, 0 to 6 percent slopes	197.25	18.79
Ky	Kyle, 0 to 6 percent slopes	92.30	8.79
Lo	Lohmiller, 0 to 6 percent slopes	4.09	0.39
MP	Mine Pit	4.19	0.40
NuA	Nunn, 0 to 6 percent slopes	5.80	0.55
NuB	Nunn, 6 to 15 percent slopes	9.15	0.87
Pg	Penrose, 15 to 40 percent slopes	48.82	4.65
PeA	Pierre, 0 to 6 percent slopes	10.85	1.03
PeB	Pierre, 6 to 15 percent slopes	17.71	1.69
Sa	Samsil, 15 to 40 percent slopes	4.42	0.42
SS	Slickspots	51.42	4.89
Ta	Tillford, 0 to 6 percent slopes	196.87	18.75
W	Water	3.43	0.33
Total		**1,049.94**	**100.00**

south of the project area, but no pigs currently graze within the project area or within the proposed land application areas.

3.5 Land Use

The predominant land use within the project area is agricultural production related to grazing (rangeland). Most of the land serves as grazing land for cattle and a few horses. Approximately 390 acres of land are irrigated for hay production along Beaver Creek. Historically, some of the land within the project area was used for mining.

There are five residences within the proposed NRC license boundary, including seasonal residences. There are two residences located within ¼ mile of the land application areas, but no residences are located within the proposed POP zones. Residences and drinking water wells are depicted on Figure 3.5-1 in relation to the proposed land application areas. The drinking water well number 43 near the Burdock area is associated with a former residence that is no longer inhabitable. Well 43 will be plugged and abandoned prior to operation of the Burdock land application system as described in Section 3.7.2.3.2.

Recreational use in and around the project area is limited primarily to large game hunting. Within the project area, hunting is currently open to the public on approximately 5,700 acres. Approximately 240 acres are public lands managed by BLM. In addition, SDGF&P leases around 3,000 acres annually of privately owned land that is designated as walk-in hunting areas. Prior to commencement of operations, Powertech (USA) will work with BLM, SDGF&P and private landowners to limit hunting within the project area to the extent practicable. Temporary fencing, signage, gates and other means of restricting public access will be installed in areas of active ISR operations such as well fields, processing plants and land application areas in order to protect the public, protect workers, prevent damage to facilities, and provide security.

Within the eastern portion of the project area are historical surface and underground mine workings associated with shallow, underground uranium mines and open pits. All of the underground workings are associated with open-pit remnants that are clearly visible in the project area. There are no underground mines within the project area that are not associated with, adjacent to, or extensions of the open pits. These types of underground workings were common at historical surface mines and were considered to be extensions of the open pit mining operations. Based on historical TVA maps, an interview with a former underground mine worker, and an interview with the former Susquehanna-Western geologist who directed the

3.7.2.3 Existing Wells

Historical records and field investigations of the project area and surrounding area were used to develop an inventory of existing wells within 1.2 miles (2 km) of the project area. An initial investigation of the wells was completed in 2007, and additional surveys were conducted in 2011 to evaluate the use and condition of the wells. The well inventory included existing wells, wells with historical records that are currently not present at the surface, and wells with historical records that have been visually confirmed as plugged and abandoned. Appendix 3.7-A contains well inventory summary tables and Appendix 3.7-B contains the detailed well inventory, well completion records and associated documentation. The following sections describe the well inventories for the areas within 1 mile of the proposed Dewey and Burdock POP zones.

Proposed wells include monitor wells and ISR injection and production wells. Monitor wells associated with the GDP are described in Section 6.1. Additional monitor wells and injection/production wells will be constructed within the project area as part of the ISR operations.

3.7.2.3.1 Dewey Area

Table 3.7-3 and Figure 3.7-9 present the well inventory within 1 mile of the proposed Dewey POP zone, which includes 26 existing wells. No wells with historical records that are currently not present or confirmed abandoned have been identified within 1 mile of the Dewey POP zone. Of the 26 existing wells, 3 are currently used for domestic use, 7 for stock watering, and 16 for monitor wells.

All existing domestic wells within the project area will be removed from private use prior to ISR operations, including wells 40 and 4002. Lease agreements for the entire project area currently allow Powertech (USA) to remove and replace the water supply wells as needed. Depending on the well construction, location and screen depth, Powertech (USA) may continue to use the former domestic wells for monitoring or plug and abandon the wells. The remaining domestic well within 1 mile of the proposed Dewey POP zone, well 96, is outside of the project area and will not be impacted by the proposed ISR operations.

Powertech (USA) will work with the owner of wells 40 and 4002 to determine a) whether water supply replacement is necessary, and b) the appropriate replacement water supply alternative, if needed. The two water supply replacement alternatives include drilling a new domestic well or extending a water supply pipeline to the residence. In the first option, Powertech (USA) would drill a new well near the residence. All replacement wells will be constructed in accordance with

South Dakota well construction standards in ARSD 74:02:04. This will ensure that the wells will not create a pathway for vertical migration of potential contaminants. Further, all replacement wells will target formations outside of the ore zone of the nearest well fields, which will occur in the Fall River Formation and/or Chilson Member of the Lakota Formation. In the case of wells 40 and 4002, replacement wells, if required, will be further restricted to locations outside of the POP zone and formations outside of the alluvium in order to eliminate potential impacts from the proposed land application systems.

The second water supply replacement alternative is to extend a pipeline from one of the proposed Dewey-Burdock Project Madison aquifer supply wells to the residence. The Madison wells are currently being permitted through the Water Rights Program with the option to provide domestic and stock water to locations inside and near the project area.

Table 3.7-3: Wells within 1 Mile of Proposed Dewey POP Zone

Hydro ID	Township	Range	Section	1/4 - 1/4 Location	Coordinates East[1]	Coordinates North[1]	Screened Location[2]	Well Use
Existing Wells								
38	6S	1E	33	SWNW	1,024,328	442,289	Fall River	Stock
40	6S	1E	30	SWNW	1,013,415	447,182	Inyan Kara	Domestic[3]
41	6S	1E	31	SWNE	1,015,385	442,081	Unknown	Stock
49	6S	1E	32	NWNW	1,018,932	444,022	Fall River	Stock
96	41N	60W	22	SWSW	1,011,630	451,853	Chilson	Domestic[3]
220	6S	1E	19	SENE	1,017,872	452,334	Unknown	Stock
270	6S	1E	19	NWSW	1,014,108	451,942	Unknown	Stock
609	6S	1E	29	SWNE	1,021,735	447,808	Chilson	Monitor
610	6S	1E	29	SWNE	1,021,599	447,969	Fall River	Monitor
611	6S	1E	20	NWNE	1,021,835	453,954	Chilson	Monitor
612	6S	1E	20	NWNE	1,021,755	454,128	Chilson	Monitor
613	6S	1E	20	NWNE	1,022,125	453,775	Fall River	Monitor
614	6S	1E	20	NWNE	1,022,185	453,769	Fuson	Monitor
615	6S	1E	20	NWNE	1,022,172	453,708	Chilson	Monitor
616	6S	1E	20	SWNE	1,022,132	453,134	Chilson	Monitor
617	6S	1E	20	NENW	1,021,026	453,582	Chilson	Monitor
628	6S	1E	20	SESE	1,022,496	449,718	Fall River	Stock
656	6S	1E	31	SENW	1,014,230	442,000	Unknown	Stock
681	6S	1E	32	NENW	1,020,330	443,725	Fall River	Monitor
683	6S	1E	29	NESW	1,020,212	446,104	Fall River	Monitor
685	6S	1E	32	NWNE	1,020,690	443,409	Fall River	Monitor
687	6S	1E	32	NENW	1,020,081	443,724	Fall River	Monitor
689	6S	1E	32	NENW	1,020,316	443,789	Chilson	Monitor
691	6S	1E	32	NENW	1,020,364	443,698	Fall River	Monitor
693	6S	1E	32	NENW	1,020,327	443,661	Unkpapa	Monitor
4002	6S	1E	30	NWSW	1,013,414	446,931	Inyan Kara	Domestic

[1] Coordinate system is NAD 27 South Dakota State Plane South
[2] Inyan Kara indicates that screened interval includes both Chilson and Fall River
[3] To be removed from service and replaced if necessary prior to ISR operations

3.7.2.3.2 Burdock Area

Table 3.7-4 and Figure 3.7-10 present the well inventory within 1 mile of the proposed Burdock POP zone, which includes 25 existing wells and 7 wells with historical records that have been confirmed as plugged and abandoned. No wells with historical records that are currently not present have been identified within 1 mile of the Burdock POP zone. Of the 25 existing wells, 1 is currently used for domestic use, 1 was formerly used for domestic use, 8 are currently used for stock watering, and 15 are currently used for monitor wells.

All existing domestic wells within the project area will be removed from private use prior to ISR operations, including wells 13 and 43. As described in Section 3.5, well 43 is associated with a former residence that is no longer inhabitable. This well will be plugged and abandoned as described below. Well 13 will be replaced with a new domestic well or a water supply pipeline. Well replacement procedures are described in Section 3.7.2.3.1. In the case of well 13, a replacement well, if required, will be constructed in accordance with ARSD 74:02:04 well construction standards, targeting a formation outside of the ore zone of the nearest well fields and outside of the alluvium, and located outside of the POP zone in order to eliminate potential impacts from the proposed land application systems.

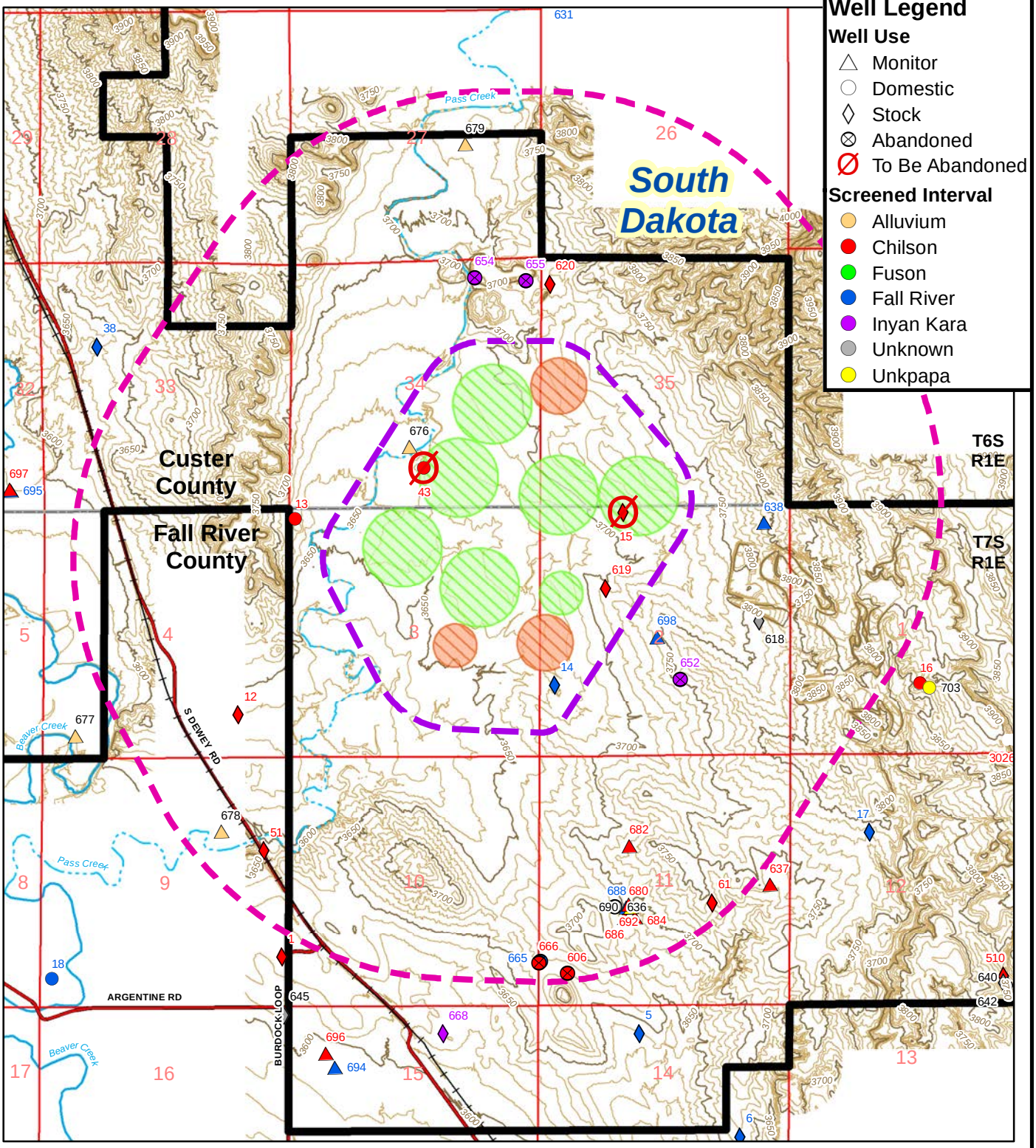
Wells 15 and 43 are both located within land application areas. Based on TVA records, both wells were constructed prior to 1977. Due to the uncertainty in the well construction methods and existing condition of these wells, Powertech (USA) will plug and abandon wells 15 and 43 prior to operation of the Burdock land application system. The wells will be plugged in accordance with ARSD 74:02:04:67 with bentonite or cement grout.

Seven wells are identified as abandoned in Table 3.7-4. Each well was visually inspected, and it has been determined that cement was placed within the well bore.

Table 3.7-4: Wells within 1 Mile of Proposed Burdock POP Zone

Hydro ID	Township	Range	Section	1/4 - 1/4 Location	Coordinates East[1]	Coordinates North[1]	Screened Location[2]	Well Use
Existing Wells								
12	7S	1E	4	SESE	1,026,978	434,378	Chilson	Stock
13	7S	1E	3	NWNW	1,028,360	438,470	Chilson	Domestic
14	7S	1E	2	NWSW	1,033,704	434,723	Fall River	Stock
15[3]	7S	1E	2	NENW	1,035,304	438,317	Chilson	Stock
43[3]	6S	1E	34	SWSE	1,031,123	439,436	Chilson	Domestic[4]
51	7S	1E	9	SENE	1,027,411	431,487	Chilson	Stock
61	7S	1E	11	NWSE	1,036,832	429,987	Chilson	Stock
618	7S	1E	2	SENE	1,038,074	435,906	Unknown	Stock
619	7S	1E	2	SENW	1,034,866	436,729	Chilson	Stock
620	6S	1E	35	NWNW	1,033,951	443,209	Chilson	Stock
638	7S	1E	2	NENE	1,038,269	437,976	Fall River	Monitor
662	7S	1E	11	SESW	1,035,381	428,928	Unknown	Monitor
676	6S	1E	34	SESW	1,030,846	439,891	Alluvial	Monitor
678	7S	1E	9	SWNE	1,026,522	431,925	Alluvial	Monitor
679	6S	1E	27	NWSE	1,032,294	446,245	Alluvial	Monitor
680	7S	1E	11	NESW	1,035,078	429,969	Chilson	Monitor
682	7S	1E	11	SENW	1,035,139	431,257	Chilson	Monitor
684	7S	1E	11	NESW	1,035,191	429,744	Chilson	Monitor
686	7S	1E	11	NESW	1,034,970	429,749	Chilson	Monitor
688	7S	1E	11	NESW	1,035,027	429,974	Fall River	Monitor
690	7S	1E	11	NESW	1,035,114	429,970	Unkpapa	Monitor
692	7S	1E	11	NESW	1,035,075	430,014	Chilson	Monitor
698	7S	1E	2	NESW	1,035,909	435,651	Fall River	Monitor
707	6S	1E	34	SWNE	1,031,935	441,809	Alluvial	Monitor
708	7S	1E	3	SESW	1,030,254	434,094	Alluvial	Monitor
Abandoned Wells								
606	7S	1E	11	SWSW	1,033,713	428,609	Chilson	None
636	7S	1E	11	NESW	1,034,774	429,982	Unknown	None
652	7S	1E	2	NWSE	1,036,360	434,742	Inyan Kara	None
654	6S	1E	34	NWNE	1,032,372	443,410	Inyan Kara	None
655	6S	1E	34	NENE	1,033,454	443,307	Inyan Kara	None
665	7S	1E	11	SWSW	1,033,153	428,901	Fall River	None
666	7S	1E	11	SWSW	1,033,128	428,870	Chilson	None

1 Coordinate system is NAD 27 South Dakota State Plane South
2 Inyan Kara indicates screened interval includes both Chilson and Fall River
3 To be plugged and abandoned prior to operation of the Burdock land application system
4 Formerly used as a domestic well; former residence is uninhabitable



Note: 10' topographic contours generated by Merrick & Co., 2008 aerial topographic survey.

Feet
0 1,500 3,000
0 300 600 900
Meters

Legend

- Project Boundary
- BNSF Railroad
- County Roads
- Ephemeral Streams
- Perennial Streams
- Land Application
- Standby Land Application
- Burdock POP Zone
- 1 Mile from Burdock POP Zone

N

Figure 3.7-10

Existing and Abandoned Wells within 1 Mile of the Proposed Burdock POP Zone
Dewey-Burdock Project

DRAWN BY	S. Hetrick
DATE	14-Jun-2012
FILENAME	Wells-AllBurd1Mile.mxd

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5.3 Pond Design

The storage ponds will be used to store treated water during the times when the land application systems are not operating. These ponds will include a single geosynthetic liner underlain by a 1-foot minimum thickness clay liner. The total estimated capacity per storage pond is 63.8 ac-ft, with 2.0 ac-ft reserved for containment of the 100-year, 24-hour storm event while maintaining 3 feet of freeboard. The available capacity of each pond is therefore 61.8 ac-ft. The storage pond dimensions will be approximately 465 feet x 465 feet x 30 feet deep.

Additional ponds at each site will include outlet ponds, radium settling ponds, and spare ponds designed to be used as either radium settling ponds or in the same capacity as the central plant pond. One central plant pond will also be provided at the Burdock CPP. The central plant pond capacity allows for adequate storage for CPP liquid waste during the initial project startup period when uranium recovery is occurring, but before aquifer restoration activities have started. During this time, CPP liquid waste will need to be stored for approximately 18 months until groundwater sweep water is available for blending with the CPP liquid waste. This capacity will provide flexibility for blending the liquid wastes during normal operation. The central plant pond capacity will allow storage of up to 660 days of CPP liquid water production at 12 gpm. Design information for these ponds is found within the Technical Report prepared for the NRC license application for the Dewey-Burdock Project.

Several ponds are located either wholly or partially within the proposed POP zones. In the Dewey area these include some of the storage ponds, the radium settling pond, the spare radium settling pond, the outlet pond, and the spare storage pond. In the Burdock area these include some of the storage ponds. Following is a description of the pond liners, leak detection systems, and inspection programs that will prevent potential groundwater impacts. Since the ponds will be lined they are not proposed as sources of discharge for the Groundwater Discharge Plan and are not considered in the designation of the proposed POP zones.

The storage ponds and outlet ponds will store treated water and will therefore pose minimal risk to groundwater. Nevertheless, each of these ponds will contain a single geosynthetic liner underlain by a 1-foot minimum thickness clay liner. These ponds will not include leak detection systems but will be inspected routinely as described in Section 10.

The radium settling ponds, spare ponds, and central plant pond will each contain a dual geosynthetic liner with a leak detection system, with a 1-foot minimum thickness clay liner beneath the secondary geosynthetic liner. The primary and secondary liners will be separated by

a geonet, which will provide a physical separation and allow any fluid to flow between the two liners. A minimum grade of 2 percent will be maintained across the bottom of the pond toward a leak detection sump. Any potential leakage from the primary liner will be contained by the secondary liner and collected in the leak detection sump. The sump will be routinely monitored for the presence of fluid as described below. Should a leak occur, the pond will be removed from service and dewatered by transferring the contents to a spare pond.

Routine inspections for all ponds will be conducted in accordance with NRC license requirements as discussed in Section 10. In addition, routine inspections for ponds with leak detection systems will include daily checks for water accumulation in leak detection systems and monthly inspections of the functionality of leak detection systems.

5.4 Catchment Areas

Runoff from significant precipitation events or snowmelt on the land application areas will be conveyed to collection areas downgradient from the land application areas and allowed to evaporate or infiltrate. The minimum collection area will be 35 acres at each of the Dewey and Burdock sites, and the capacity will be sufficient to contain the estimated 100-year runoff event from each center pivot area. The application rate will be maintained at an agronomic rate that will prevent runoff from the center pivot areas to the catchment areas during normal operation. The application rate will be adjusted as necessary including temporary shutdown if needed to prevent excessive ponding in the catchment areas. The catchment areas will be constructed with berms and will be graded to prevent any runoff from applied water and rainfall on the land

application areas from reaching surface water. Berms surrounding the land application areas and catchment areas will also prevent any surface water from entering or leaving the land application areas. Catchment area capacities were estimated using the SPAW model as described below.

5.5 Irrigated Crops

Irrigated crops may include one or more of the following: native vegetation (primarily warm season perennial grasses, cool season perennial grasses, and perennial shrubs), alfalfa, or salt-tolerant wheatgrass.

5.6 Land Application System Operation

The center pivot irrigation systems will typically operate 24 hours per day during the normal frost-free season, which is approximately April through October. The land application systems will have variable operation schedules to allow for adjustments due to weather conditions and other site-specific conditions. The land application system design will allow for instantaneous shutdown of any one or more center pivots as needed. Temporary shutdowns would occur in the event of a piping leak, for maintenance activities, during significant precipitation events, due to excessive ponding in a catchment area, or due to cold temperature. The land application systems will not be used when water cannot infiltrate due to frozen ground. During times when land application will not be used, the treated liquid waste stream will be temporarily stored in ponds. As discussed in Section 5.7.4, the storage ponds will have significant surplus capacity. This will provide contingency to allow for a late spring startup or an early fall stoppage of operations. In addition, Section 5.3 describes how the central plant pond will provide additional capacity for blending of process water to keep the land application water quality relatively consistent.

The land application schedule will follow the project schedule shown in Figure 2.4-1. Land application will occur during production and restoration, the total duration of which is expected to be approximately 9.25 years. During the initial production period prior to restoration, which is expected to last approximately 1.5 to 2 years, the land application rate will be relatively low. During this phase the CPP liquid waste will be stored in the central plant pond and the land application solutions will consist almost entirely of production bleed. The average annual production bleed will be less than 100 gpm, or less than one-third the design average annual application rate of 310 gpm shown in Tables 5.1-1 and 5.2-1. The land application rate will be highest during concurrent production and restoration, which is expected to last approximately 6 years. The design application rates shown in Table 5.1-1 and 5.2-1 are based on this period of operation. The final project phase will be restoration without concurrent production. The land application rate during this relatively brief phase (approximately 0.25 year) will be slightly less

than the values shown in Tables 5.1-1 and 5.2-1, since there will not be disposal of production bleed.

5.7 Hydrologic Land Application and Pond Simulations

Disposal capacity for the land application system was estimated using the SPAW (Soil-Plant-Atmosphere-Water) model, which is described below. In addition to estimating the water budget for agricultural landscapes, the SPAW model also was used to estimate the water budget for the storage ponds and catchment areas.

5.7.1 SPAW Model Description

The SPAW (Soil-Plant-Atmosphere-Water) model was developed by the USDA (Saxton and Willey, 2006) to simulate the daily hydrologic water budgets of agricultural landscapes by two connected routines, one for farm fields and one for impoundments such as irrigation ponds. The field hydrology simulation is represented by: 1) daily climatic descriptions of precipitation, temperature, and evaporation, 2) a soil profile of interacting layers each with unique water holding characteristics, and 3) annual crop growth with management options for rotations, irrigation, and fertilization. The model output for the field hydrology routine includes a daily vertical, one-dimensional water budget depth for all major hydrologic processes such as runoff, infiltration, evapotranspiration, soil water profiles, and percolation. Water volumes for each component of the water balance are estimated by multiplying the water budget depth times the associated field area.

Pond hydrology simulations provide water budgets by multiple input and depletion processes for impoundments whose water source is runoff from agricultural fields and/or water produced by wells or other sources. Model outputs for the pond hydrology routine include daily values of depth, volume, precipitation, evaporation, and change in storage for the period of simulation. The version of the SPAW model used was Version 6.02.75. The model has been extensively tested by the developers using research data and real-world applications.

5.7.2 Model Input Parameters

5.7.2.1 Meteorological Parameters

The local climate at the project site is continental, with hot summers, cold winters, and an average annual precipitation of 16 to 17 inches. The wettest months are from May to July. May and June are the months of highest average precipitation, with occasional thunderstorms that can be severe. Typical average daily temperatures range from 23 °F in January to 73 °F in July.

PET for each month was then calculated by dividing the monthly PET by the number of days in the month. Table 5.7-3 shows the estimated average monthly and annual potential evapotranspiration at the site calculated using this method.

Table 5.7-3: Average Monthly and Annual Potential Evapotranspiration at Project Site (inches)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
0.92	1.23	1.98	3.30	4.40	5.76	7.08	6.95	5.50	3.74	2.02	1.10	44.0

5.7.2.2 Material Properties

To characterize the soils at the site, eleven test pits were excavated on July 11 and 12, 2008. Samples were collected at various depths and analyzed for particle size distribution, dry bulk density, permeability, and other geotechnical parameters. Test pits 1 through 5 were excavated at the Dewey land application area, and test pits 6 through 11 were excavated in and near the Burdock land application area. The test pit locations are shown on Figure 3.2-1. Section 3.2.5 provides a summary of the soil properties.

5.7.3 Modeling Approach

The general assumptions for the SPAW model include the following:

1. The model is a one-dimensional vertical model.
2. The model assumes that the modeled area is spatially uniform in soil, crop and climate characteristics.
3. Model inputs and outputs are based on daily values.
4. The model does not does not include flow routing or channel descriptors.
5. Daily runoff is estimated as an equivalent depth over the simulation field by the USDA/SCS Curve Number method.
6. The field budget utilizes a one-dimensional vertical system beginning above the plant canopy and proceeding downward through the soil profile to a depth sufficient to represent the complete root penetration and subsurface hydrologic processes (lateral soil water flow is not simulated).

Specific assumptions related to this project are as follows:

1. Daily precipitation and temperature data used in the model are based on 28 years of record from the Edgemont, South Dakota station.
2. SPAW modeling was done for two land application and pond areas, the Dewey site and the Burdock site.

excess production solution withdrawn to maintain a cone of depression so native groundwater continually flows to the center of the production zone.

Table 5.8-1 presents the estimated end-of-production water quality in the ISR well fields. This represents the untreated water quality extracted from the ore zone at the end of uranium recovery and at the beginning of aquifer restoration. This table represents the worst-case water quality encountered in the well fields, and it was used to estimate the range of concentrations of the treated effluent proposed for land application after accounting for treatment and blending.

The typical water quality during land application will be better than that shown in Table 5.8-1, since the water quality will be continually improving during aquifer restoration. Table 5.8-2 presents the anticipated land application water quality. The upper values shown in this table represent the estimated worst-case water quality to be land applied. The typical land application water quality will be better than the upper values, since multiple well fields will typically be in various stages of production and aquifer restoration at one time, with water quality gradually degrading toward the worst case during production and gradually improving to approximately baseline water quality during restoration. In addition, Madison water may be used at any time to improve the land application water quality. It is anticipated that trace metal concentrations will be at or below ARSD 74:54:01:04 human health standards. In addition, the effluent concentration limits will be met for the release of radionuclides to the environment as defined in 10 CFR Part 20, Appendix B. This will be accomplished through treating the water as follows.

Prior to discharge to the storage ponds, Powertech (USA) will treat all land application water to meet the requirements of 10 CFR 20, Appendix B, Table 2, Column 2, which are the established limits for discharge of radionuclides to the environment and include limits for natural uranium, radium-226, lead-210 and thorium-230. This will be accomplished by ion exchange for uranium removal followed by radium removal through co-precipitation with barium sulfate in radium settling ponds. It is not anticipated that thorium-230 and lead-210 will be present at concentrations above the limits. If concentrations in the storage ponds are above the release limits, the effluent will be treated as necessary to satisfy the Appendix B limits.

As stated in Section 2.2.1 the land application water will not contain any domestic (septic) waste water.

The values shown in Tables 5.8-1 and 5.8-2 were estimated by Powertech (USA) based on results of laboratory-scale leach tests conducted on ore samples from the project sandstones, as well as from historical end-of-production water quality data from other ISR facilities in

Wyoming and Nebraska, with adjustments as necessary to account for planned post-production water treatment(s).

The primary source of land application water, production and restoration bleed, will result from multiple well fields undergoing differing phases of production and restoration. During production, the concentrations of dissolved constituents in each well field will gradually increase from the baseline quality to the post-production quality estimated in Table 5.8-1. During restoration, the water quality will be returned to approximately baseline water quality. The water from multiple well fields will be combined in the storage ponds, where increasing concentrations from producing well fields will be offset by decreasing concentrations from well fields undergoing restoration. This, combined with adequate pond capacity, will ensure that the land

Compliance wells are proposed hydrologically down-gradient from the land application systems at the POP zone boundaries. These wells will serve as compliance monitoring locations for potential impacts to alluvial water quality outside of the POP zone.

Interior wells are proposed within each POP zone to measure potential changes in alluvial water quality within the POP zones. Per ARSD 74:54:02:06(9)(a), the interior wells will be positioned approximately 1/3 the distance between the point of application (pivot areas) and the compliance monitoring points.

Other wells are proposed to measure ambient alluvial water quality within the project area. These include wells located upgradient of the proposed land application systems and downgradient wells outside of the POP zones. Many of these wells will be monitored as a condition of the NRC license and are not directly associated with the GDP. Nevertheless, Powertech (USA) will provide the monitoring results for these other wells to DENR.

Tables 6.1-1 and 6.1-2 present the proposed alluvial monitor wells. The wells are depicted on Figures 6.1-1 and 6.1-2.

Table 6.1-1: Proposed Alluvial Monitor Wells, Dewey Land Application System

Category	Well ID	Qtr-Qtr	Section	Township	Range	Status
Compliance wells	DC-1	NWSW	30	6S	1E	Proposed
	DC-2	SESW	30	6S	1E	Proposed
	DC-3	NENW	31	6S	1E	Proposed
	DC-4	NWNW	32	6S	1E	Proposed
Interior wells	DI-1	SWNW	30	6S	1E	Proposed
	DI-2	SESE	30	6S	1E	Proposed
	DI-3	SWSW	29	6S	1E	Proposed
Other wells	TBD	NWNW	30	6S	1E	Proposed
	TBD	NWSE	32	6S	1E	Proposed
	677	SWSW	4	6S	1E	Existing

Table 6.1-2: Proposed Alluvial Monitor Wells, Burdock Land Application System

Category	Well ID	Qtr-Qtr	Section	Township	Range	Status
Compliance wells	BC-1	NWSW	3	7S	1E	Proposed
	BC-2	SESW	3	7S	1E	Proposed
	BC-3	NWNW	4	7S	1E	Proposed
Interior wells	BI-1	SENW	3	7S	1E	Proposed
	BI-2	NWSE	3	7S	1E	Proposed
	BI-3	NWNE	3	7S	1E	Proposed
	BI-4	NWNW	3	7S	1E	Proposed
Other wells	676	SESW	34	6S	1E	Existing
	678	SWNE	9	7S	1E	Existing
	679	NWSE	27	6S	1E	Existing
	707	SWNE	34	6S	1E	Existing
	708	SESW	3	7S	1E	Existing

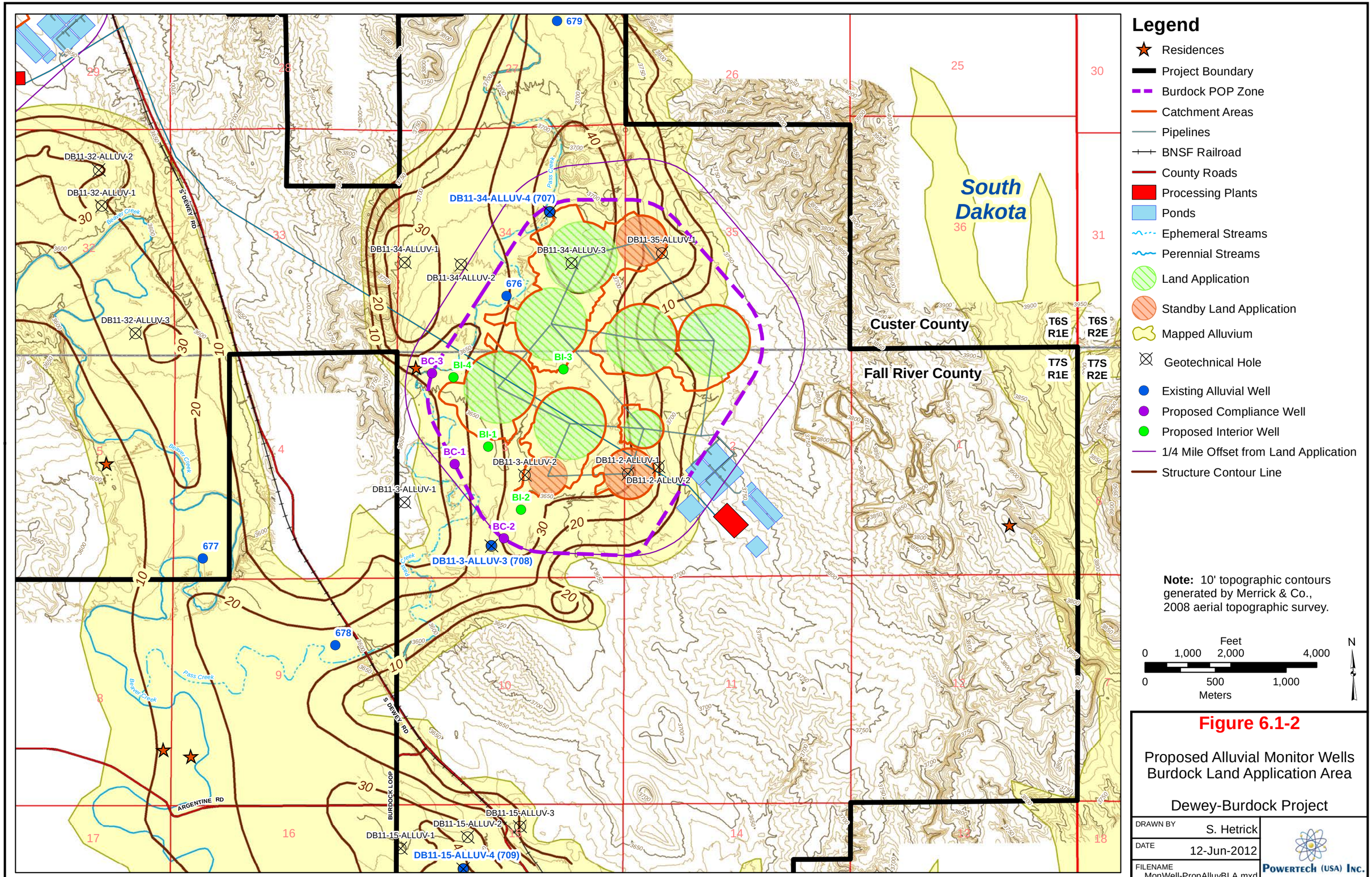

Figure 6.1-2

Proposed Alluvial Monitor Wells
Burdock Land Application Area

Dewey-Burdock Project

DRAWN BY	S. Hetrick
DATE	12-Jun-2012
FILENAME	MonWell-PropAlluvBLA.mxd

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During operation of the land application systems, pore water samples will be collected once prior to each irrigation season, once during each irrigation season (for lysimeters installed beneath operational pivots and catchment areas only), and once after each irrigation season. Samples will be analyzed for the same parameters as pre-operational monitoring.

6.1.4 Domestic Wells

Domestic wells within 1.2 miles (2 km) of the project area will be monitored prior to and during ISR operations, including operation of the proposed land application systems. In accordance with NRC license conditions, samples will be collected quarterly for four quarters prior to operations and annually during operations. Samples will be analyzed for the constituents in Table 6.1-3. To demonstrate protection of drinking water wells during operation of the proposed land application systems, Powertech (USA) will provide the sample results to DENR.

6.2 Surface Water

6.2.1 Streams

Prior to ISR operations, Powertech (USA) will establish upstream and downstream sampling sites on Beaver Creek and Pass Creek. The locations of the stream sampling sites are listed in Table 6.2-1 and depicted on Figure 6.2-1. These locations are different from those described in Section 4.1. The new stream sampling sites better meet NRC regulatory guidance. The upstream sites on each creek will be positioned approximately at the upstream boundaries of the NRC license area and will represent ambient water quality. The downstream location on Beaver Creek is downstream of the Dewey land application system, and the downstream location on Pass Creek is downstream of the Burdock land application system.

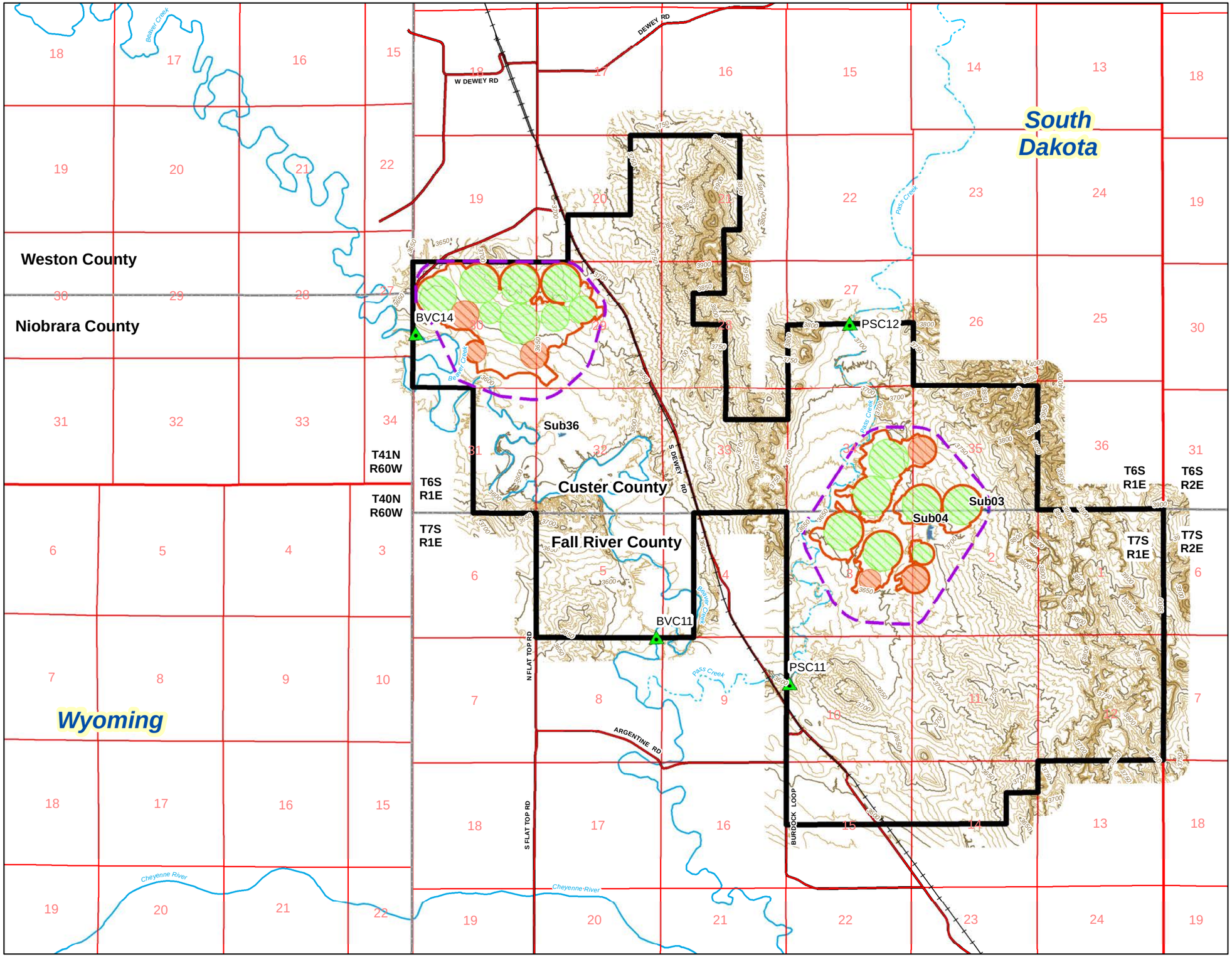
Table 6.2-1: Operational Stream Sampling Locations

Site ID	Name	Sample Type	Location (feet)[1]	
			Northing	Easting
BVC11	Beaver Creek Downstream	Grab	433,638	1,022,546
BVC14	Beaver Creek Upstream	Grab	446,829	1,012,976
PSC11	Pass Creek Downstream	Passive sampler	431,452	1,028,064
PSC12	Pass Creek Upstream	Passive sampler	446,470	1,031,222

[1]Coordinate system is NAD 27, South Dakota State Plane South

Prior to ISR operations, Powertech (USA) will sample each stream sampling site monthly for 12 consecutive months. Grab samples will be collected from sites BVC11 and BVC14. Passive samplers will be installed at sites PSC11 and PSC12 to collect samples during ephemeral flow events. Water samples will be analyzed for constituents listed in Table 4.1-2.

During ISR operations, including operation of the land application systems, streams will be sampled by grab sampling or with automatic samplers. Grab samples will be collected quarterly from the perennial stream sampling locations on Beaver Creek. Passive samplers (single-stage samplers) will be installed at Pass Creek sampling sites from April through October. These will automatically collect samples when the flow rate in the channel reaches a field-adjustable minimum depth threshold. Following the runoff event the water will be manually transferred



Legend

- Project Boundary
- BNSF Railroad
- County Roads
- Ephemeral Streams
- Perennial Streams
- Operational Sampling Locations
- Impoundments
- POP Zones
- Catchment Areas
- Land Application
- Standby Land Application

Note: 10' topographic contours generated by Merrick & Co., 2008 aerial topographic survey.

Feet: 0 2,000 4,000 8,000
Meters: 0 1,000 2,000

N

Figure 6.2-1

Operational Surface Water Sampling Locations

Dewey-Burdock Project

DRAWN BY	S. Hetrick
DATE	14-Jun-2012
FILENAME	OperSurfH2OSampLoc.mxd

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8.0 MITIGATION OF POTENTIAL IMPACTS

The following sections describe the mitigation measures that will be used to minimize the potential impacts to groundwater, surface water, soil, vegetation, livestock and wildlife.

8.1 Groundwater

8.1.1 Alluvial Groundwater

Mitigation measures used to protect alluvial groundwater quality are described below and include:

- Siting the land application areas at locations where natural conditions make it highly unlikely that the land application water will reach the alluvium,
- Plugging and abandoning existing wells within the land application areas,
- Design and construct well fields and land application systems to avoid any potential conflicts and minimize potential risks,
- Applying the water at agronomic rates,
- Treating the land application water to remove radionuclides,
- Providing sufficient pond storage capacity to stabilize the water quality over long periods of time,
- Implementing an extensive monitoring program, and
- Implementing a contingency plan to address increasing trends in groundwater quality constituents within the POP zones in order to avoid potential impacts to groundwater outside of the POP zones.

<u>Natural Conditions</u>

Potential impacts to alluvial groundwater will be minimized by natural conditions that make it highly unlikely that the land application water will reach the alluvial groundwater. Figure 3.4-6 depicts shallow geologic cross sections drawn through the Burdock land application area. The figure shows that the depth to the top of the alluvial gravel ranges from about 12 to 33 feet and is typically 15 to 25 feet. The depth to alluvial groundwater, where encountered, is typically 25 to 35 feet. By comparison, the SPAW model simulations predict that the land application water will not percolate deeper than 8 feet.

In the Dewey area, groundwater was not typically encountered in the alluvial drilling program completed in May 2011. The primary reason is the composition of the clay-rich alluvial material along Beaver Creek in the project area, which generally contains less gravel than the alluvium along Pass Creek. Many of the Beaver Creek alluvial characterization holes encountered no gravel from the surface to the well-defined contact with the Granerous Group shales. Due to the limited occurrence of gravel and water within the Beaver Creek alluvium, there is even less potential to impact alluvial groundwater from the proposed land application system.

The soil hydraulic properties beneath the land application areas will help prevent the migration of water into the alluvial groundwater. Table 3.2-3 shows that the soils sampled from test pits in and around the land application areas predominantly contain clay and silt, with lesser amounts of sand and virtually no gravel to a depth of 7 to 10 feet. The primary mapped soil units in the Dewey land application area are Arvada fine sandy loam, Pierre clay, and slickspots. The permeability of each of these units is very slow as described in Appendix 3.2-A. The primary mapped soil units in the Burdock land application area include some with very low permeability (Arvada and Hisle silt loam) and others with moderate permeability (Barnum very fine sandy loam, Tilford silt loam, and Cushman very fine sandy loam).

Soil permeability was measured on samples from three test pits at each of the land application areas. Table 3.2-3 shows the permeability in the Dewey area ranged from 3.2×10^{-5} to 8.3×10^{-5} cm/sec (TP-01, TP-03 and TP-05). The permeability in the Burdock area was lower on average, ranging from 1.6×10^{-7} to 5.7×10^{-4} cm/sec. The differences in permeability for the two land application areas were taken into account in the SPAW model simulations.

The results of the May 2011 alluvial drilling program (Appendix 3.6-A) show similar soils as those sampled from the test pits to greater depths. Only the bottom 0 to 15 feet of the alluvium typically contains gravel, and this is typically a mixture of silt, clay and sand with scattered gravel. The top of the alluvium contains a mixture of silt, clay and sand as described in Section 3.6.2.2.

Plugging and Abandoning Existing Wells within Land Application Areas

Powertech (USA) has not identified any existing wells within the proposed Dewey land application area. Within the proposed Burdock land application area, there are two existing wells. As described in Section 3.7.2.3.2, these include one former domestic well (well 43) and one stock well (well 15). Both of these wells will be plugged and abandoned prior to operation of the Burdock land application system. The wells will be plugged in accordance with ARSD

74:02:04:67 with bentonite or cement grout. This will eliminate the potential for vertical migration of land application solutions through these existing wells.

Design and Construction of Well Fields and Land Application Systems to Avoid Potential Conflicts and Minimize Potential Risks

The potential well field areas are shown on Figure 2.3-2 along with the proposed land application areas. The figure shows limited overlap between the potential well field areas and the proposed land application systems. In the Dewey area, the only land application areas that will potentially overlap with well fields are designated for standby operation. These standby areas generally will not be used at the same time as the underlying well fields, but there is potential for simultaneous operation of the standby land application systems and overlapping well fields. Potential impacts will be mitigated as described below.

In the Burdock area, there will be very limited potential overlap between the proposed land application systems and potential well field areas. In this case overlap will likely be limited to perimeter monitor wells, which are shown as rings 400 feet from the ore bodies on Figure 2.3-2.

Although overlap between active land application areas and potential well field areas will be limited, there may be times that production, injection and monitor wells are operated within active land application areas. Powertech (USA) will design and construct the well fields and land application systems to avoid any potential conflicts and minimize potential risks. The irrigation nozzles will be suspended above the well head covers, and wells and fences will be positioned to avoid the center pivot wheel pathways. Injection, production and monitor wells will have sealed well heads to prevent entry of the land application water. The well heads also will have sufficient aboveground casing to ensure that surface water cannot enter the wells. Injection and production pipelines will be buried and will not conflict with land application systems. Perimeter monitor wells will have pressure transducers that will allow remote monitoring of water levels. If necessary, discharge piping and pressure transducer cable will be installed from the monitor wells to remote sampling locations outside of the land application area. This would allow Powertech personnel to measure water levels and sample monitor wells without traveling through active land application areas.

Water Application Rate

The land application rate has been specifically designed to minimize percolation below the rooting zone. The typical seasonal application rate over each of the land application areas will be

about 19 inches of water, which is a typical agronomic application rate for growing alfalfa and grasses in this region. The instantaneous rate will be adjusted as needed to avoid excessive ponding in the catchment areas. Section 8.2 also describes how Powertech (USA) will pump water from the catchment areas if necessary. Infiltration from the catchment areas will only occur sporadically. The annual average infiltration rate from the catchment areas is expected to be much lower than that from the center pivot areas, and thus potential alluvial groundwater impacts from catchment area infiltration will be lower than those from the center pivot areas. Due to the extensive monitoring system available within each land application area, including

8.1.2 Bedrock Groundwater

Bedrock groundwater quality will be protected from potential impacts from the land application systems by the thickness and confining properties of the Graneros Group shales, which separate the proposed land application systems from bedrock aquifers.

8.1.3 Domestic Wells

Powertech (USA) will protect domestic wells in and near the project area throughout all phases of the Dewey-Burdock Project. As described in Section 3.7.2.3.1, Powertech (USA) will remove all domestic wells within the project area from private use prior to ISR operations. Domestic well replacement procedures are described in Section 3.7.2.3.1 will include drilling a new domestic well or extending a Madison water supply pipeline to the residence. Replacement wells will be protected from potential impacts by locating wells outside of the POP zones, constructing them in accordance with ARSD 74:02:04, and completing them in formations outside of the ore zone targeted in the nearest well fields. This will ensure that there is no plausible pathway for contamination of domestic wells from the proposed land application systems. This will be verified through operational monitoring as described in Section 6.1.4.

8.1.4 Modeling Potential Postclosure Impacts

The SPAW model was used to estimate the potential postclosure impacts of the land application system. The objective of the postclosure modeling was to determine if there would be a potential for continuing downward migration of water and salts after cessation of land application operations. In order to conservatively estimate potential operational and postclosure impacts, the wettest 15-year period of record was modeled during operations and repeated for two cycles after operations (30-year postclosure modeling period). The wettest 15-year period of record was 1986 to 2000. This period of record yielded the deepest penetration of the water during the operational land application modeling simulations.

During the 15 years of operational monitoring, the irrigation parameters described in Section 5.7.3 were used. The SPAW model was continued for 30 additional years by repeating the 15-year precipitation and temperature inputs. During the 30-year postclosure modeling period, no irrigation water was input.

Table 8.1-1 presents the 15-year modeling results for the Dewey land application area during operations. The average input and output values match those shown in Table 5.7-5 for simulation number 7. Table 8.1-2 presents the 30-year postclosure modeling results for the Dewey land

application area. The results show lower average annual runoff during the postclosure period (4.3 versus 5.5 inches), lower annual average infiltration (9.3 versus 18.8 inches), lower annual average percolation (-0.01 versus 0.08 inch), no deep percolation, and a reversal of the change in soil moisture (-0.02 versus 0.42 inch).

Table 8.1-3 presents the 15-year modeling results for the Burdock land application area during operations. The average input and output values match those shown in Table 5.7-5 for simulation number 7. Table 8.1-4 presents the 30-year postclosure modeling results for the Burdock land application area. As with the Dewey model, the results show similar decreases during the postclosure period in average annual runoff, infiltration, percolation, and soil moisture.

The results of the postclosure modeling show that using the wettest 15-year period of record for climatic inputs, there would be no net downward movement of water beneath the land

Decommissioning will begin with a gamma survey to determine if there are areas requiring soil cleanup. Areas exhibiting contamination will be excavated and the affected soil disposed at an appropriately permitted facility. Compliance with cleanup standards will be verified through radiological gamma surveys and soil sampling with laboratory analysis. Upon completion of decommissioning activities, the NRC will release the site for unrestricted (i.e., any) use.

Metals and Metalloids

The concentrations of metals and metalloids, including arsenic and selenium, are anticipated to be low as shown in Table 5.8-2. Nevertheless, there is potential for buildup of metals and metalloids over time in the land application areas. Potential impacts will be mitigated by monitoring soil concentrations during operations and implementing a contingency plan if concentrations approach trigger values. Table 8.3-1 presents the proposed trigger values for arsenic and selenium in surface and subsurface soil.

Table 8.3-1: Trigger Values for Arsenic and Selenium in Soil

Parameter	Units	Trigger Value
Arsenic	mg/kg-dry	Baseline average concentration plus 2 standard deviations
Selenium	mg/kg-dry	Baseline average concentration plus 2 standard deviations

Powertech (USA) has evaluated the baseline concentrations of arsenic and selenium within the project area and determined that significant natural variability occurs in these parameters. Therefore, Powertech (USA) proposes to base the arsenic and selenium trigger values on the baseline concentration and natural variability. Specifically, Powertech (USA) proposes to collect four samples from each of two sample depths in each center pivot area as described in Section 6.4. For each sampling depth within each center pivot area, the trigger value will be established as the average baseline concentration plus two standard deviations.

Recognizing the potential for buildup of metals and metalloids other than arsenic and selenium, Powertech (USA) commits to sample an extensive list of metals and other trace elements as described in Section 6.4. Powertech (USA) will analyze the results of monitoring for all soil parameters in Table 6.4-1 and propose additional trigger values if increasing trends are observed. This analysis will be completed annually and provided in the written report submitted to DENR following each land application cycle described in Section 11.

Soil Fertility

Powertech (USA) may apply fertilizer to the land application areas to maximize crop production and maintain adequate soil fertility. Fertilizer will contain one or more of the three primary nutrients of nitrogen (N), phosphate (P_2O_5), and potash (K_2O). The alluvial water quality parameter list in Table 6.1-3 includes nitrate and potassium and will be adequate to detect any potential impacts to alluvial water quality from the use of fertilizer. These parameters are better indicators of potential impacts from fertilizer than phosphorus, which tends to adsorb to soil surfaces.

11.0 REPORTING

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

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

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

1) The total amount of land application solution applied
2) The total hydraulic loading rate per acre
3) The total metals loading rate per acre, including all of the trace and minor elements and radiological parameters in Table 6.1-3
4) All sampling data, including alluvial groundwater, Fall River Formation groundwater, streams and impoundments, domestic wells, land application discharge water, soil, vegetation, and livestock
5) An analysis of potential increasing trends in the concentration of all soil sampling parameters in Table 6.4-1 and proposed additional trigger values, if applicable
6) A general discussion of the success of the system

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

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

Appendix 3.7-A

Well Inventory Summary Tables

Table 1. Current Wells within 2 Kilometers of Permit Area

Hydro ID	Legal Location				SD State Plane NAD 27		Aquifer[1]	Use
	T.	R.	Sec.	Qtr. Qtr.	East (ft)	North (ft)		
1	7S	1E	9	SESE	1027696	429227	Chilson	Stock
2	7S	1E	16	SESE	1026724	423922	Chilson	Domestic
3	7S	1E	22	SWNW	1028593	421104	Chilson	Stock
4	7S	1E	15	SESE	1032516	423080	Unknown	Stock
5	7S	1E	14	NENW	1035181	427284	Fall River	Stock
6	7S	1E	14	NESE	1037218	425012	Fall River	Stock
7	7S	1E	23	NWNW	1033304	422417	Fall River	Domestic
9	7S	1E	23	NENE	1038003	421806	Fall River	Stock
12	7S	1E	4	SESE	1026978	434378	Chilson	Stock
13	7S	1E	3	NWNW	1028360	438470	Chilson	Domestic
14	7S	1E	2	NWSW	1033700	434723	Fall River	Stock
15	7S	1E	2	NENW	1035304	438317	Chilson	Stock
16	7S	1E	1	NWSE	1041428	434446	Chilson	Domestic
17	7S	1E	12	SENW	1040223	431329	Fall River	Stock
18	7S	1E	9	SWSW	1022812	428960	Fall River	Domestic
37	7S	2E	18	NWSW	1044183	423947	Fall River	Stock
38	6S	1E	33	SWNW	1024328	442289	Fall River	Stock
40[2]	6S	1E	30	SWNW	1013415	447182	Inyan Kara	Domestic
41	6S	1E	31	SWNE	1015385	442081	Unknown	Stock
42	7S	1E	5	SWNE	1021144	436481	Chilson	Domestic
43	6S	1E	34	SWSE	1031123	439436	Chilson	Domestic
49	6S	1E	32	NWNW	1018932	444022	Fall River	Stock
50	41N	60W	28	SWNW	974693	446835	Chilson	Stock
51	7S	1E	9	SENE	1027411	431487	Chilson	Stock
61	7S	1E	11	NWSE	1036832	429987	Chilson	Stock
96	41N	60W	22	SWSW	1011630	451853	Chilson	Domestic
102	6S	1E	18	SWNE	1016825	458312	Chilson	Domestic
106	6S	1E	18	NENE	1018099	459625	Unknown	Stock
107	6S	1E	18	SWNE	1017018	458158	Fall River	Domestic
109	6S	1E	17	NENW	1020801	459625	Chilson	Domestic
110	6S	1E	17	NENE	1023777	459643	Chilson	Stock
111	6S	1E	17	NWNE	1022074	459586	Fall River	Stock
112	6S	1E	16	SESE	1027864	455881	Fall River	Stock
113	7S	2E	6	NESW	1046437	434417	Unknown	Stock
114	7S	2E	7	SESW	1045410	428653	Unkpapa	Stock
115	6S	1E	18	SENE	1017697	457640	Inyan Kara	Domestic
116	6S	1E	18	SENE	1017992	458111	Fall River	Stock
117	6S	1E	8	SWSE	1022177	460796	Unknown	Stock
138	6S	1E	18	NENE	1017537	459030	Fall River	Domestic
147	6S	1E	17	NESW	1020879	456566	Chilson	Monitor

Table 1. Current Wells within 2 Kilometers of Permit Area (Cont'd)

Hydro ID	Legal Location				SD State Plane NAD 27		Aquifer[1]	Use
	T.	R.	Sec.	Qtr. Qtr.	East (ft)	North (ft)		
220	6S	1E	19	SENE	1017872	452334	Unknown	Stock
270	6S	1E	19	NWSW	1014108	451942	Unknown	Stock
436	6S	1E	20	NWNE	1021603	454436	Fall River	Monitor
506	7S	2E	8	SWNW	1050129	430704	Unkpapa	Stock
510	7S	1E	12	SESE	1042933	428178	Chilson	Stock
609	6S	1E	29	SWNE	1021735	447808	Chilson	Monitor
610	6S	1E	29	SWNE	1021599	447969	Fall River	Monitor
611	6S	1E	20	NWNE	1021837	453958	Chilson	Monitor
612	6S	1E	20	NWNE	1021757	454133	Chilson	Monitor
613	6S	1E	20	NWNE	1022125	453775	Fall River	Monitor
614	6S	1E	20	NWNE	1022185	453769	Fuson	Monitor
615	6S	1E	20	NWNE	1022172	453708	Chilson	Monitor
616	6S	1E	20	SWNE	1022135	453141	Chilson	Monitor
617	6S	1E	20	NWNE	1021029	453586	Chilson	Monitor
618	7S	1E	2	SENE	1038074	435906	Unknown	Stock
619	7S	1E	2	NWNW	1034739	437071	Chilson	Stock
620	6S	1E	35	NWNW	1033951	443209	Chilson	Stock
622	6S	1E	20	NENE	1022776	454033	Chilson	Monitor
623	6S	1E	20	NENE	1022669	454299	Fall River	Monitor
624	6S	1E	18	SENE	1017992[3]	458111[3]	Fall River	Monitor
628	6S	1E	20	SESE	1022654	449402	Fall River	Stock
631	6S	1E	26	NWNW	1034335	448992	Fall River	Stock
637	7S	1E	11	NESE	1038075	430320	Chilson	Monitor
638	7S	1E	2	NENE	1038269	437976	Fall River	Monitor
639	7S	2E	7	SENW	1045704	430722	Unknown	Stock
640	7S	1E	12	SESE	1043010	427965	Unknown	Stock
642	7S	1E	12	SESE	1042926	428042	Unknown	Stock
645	7S	1E	16	NENE	1027681	427998	Unknown	Stock
650	7S	1E	1	SESE	1043795	433351	Chilson	Stock
656	6S	1E	31	SENW	1014230	442000	Unknown	Stock
657	6S	1E	20	NWNE	1021637	454497	Chilson	Monitor
662	7S	1E	11	SESW	1035381	428928	Sundance	Monitor
668	7S	1E	15	NWNE	1031029	427450	Inyan Kara	Stock
676	6S	1E	34	SESW	1030846	439891	Alluvial	Monitor
677	7S	1E	4	SWSW	1023527	434077	Alluvial	Monitor
678	7S	1E	9	SWNE	1026522	431925	Alluvial	Monitor
679	6S	1E	27	NWSE	1032294	446245	Alluvial	Monitor
680	7S	1E	11	NESW	1035078	429969	Chilson	Monitor
681	6S	1E	32	NENW	1020330	443725	Fall River	Monitor
682	7S	1E	11	SENW	1035136	431259	Chilson	Monitor
683	6S	1E	29	NESW	1020209	446107	Fall River	Monitor

Table 1. Current Wells within 2 Kilometers of Permit Area (Cont'd)

Hydro ID	Legal Location				SD State Plane NAD 27		Aquifer[1]	Use
	T.	R.	Sec.	Qtr. Qtr.	East (ft)	North (ft)		
684	7S	1E	11	NESW	1035188	429745	Chilson	Monitor
685	6S	1E	32	NWNE	1020687	443415	Fall River	Monitor
686	7S	1E	11	NESW	1034966	429751	Chilson	Monitor
687	6S	1E	32	NENW	1020078	443730	Fall River	Monitor
688	7S	1E	11	NESW	1035027	429974	Fall River	Monitor
689	6S	1E	32	NENW	1020316	443789	Chilson	Monitor
690	7S	1E	11	NESW	1035113	429971	Unkpapa	Monitor
691	6S	1E	32	NENW	1020366	443706	Fall River	Monitor
692	7S	1E	11	NESW	1035068	429999	Chilson	Monitor
693	6S	1E	32	NENW	1020329	443667	Unkpapa	Monitor
694	7S	1E	15	NWNW	1028717	426836	Fall River	Monitor
695	6S	1E	32	SESE	1022385	439312	Fall River	Monitor
696	7S	1E	15	NWNW	1028687	426946	Chilson	Monitor
697	6S	1E	32	SESE	1022350	439347	Chilson	Monitor
698	7S	1E	2	NESW	1035946	436967	Fall River	Monitor
703	7S	1E	1	SWSE	1042294	434136	Unkpapa	Domestic
704[4]	7S	1E	5	SWNE	1020966	436647	Chilson (Beginning 2/4/2009)	Domestic
704[4]	7S	1E	5	SWNE	1020966	436647	Unkpapa (Cemented to Chilson 1/28/2009)	Domestic
705	6S	1E	21	NENE	1028624	453314	Chilson	Monitor
706	6S	1E	21	NENE	1028589	453276	Fall River	Monitor
707	6S	1E	34	SWNE	1032064	441813	Alluvial	Monitor
708	7S	1E	3	SESW	1030383	434098	Alluvial	Monitor
709	7S	1E	15	SENW	1029415	426607	Alluvial	Monitor
710	6S	1E	17	NWNW	1019432[5]	459053[5]	Unknown	Irrigation
3026	7S	1E	1	SESE	1043749	433354	Chilson	Monitor
4002	6S	1E	30	NWSW	1013414	446931	Inyan Kara	Domestic
5002	41N	60W	28	SWSW	974687	446660	Chilson	Stock
7002	7S	1E	23	NWNW	1033333	421931	Chilson	Stock

Notes: (1) Inyan Kara indicates screened interval is across Fall River and Chilson.

(2) Hydro ID 40 possibly replaced by BY-1 (depth 680 ft and casing diameter 5.5 inches) on 3/4/1982

(3) Coordinates and elevation for Hydro ID 116 used for Hydro ID 624 pending field verification

(4) 704 was originally completed in the Unkpapa aquifer. It was recompleted 1/28/2009 in the Chilson aquifer.

(5) Handheld GPS coordinates converted to South Dakota State Plane NAD 27, Powertech (USA) Inc., February 2012

Table 2. Historical Wells Noted in Data Sources within 2 Kilometers but No Longer Present at Surface

Hydro ID	Legal Location				SD State Plane NAD 27		Former Aquifer	Previous Use
	T.	R.	Sec.	Qtr. Qtr.	East (ft)	North (ft)		
10	7S	1E	13	NENE	1043664	427041	Chilson	Stock
39	6S	1E	29	NENE	1022916	448656	Chilson	Stock
48	6S	1E	19	SENW	1015295	453037	Chilson	Stock
425	7S	1E	14	SENW	1034449	426208	Chilson	Unknown
429	6S	1E	20	SENE	1023157	452953	Not a Well	NA
431	6S	1E	20	SENE	1023157	452953	Not a Well	NA
432	6S	1E	20	SENE	1023157	452953	Not a Well	NA
433	6S	1E	20	SENE	1023157	452953	Not a Well	NA
502	6S	1E	27	NWSE	1031990	446360	Alluvial	Unknown
605(1)	7S	1E	10	SWSE	1031814	428484	Not a Well(1)	NA
621	6S	1E	27	NWSE	1031930	446397	Alluvial	Unknown
634	6S	1E	34	NESE	1032502	440168	Unknown	Unknown
635(2)	7S	1E	14	NENW	1004085	427131	Not a Well(2)	NA
646	7S	1E	15	SWNE	1031248	426409	Fall River	Monitor
651(3)	7S	1E	14	NWSE	1036009	424246	Not a Well(3)	NA
658	7S	1E	15	SWNE	1031234	426398	Chilson	Monitor
659	7S	1E	10	SWNE	1031876	431048	Fall River	Monitor
660	7S	1E	10	SWNE	1031822	431030	Chilson	Monitor
661	7S	1E	12	NENW	1040977	431970	Chilson	Monitor
663	7S	1E	10	SWSE	1030659	428346	Chilson	Monitor
664	7S	1E	10	SWSE	1030634	428338	Fall River	Monitor
669	7S	1E	15	NWNE	1031005	427910	Chilson	Monitor
670	7S	1E	15	NWNE	1031065	427936	Fuson	Monitor
671	7S	1E	15	NWNE	1031016	427870	Fall River	Monitor
672	7S	1E	15	NWNE	1030632	427480	Fall River	Monitor
673	7S	1E	15	NWNE	1030628	427511	Fuson	Monitor
674	7S	1E	15	NWNE	1030555	427513	Chilson	Monitor

Notes: (1) Hydro ID 605 is not a well. It is a pipe from Hydro ID 668.
(2) Hydro ID 635 is not a well. It is a pipe from Hydro ID 5.
(3) Hydro ID 651 is not a well. It was historically a pipe from Hydro ID 6.
NA = Not applicable; not a well

Table 3. Plugged and Abandoned Wells within 2 Kilometers of the Permit Area

Hydro ID	Legal Location				SD State Plane NAD 27		Former Aquifer	Previous Use
	T.	R.	Sec.	Qtr. Qtr.	East (ft)	North (ft)		
606	7S	1E	11	SWSW	1033713	428609	Unknown	Unknown
636	7S	1E	11	NESW	1034774	429982	Unknown	Unknown
652	7S	1E	2	NWSE	1036360	434742	Unknown	Unknown
653	7S	1E	22	NWNE	1030679	422487	Unknown	Unknown
654	6S	1E	34	NWNE	1032372	443410	Unknown	Unknown
655	6S	1E	34	NENE	1033454	443307	Unknown	Unknown
665	7S	1E	11	SWSW	1033153	428901	Fall River	Monitor
666	7S	1E	11	SWSW	1033128	428870	Chilson	Monitor
---	6S	1E	19	SWSE	Longitude 104.042397°W	Latitude 43.508820°N	Fall River	Oil Test
---	6S	1E	19	SWSE	Longitude 104.042397°W	Latitude 43.508820°N	Fall River	Oil Test
---	7S	1E	2	SESE	Longitude 103.958032°W	Latitude 43.466062°N	Minnelusa	Oil Test
---	7S	1E	22	NWSE	Longitude 103.983142°W	Latitude 43.429674°N	Minnelusa	Oil Test
---	7S	1E	11	SWSE	Longitude 103.963826°W	Latitude 43.451453°N	Minnelusa	Oil Test
---	7S	1E	21	NENE	Longitude 103.997735°W	Latitude 43.433117°N	Minnelusa	Oil Test
---	7S	1E	15	SWSW	Longitude 103.991563°W	Latitude 43.435870°N	Minnelusa	Oil Test
---	7S	1E	21	NENE	Longitude 103.996978°W	Latitude 43.433064°N	Minnelusa	Oil Test
---	7S	1E	21	NESE	Longitude 103.997224°W	Latitude 43.425795°N	Madison	Oil Test

Appendix 3.7-B

Well Inventory

(Provided on CD only)

POWERTECH (USA) INC.

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695	49
698	53
706	57

Data Qualifiers*	
b -	analyte detected in method blank
d -	RL increased due to sample matrix interference
h -	analysis performed past recommended hold time
j -	not detected above minimum detectable concentration
l -	lowest available reporting limit for method used

* Note: data qualifiers are used with individual sample results, where applicable, throughout the individual well summary tables.

Monthly Runoff Water Balance

Dewey Area

POWERTECH (USA) INC.

1984-1998 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
Jan	1984	35.00	0.00	0	0.00	0.13	0.92	0.00	-0.79	0.00E+00
Feb	1984	35.00	0.00	0	0.00	0.28	1.23	0.00	-0.95	0.00E+00
Mar	1984	35.00	0.26	0.01	0.09	0.8	1.98	0.00	-1.09	0.00E+00
Apr	1984	35.00	28.09	1.07	9.63	3.59	3.3	52.41	-42.49	5.14E-05
May	1984	35.00	24.94	0.95	8.55	2.93	4.4	54.16	-47.08	5.14E-05
Jun	1984	35.00	5.25	0.2	1.80	1.91	5.76	52.41	-54.46	5.14E-05
Jul	1984	35.00	9.71	0.37	3.33	2.38	7.08	54.16	-55.53	5.14E-05
Aug	1984	35.00	9.45	0.36	3.24	1.68	6.95	54.16	-56.19	5.14E-05
Sep	1984	35.00	0.00	0	0.00	0.4	5.5	52.41	-57.51	5.14E-05
Oct	1984	35.00	0.53	0.02	0.18	0.63	3.74	54.16	-57.09	5.14E-05
Nov	1984	35.00	4.46	0.17	1.53	0.57	2.02	52.41	-52.33	5.14E-05
Dec	1984	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1985	35.00	0.00	0	0.00	0.17	0.92	0.00	-0.75	0.00E+00
Feb	1985	35.00	0.00	0	0.00	0.57	1.23	0.00	-0.66	0.00E+00
Mar	1985	35.00	0.00	0	0.00	0.77	1.98	0.00	-1.21	0.00E+00
Apr	1985	35.00	47.51	1.81	16.29	3.15	3.3	52.41	-36.27	5.14E-05
May	1985	35.00	2.63	0.1	0.90	1.05	4.4	54.16	-56.61	5.14E-05
Jun	1985	35.00	1.58	0.06	0.54	1.03	5.76	52.41	-56.60	5.14E-05
Jul	1985	35.00	2.36	0.09	0.81	1.2	7.08	54.16	-59.23	5.14E-05
Aug	1985	35.00	0.00	0	0.00	0.5	6.95	54.16	-60.61	5.14E-05
Sep	1985	35.00	12.34	0.47	4.23	1.99	5.5	52.41	-51.69	5.14E-05
Oct	1985	35.00	1.05	0.04	0.36	0.68	3.74	54.16	-56.86	5.14E-05
Nov	1985	35.00	0.00	0	0.00	0.22	2.02	52.41	-54.21	5.14E-05
Dec	1985	35.00	0.00	0	0.00	0.41	1.1	0.00	-0.69	0.00E+00
Jan	1986	35.00	0.00	0	0.00	1.63	0.92	0.00	0.71	0.00E+00
Feb	1986	35.00	0.00	0	0.71	1.06	1.23	0.00	0.54	0.00E+00
Mar	1986	35.00	0.00	0	0.54	0.52	1.98	0.00	-0.92	0.00E+00
Apr	1986	35.00	32.29	1.23	11.07	3.27	3.3	52.41	-41.37	5.14E-05
May	1986	35.00	8.40	0.32	2.88	1.07	4.4	54.16	-54.61	5.14E-05
Jun	1986	35.00	76.13	2.9	26.10	4.87	5.76	52.41	-27.20	5.14E-05
Jul	1986	35.00	6.83	0.26	2.34	1.63	7.08	54.16	-57.27	5.14E-05
Aug	1986	35.00	6.83	0.26	2.34	1.19	6.95	54.16	-57.58	5.14E-05
Sep	1986	35.00	36.23	1.38	12.42	3.52	5.5	52.41	-41.97	5.14E-05
Oct	1986	35.00	55.39	2.11	18.99	3.88	3.74	54.16	-35.03	5.14E-05
Nov	1986	35.00	2.10	0.08	0.72	0.86	2.02	52.41	-52.85	5.14E-05
Dec	1986	35.00	0.00	0	0.00	0.09	1.1	0.00	-1.01	0.00E+00
Jan	1987	35.00	0.00	0	0.00	0.13	0.92	0.00	-0.79	0.00E+00
Feb	1987	35.00	0.00	0	0.00	0.87	1.23	0.00	-0.36	0.00E+00
Mar	1987	35.00	3.15	0.12	1.08	2.22	1.98	0.00	1.32	0.00E+00
Apr	1987	35.00	4.99	0.19	3.03	0.69	3.3	52.41	-51.99	5.14E-05
May	1987	35.00	26.78	1.02	9.18	2.97	4.4	54.16	-46.41	5.14E-05
Jun	1987	35.00	0.79	0.03	0.27	0.59	5.76	52.41	-57.31	5.14E-05
Jul	1987	35.00	15.75	0.6	5.40	1.71	7.08	54.16	-54.13	5.14E-05
Aug	1987	35.00	2.36	0.09	0.81	1.04	6.95	54.16	-59.26	5.14E-05
Sep	1987	35.00	2.63	0.1	0.90	0.76	5.5	52.41	-56.25	5.14E-05
Oct	1987	35.00	0.26	0.01	0.09	0.42	3.74	54.16	-57.39	5.14E-05
Nov	1987	35.00	5.51	0.21	1.89	0.71	2.02	52.41	-51.83	5.14E-05
Dec	1987	35.00	0.26	0.01	0.09	0.25	1.1	0.00	-0.76	0.00E+00
Jan	1988	35.00	0.00	0	0.00	0.63	0.92	0.00	-0.29	0.00E+00
Feb	1988	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1988	35.00	0.00	0	0.00	1.17	1.98	0.00	-0.81	0.00E+00
Apr	1988	35.00	1.58	0.06	0.54	0.63	3.3	52.41	-54.54	5.14E-05
May	1988	35.00	20.21	0.77	6.93	2.64	4.4	54.16	-48.99	5.14E-05
Jun	1988	35.00	42.00	1.6	14.40	2.78	5.76	52.41	-40.99	5.14E-05
Jul	1988	35.00	28.61	1.09	9.81	2.18	7.08	54.16	-49.25	5.14E-05
Aug	1988	35.00	27.83	1.06	9.54	1.87	6.95	54.16	-49.70	5.14E-05
Sep	1988	35.00	1.05	0.04	0.36	0.84	5.5	52.41	-56.71	5.14E-05
Oct	1988	35.00	0.00	0	0.00	0.09	3.74	54.16	-57.81	5.14E-05
Nov	1988	35.00	0.26	0.01	0.09	0.52	2.02	52.41	-53.82	5.14E-05
Dec	1988	35.00	0.00	0	0.00	0.23	1.1	0.00	-0.87	0.00E+00
Jan	1989	35.00	0.00	0	0.00	0.09	0.92	0.00	-0.83	0.00E+00
Feb	1989	35.00	0.00	0	0.00	0.6	1.23	0.00	-0.63	0.00E+00
Mar	1989	35.00	0.53	0.02	0.18	1.14	1.98	0.00	-0.66	0.00E+00
Apr	1989	35.00	10.76	0.41	3.69	1.67	3.3	52.41	-50.35	5.14E-05
May	1989	35.00	3.15	0.12	1.08	1.41	4.4	54.16	-56.07	5.14E-05
Jun	1989	35.00	2.10	0.08	0.72	1.2	5.76	52.41	-56.25	5.14E-05
Jul	1989	35.00	26.51	1.01	9.09	2.21	7.08	54.16	-49.94	5.14E-05
Aug	1989	35.00	14.44	0.55	4.95	1.46	6.95	54.16	-54.70	5.14E-05
Sep	1989	35.00	64.58	2.46	22.14	3.94	5.5	52.41	-31.83	5.14E-05
Oct	1989	35.00	2.89	0.11	0.99	1.07	3.74	54.16	-55.84	5.14E-05
Nov	1989	35.00	0.00	0	0.00	0.23	2.02	52.41	-54.20	5.14E-05
Dec	1989	35.00	0.00	0	0.00	0.56	1.1	0.00	-0.54	0.00E+00
Jan	1990	35.00	0.00	0	0.00	0.08	0.92	0.00	-0.84	0.00E+00
Feb	1990	35.00	0.00	0	0.00	0.4	1.23	0.00	-0.83	0.00E+00

POWERTECH (USA) INC.

1984-1998 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
Mar	1990	35.00	0.79	0.03	0.27	1.17	1.98	0.00	-0.54	0.00E+00
Apr	1990	35.00	11.03	0.42	3.78	2.31	3.3	52.41	-49.62	5.14E-05
May	1990	35.00	56.18	2.14	19.26	4.45	4.4	54.16	-34.85	5.14E-05
Jun	1990	35.00	8.66	0.33	2.97	1.22	5.76	52.41	-53.98	5.14E-05
Jul	1990	35.00	54.60	2.08	18.72	3.84	7.08	54.16	-38.68	5.14E-05
Aug	1990	35.00	5.25	0.2	1.80	0.86	6.95	54.16	-58.45	5.14E-05
Sep	1990	35.00	35.18	1.34	12.06	2.48	5.5	52.41	-43.37	5.14E-05
Oct	1990	35.00	1.84	0.07	0.63	0.89	3.74	54.16	-56.38	5.14E-05
Nov	1990	35.00	6.83	0.26	2.34	1.12	2.02	52.41	-50.97	5.14E-05
Dec	1990	35.00	0.79	0.03	0.27	0.32	1.1	0.00	-0.51	0.00E+00
Jan	1991	35.00	0.00	0	0.00	0.15	0.92	0.00	-0.77	0.00E+00
Feb	1991	35.00	0.00	0	0.00	0.9	1.23	0.00	-0.33	0.00E+00
Mar	1991	35.00	0.00	0	0.00	0.35	1.98	0.00	-1.63	0.00E+00
Apr	1991	35.00	4.46	0.17	1.53	1.58	3.3	52.41	-52.60	5.14E-05
May	1991	35.00	56.44	2.15	19.35	4.91	4.4	54.16	-34.30	5.14E-05
Jun	1991	35.00	39.11	1.49	13.41	3.16	5.76	52.41	-41.60	5.14E-05
Jul	1991	35.00	0.26	0.01	0.09	0.36	7.08	54.16	-60.79	5.14E-05
Aug	1991	35.00	13.91	0.53	4.77	1.52	6.95	54.16	-54.82	5.14E-05
Sep	1991	35.00	0.00	0	0.00	0.29	5.5	52.41	-57.62	5.14E-05
Oct	1991	35.00	4.73	0.18	1.62	0.95	3.74	54.16	-55.33	5.14E-05
Nov	1991	35.00	0.26	0.01	0.09	0.51	2.02	52.41	-53.83	5.14E-05
Dec	1991	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1992	35.00	0.00	0	0.00	0.32	0.92	0.00	-0.60	0.00E+00
Feb	1992	35.00	1.84	0.07	0.63	0.51	1.23	0.00	-0.09	0.00E+00
Mar	1992	35.00	5.78	0.22	1.98	1.07	1.98	0.00	1.07	0.00E+00
Apr	1992	35.00	0.79	0.03	1.34	0.66	3.3	52.41	-53.71	5.14E-05
May	1992	35.00	30.71	1.17	10.53	2.76	4.4	54.16	-45.27	5.14E-05
Jun	1992	35.00	13.39	0.51	4.59	1.88	5.76	52.41	-51.70	5.14E-05
Jul	1992	35.00	45.15	1.72	15.48	3.92	7.08	54.16	-41.84	5.14E-05
Aug	1992	35.00	14.70	0.56	5.04	1.74	6.95	54.16	-54.33	5.14E-05
Sep	1992	35.00	0.00	0	0.00	0.08	5.5	52.41	-57.83	5.14E-05
Oct	1992	35.00	1.58	0.06	0.54	0.61	3.74	54.16	-56.75	5.14E-05
Nov	1992	35.00	0.00	0	0.00	0.2	2.02	52.41	-54.23	5.14E-05
Dec	1992	35.00	0.00	0	0.00	0.33	1.1	0.00	-0.77	0.00E+00
Jan	1993	35.00	0.00	0	0.00	0.26	0.92	0.00	-0.66	0.00E+00
Feb	1993	35.00	0.00	0	0.00	0.13	1.23	0.00	-1.10	0.00E+00
Mar	1993	35.00	5.78	0.22	1.98	3.58	1.98	0.00	3.58	0.00E+00
Apr	1993	35.00	13.91	0.53	8.35	1.71	3.3	52.41	-45.65	5.14E-05
May	1993	35.00	16.80	0.64	5.76	1.98	4.4	54.16	-50.82	5.14E-05
Jun	1993	35.00	101.85	3.88	34.92	6.14	5.76	52.41	-17.11	5.14E-05
Jul	1993	35.00	28.61	1.09	9.81	2.67	7.08	54.16	-48.76	5.14E-05
Aug	1993	35.00	20.21	0.77	6.93	1.82	6.95	54.16	-52.36	5.14E-05
Sep	1993	35.00	2.10	0.08	0.72	1	5.5	52.41	-56.19	5.14E-05
Oct	1993	35.00	12.60	0.48	4.32	1.48	3.74	54.16	-52.10	5.14E-05
Nov	1993	35.00	0.00	0	0.00	0.72	2.02	52.41	-53.71	5.14E-05
Dec	1993	35.00	0.00	0	0.00	0.82	1.1	0.00	-0.28	0.00E+00
Jan	1994	35.00	0.00	0	0.00	0.6	0.92	0.00	-0.32	0.00E+00
Feb	1994	35.00	0.00	0	0.00	0.36	1.23	0.00	-0.87	0.00E+00
Mar	1994	35.00	0.00	0	0.00	0.73	1.98	0.00	-1.25	0.00E+00
Apr	1994	35.00	9.98	0.38	3.42	1.62	3.3	52.41	-50.67	5.14E-05
May	1994	35.00	11.55	0.44	3.96	1.47	4.4	54.16	-53.13	5.14E-05
Jun	1994	35.00	6.30	0.24	2.16	1.22	5.76	52.41	-54.79	5.14E-05
Jul	1994	35.00	16.28	0.62	5.58	2.04	7.08	54.16	-53.62	5.14E-05
Aug	1994	35.00	1.05	0.04	0.36	0.45	6.95	54.16	-60.30	5.14E-05
Sep	1994	35.00	0.00	0	0.00	0.32	5.5	52.41	-57.59	5.14E-05
Oct	1994	35.00	12.86	0.49	4.41	2.19	3.74	54.16	-51.30	5.14E-05
Nov	1994	35.00	0.00	0	0.00	0.3	2.02	52.41	-54.13	5.14E-05
Dec	1994	35.00	0.00	0	0.00	0.71	1.1	0.00	-0.39	0.00E+00
Jan	1995	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1995	35.00	0.00	0	0.00	0.7	1.23	0.00	-0.53	0.00E+00
Mar	1995	35.00	0.00	0	0.00	0.63	1.98	0.00	-1.35	0.00E+00
Apr	1995	35.00	1.31	0.05	0.45	1.36	3.3	52.41	-53.90	5.14E-05
May	1995	35.00	38.59	1.47	13.23	4.42	4.4	54.16	-40.91	5.14E-05
Jun	1995	35.00	39.64	1.51	13.59	3.09	5.76	52.41	-41.49	5.14E-05
Jul	1995	35.00	1.31	0.05	0.45	1.07	7.08	54.16	-59.72	5.14E-05
Aug	1995	35.00	1.58	0.06	0.54	0.55	6.95	54.16	-60.02	5.14E-05
Sep	1995	35.00	53.81	2.05	18.45	3.61	5.5	52.41	-35.85	5.14E-05
Oct	1995	35.00	5.51	0.21	1.89	1.43	3.74	54.16	-54.58	5.14E-05
Nov	1995	35.00	2.36	0.09	0.81	0.81	2.02	52.41	-52.81	5.14E-05
Dec	1995	35.00	0.00	0	0.00	0.13	1.1	0.00	-0.97	0.00E+00
Jan	1996	35.00	0.00	0	0.00	0.35	0.92	0.00	-0.57	0.00E+00
Feb	1996	35.00	0.00	0	0.00	0.24	1.23	0.00	-0.99	0.00E+00
Mar	1996	35.00	0.00	0	0.00	0.92	1.98	0.00	-1.06	0.00E+00
Apr	1996	35.00	28.88	1.1	9.90	3	3.3	52.41	-42.81	5.14E-05

POWERTECH (USA) INC.

1984-1998 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
May	1996	35.00	35.44	1.35	12.15	3.69	4.4	54.16	-42.72	5.14E-05
Jun	1996	35.00	17.59	0.67	6.03	1.85	5.76	52.41	-50.29	5.14E-05
Jul	1996	35.00	0.53	0.02	0.18	0.55	7.08	54.16	-60.51	5.14E-05
Aug	1996	35.00	32.81	1.25	11.25	2.72	6.95	54.16	-47.14	5.14E-05
Sep	1996	35.00	6.56	0.25	2.25	1.37	5.5	52.41	-54.29	5.14E-05
Oct	1996	35.00	7.35	0.28	2.52	1.79	3.74	54.16	-53.59	5.14E-05
Nov	1996	35.00	0.00	0	0.00	0.5	2.02	52.41	-53.93	5.14E-05
Dec	1996	35.00	0.00	0	0.00	0.62	1.1	0.00	-0.48	0.00E+00
Jan	1997	35.00	0.00	0	0.00	0.62	0.92	0.00	-0.30	0.00E+00
Feb	1997	35.00	0.00	0	0.00	0.48	1.23	0.00	-0.75	0.00E+00
Mar	1997	35.00	0.00	0	0.00	0.32	1.98	0.00	-1.66	0.00E+00
Apr	1997	35.00	15.75	0.6	5.40	2.52	3.3	52.41	-47.79	5.14E-05
May	1997	35.00	27.30	1.04	9.36	2.84	4.4	54.16	-46.36	5.14E-05
Jun	1997	35.00	34.13	1.3	11.70	3.17	5.76	52.41	-43.30	5.14E-05
Jul	1997	35.00	67.73	2.58	23.22	4.61	7.08	54.16	-33.41	5.14E-05
Aug	1997	35.00	5.51	0.21	1.89	1.05	6.95	54.16	-58.17	5.14E-05
Sep	1997	35.00	2.36	0.09	0.81	0.73	5.5	52.41	-56.37	5.14E-05
Oct	1997	35.00	1.05	0.04	0.36	0.7	3.74	54.16	-56.84	5.14E-05
Nov	1997	35.00	2.10	0.08	0.72	0.43	2.02	52.41	-53.28	5.14E-05
Dec	1997	35.00	0.00	0	0.00	0.26	1.1	0.00	-0.84	0.00E+00
Jan	1998	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1998	35.00	2.89	0.11	0.99	0.78	1.23	0.00	0.54	0.00E+00
Mar	1998	35.00	19.43	0.74	7.20	2.02	1.98	0.00	7.24	0.00E+00
Apr	1998	35.00	0.00	0	7.24	0.27	3.3	52.41	-48.20	5.14E-05
May	1998	35.00	31.24	1.19	10.71	3.58	4.4	54.16	-44.27	5.14E-05
Jun	1998	35.00	51.71	1.97	17.73	3.36	5.76	52.41	-37.08	5.14E-05
Jul	1998	35.00	45.41	1.73	15.57	3.38	7.08	54.16	-42.29	5.14E-05
Aug	1998	35.00	29.40	1.12	10.08	2.36	6.95	54.16	-48.67	5.14E-05
Sep	1998	35.00	33.60	1.28	11.52	2.08	5.5	52.41	-44.31	5.14E-05
Oct	1998	35.00	44.63	1.7	15.30	4.16	3.74	54.16	-38.44	5.14E-05
Nov	1998	35.00	8.66	0.33	2.97	1.42	2.02	52.41	-50.04	5.14E-05
Dec	1998	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
				5.22 (Avg. annual)		16.88 (Avg. annual)	43.98 (Avg. annual)		7.24 (Maximum value)	

Assumes seepage is 0.00 for January, February, March and December due to frozen soils.
Trial is for bare soil, 315 acres irrigated area.

Permeability value is geometric mean of three available permeability values from Dewey test pits.

POWERTECH (USA) INC.

1985-1999 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
Jan	1985	35.00	0.00	0	0.00	0.17	0.92	0.00	-0.75	0.00E+00
Feb	1985	35.00	0.00	0	0.00	0.57	1.23	0.00	-0.66	0.00E+00
Mar	1985	35.00	0.00	0	0.00	0.77	1.98	0.00	-1.21	0.00E+00
Apr	1985	35.00	47.51	1.81	16.29	3.15	3.3	52.41	-36.27	5.14E-05
May	1985	35.00	2.63	0.1	0.90	1.05	4.4	54.16	-56.61	5.14E-05
Jun	1985	35.00	1.58	0.06	0.54	1.03	5.76	52.41	-56.60	5.14E-05
Jul	1985	35.00	2.36	0.09	0.81	1.2	7.08	54.16	-59.23	5.14E-05
Aug	1985	35.00	0.00	0	0.00	0.5	6.95	54.16	-60.61	5.14E-05
Sep	1985	35.00	12.34	0.47	4.23	1.99	5.5	52.41	-51.69	5.14E-05
Oct	1985	35.00	1.05	0.04	0.36	0.68	3.74	54.16	-56.86	5.14E-05
Nov	1985	35.00	0.00	0	0.00	0.22	2.02	52.41	-54.21	5.14E-05
Dec	1985	35.00	0.00	0	0.00	0.41	1.1	0.00	-0.69	0.00E+00
Jan	1986	35.00	0.00	0	0.00	1.63	0.92	0.00	0.71	0.00E+00
Feb	1986	35.00	0.00	0	0.71	1.06	1.23	0.00	0.54	0.00E+00
Mar	1986	35.00	0.00	0	0.54	0.52	1.98	0.00	-0.92	0.00E+00
Apr	1986	35.00	32.29	1.23	11.07	3.27	3.3	52.41	-41.37	5.14E-05
May	1986	35.00	8.40	0.32	2.88	1.07	4.4	54.16	-54.61	5.14E-05
Jun	1986	35.00	75.86	2.89	26.01	4.87	5.76	52.41	-27.29	5.14E-05
Jul	1986	35.00	6.30	0.24	2.16	1.63	7.08	54.16	-57.45	5.14E-05
Aug	1986	35.00	6.83	0.26	2.34	1.19	6.95	54.16	-57.58	5.14E-05
Sep	1986	35.00	36.23	1.38	12.42	3.52	5.5	52.41	-41.97	5.14E-05
Oct	1986	35.00	55.39	2.11	18.99	3.88	3.74	54.16	-35.03	5.14E-05
Nov	1986	35.00	2.10	0.08	0.72	0.86	2.02	52.41	-52.85	5.14E-05
Dec	1986	35.00	0.00	0	0.00	0.09	1.1	0.00	-1.01	0.00E+00
Jan	1987	35.00	0.00	0	0.00	0.13	0.92	0.00	-0.79	0.00E+00
Feb	1987	35.00	0.00	0	0.00	0.87	1.23	0.00	-0.36	0.00E+00
Mar	1987	35.00	3.15	0.12	1.08	2.22	1.98	0.00	1.32	0.00E+00
Apr	1987	35.00	4.99	0.19	3.03	0.69	3.3	52.41	-51.99	5.14E-05
May	1987	35.00	22.05	0.84	7.56	2.97	4.4	54.16	-48.03	5.14E-05
Jun	1987	35.00	0.79	0.03	0.27	0.59	5.76	52.41	-57.31	5.14E-05
Jul	1987	35.00	15.75	0.6	5.40	1.71	7.08	54.16	-54.13	5.14E-05
Aug	1987	35.00	2.36	0.09	0.81	1.04	6.95	54.16	-59.26	5.14E-05
Sep	1987	35.00	2.63	0.1	0.90	0.76	5.5	52.41	-56.25	5.14E-05
Oct	1987	35.00	0.26	0.01	0.09	0.42	3.74	54.16	-57.39	5.14E-05
Nov	1987	35.00	5.51	0.21	1.89	0.71	2.02	52.41	-51.83	5.14E-05
Dec	1987	35.00	0.26	0.01	0.09	0.25	1.1	0.00	-0.76	0.00E+00
Jan	1988	35.00	0.00	0	0.00	0.63	0.92	0.00	-0.29	0.00E+00
Feb	1988	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1988	35.00	0.00	0	0.00	1.17	1.98	0.00	-0.81	0.00E+00
Apr	1988	35.00	1.58	0.06	0.54	0.63	3.3	52.41	-54.54	5.14E-05
May	1988	35.00	20.21	0.77	6.93	2.64	4.4	54.16	-48.99	5.14E-05
Jun	1988	35.00	42.00	1.6	14.40	2.78	5.76	52.41	-40.99	5.14E-05
Jul	1988	35.00	28.61	1.09	9.81	2.18	7.08	54.16	-49.25	5.14E-05
Aug	1988	35.00	27.83	1.06	9.54	1.87	6.95	54.16	-49.70	5.14E-05
Sep	1988	35.00	1.05	0.04	0.36	0.84	5.5	52.41	-56.71	5.14E-05
Oct	1988	35.00	0.00	0	0.00	0.09	3.74	54.16	-57.81	5.14E-05
Nov	1988	35.00	0.26	0.01	0.09	0.52	2.02	52.41	-53.82	5.14E-05
Dec	1988	35.00	0.00	0	0.00	0.23	1.1	0.00	-0.87	0.00E+00
Jan	1989	35.00	0.00	0	0.00	0.09	0.92	0.00	-0.83	0.00E+00
Feb	1989	35.00	0.00	0	0.00	0.6	1.23	0.00	-0.63	0.00E+00
Mar	1989	35.00	0.53	0.02	0.18	1.14	1.98	0.00	-0.66	0.00E+00
Apr	1989	35.00	10.76	0.41	3.69	1.67	3.3	52.41	-50.35	5.14E-05
May	1989	35.00	3.15	0.12	1.08	1.41	4.4	54.16	-56.07	5.14E-05
Jun	1989	35.00	2.10	0.08	0.72	1.2	5.76	52.41	-56.25	5.14E-05
Jul	1989	35.00	26.51	1.01	9.09	2.21	7.08	54.16	-49.94	5.14E-05
Aug	1989	35.00	14.44	0.55	4.95	1.46	6.95	54.16	-54.70	5.14E-05
Sep	1989	35.00	64.58	2.46	22.14	3.94	5.5	52.41	-31.83	5.14E-05
Oct	1989	35.00	2.89	0.11	0.99	1.07	3.74	54.16	-55.84	5.14E-05
Nov	1989	35.00	0.00	0	0.00	0.23	2.02	52.41	-54.20	5.14E-05
Dec	1989	35.00	0.00	0	0.00	0.56	1.1	0.00	-0.54	0.00E+00
Jan	1990	35.00	0.00	0	0.00	0.08	0.92	0.00	-0.84	0.00E+00
Feb	1990	35.00	0.00	0	0.00	0.4	1.23	0.00	-0.83	0.00E+00
Mar	1990	35.00	0.79	0.03	0.27	1.17	1.98	0.00	-0.54	0.00E+00
Apr	1990	35.00	11.03	0.42	3.78	2.31	3.3	52.41	-49.62	5.14E-05
May	1990	35.00	56.18	2.14	19.26	4.45	4.4	54.16	-34.85	5.14E-05
Jun	1990	35.00	6.56	0.25	2.25	1.22	5.76	52.41	-54.70	5.14E-05
Jul	1990	35.00	54.60	2.08	18.72	3.84	7.08	54.16	-38.68	5.14E-05
Aug	1990	35.00	5.25	0.2	1.80	0.86	6.95	54.16	-58.45	5.14E-05
Sep	1990	35.00	35.18	1.34	12.06	2.48	5.5	52.41	-43.37	5.14E-05
Oct	1990	35.00	1.84	0.07	0.63	0.89	3.74	54.16	-56.38	5.14E-05
Nov	1990	35.00	6.83	0.26	2.34	1.12	2.02	52.41	-50.97	5.14E-05
Dec	1990	35.00	0.79	0.03	0.27	0.32	1.1	0.00	-0.51	0.00E+00
Jan	1991	35.00	0.00	0	0.00	0.15	0.92	0.00	-0.77	0.00E+00
Feb	1991	35.00	0.00	0	0.00	0.9	1.23	0.00	-0.33	0.00E+00

POWERTECH (USA) INC.

1985-1999 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
Mar	1991	35.00	0.00	0	0.00	0.35	1.98	0.00	-1.63	0.00E+00
Apr	1991	35.00	4.46	0.17	1.53	1.58	3.3	52.41	-52.60	5.14E-05
May	1991	35.00	56.44	2.15	19.35	4.91	4.4	54.16	-34.30	5.14E-05
Jun	1991	35.00	39.11	1.49	13.41	3.16	5.76	52.41	-41.60	5.14E-05
Jul	1991	35.00	0.26	0.01	0.09	0.36	7.08	54.16	-60.79	5.14E-05
Aug	1991	35.00	13.91	0.53	4.77	1.52	6.95	54.16	-54.82	5.14E-05
Sep	1991	35.00	0.00	0	0.00	0.29	5.5	52.41	-57.62	5.14E-05
Oct	1991	35.00	4.73	0.18	1.62	0.95	3.74	54.16	-55.33	5.14E-05
Nov	1991	35.00	0.26	0.01	0.09	0.51	2.02	52.41	-53.83	5.14E-05
Dec	1991	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1992	35.00	0.00	0	0.00	0.32	0.92	0.00	-0.60	0.00E+00
Feb	1992	35.00	1.84	0.07	0.63	0.51	1.23	0.00	-0.09	0.00E+00
Mar	1992	35.00	5.78	0.22	1.98	1.07	1.98	0.00	1.07	0.00E+00
Apr	1992	35.00	0.79	0.03	1.34	0.66	3.3	52.41	-53.71	5.14E-05
May	1992	35.00	30.71	1.17	10.53	2.76	4.4	54.16	-45.27	5.14E-05
Jun	1992	35.00	13.39	0.51	4.59	1.88	5.76	52.41	-51.70	5.14E-05
Jul	1992	35.00	45.15	1.72	15.48	3.92	7.08	54.16	-41.84	5.14E-05
Aug	1992	35.00	14.70	0.56	5.04	1.74	6.95	54.16	-54.33	5.14E-05
Sep	1992	35.00	0.00	0	0.00	0.08	5.5	52.41	-57.83	5.14E-05
Oct	1992	35.00	1.58	0.06	0.54	0.61	3.74	54.16	-56.75	5.14E-05
Nov	1992	35.00	0.00	0	0.00	0.2	2.02	52.41	-54.23	5.14E-05
Dec	1992	35.00	0.00	0	0.00	0.33	1.1	0.00	-0.77	0.00E+00
Jan	1993	35.00	0.00	0	0.00	0.26	0.92	0.00	-0.66	0.00E+00
Feb	1993	35.00	0.00	0	0.00	0.13	1.23	0.00	-1.10	0.00E+00
Mar	1993	35.00	5.78	0.22	1.98	3.58	1.98	0.00	3.58	0.00E+00
Apr	1993	35.00	13.91	0.53	8.35	1.71	3.3	52.41	-45.65	5.14E-05
May	1993	35.00	16.80	0.64	5.76	1.98	4.4	54.16	-50.82	5.14E-05
Jun	1993	35.00	101.85	3.88	34.92	6.14	5.76	52.41	-17.11	5.14E-05
Jul	1993	35.00	28.61	1.09	9.81	2.67	7.08	54.16	-48.76	5.14E-05
Aug	1993	35.00	20.21	0.77	6.93	1.82	6.95	54.16	-52.36	5.14E-05
Sep	1993	35.00	2.10	0.08	0.72	1	5.5	52.41	-56.19	5.14E-05
Oct	1993	35.00	12.60	0.48	4.32	1.48	3.74	54.16	-52.10	5.14E-05
Nov	1993	35.00	0.00	0	0.00	0.72	2.02	52.41	-53.71	5.14E-05
Dec	1993	35.00	0.00	0	0.00	0.82	1.1	0.00	-0.28	0.00E+00
Jan	1994	35.00	0.00	0	0.00	0.6	0.92	0.00	-0.32	0.00E+00
Feb	1994	35.00	0.00	0	0.00	0.36	1.23	0.00	-0.87	0.00E+00
Mar	1994	35.00	0.00	0	0.00	0.73	1.98	0.00	-1.25	0.00E+00
Apr	1994	35.00	9.98	0.38	3.42	1.62	3.3	52.41	-50.67	5.14E-05
May	1994	35.00	11.55	0.44	3.96	1.47	4.4	54.16	-53.13	5.14E-05
Jun	1994	35.00	6.30	0.24	2.16	1.22	5.76	52.41	-54.79	5.14E-05
Jul	1994	35.00	16.28	0.62	5.58	2.04	7.08	54.16	-53.62	5.14E-05
Aug	1994	35.00	1.05	0.04	0.36	0.45	6.95	54.16	-60.30	5.14E-05
Sep	1994	35.00	0.00	0	0.00	0.32	5.5	52.41	-57.59	5.14E-05
Oct	1994	35.00	12.86	0.49	4.41	2.19	3.74	54.16	-51.30	5.14E-05
Nov	1994	35.00	0.00	0	0.00	0.3	2.02	52.41	-54.13	5.14E-05
Dec	1994	35.00	0.00	0	0.00	0.71	1.1	0.00	-0.39	0.00E+00
Jan	1995	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1995	35.00	0.00	0	0.00	0.7	1.23	0.00	-0.53	0.00E+00
Mar	1995	35.00	0.00	0	0.00	0.63	1.98	0.00	-1.35	0.00E+00
Apr	1995	35.00	1.31	0.05	0.45	1.36	3.3	52.41	-53.90	5.14E-05
May	1995	35.00	38.59	1.47	13.23	4.42	4.4	54.16	-40.91	5.14E-05
Jun	1995	35.00	39.64	1.51	13.59	3.09	5.76	52.41	-41.49	5.14E-05
Jul	1995	35.00	1.31	0.05	0.45	1.07	7.08	54.16	-59.72	5.14E-05
Aug	1995	35.00	1.58	0.06	0.54	0.55	6.95	54.16	-60.02	5.14E-05
Sep	1995	35.00	53.81	2.05	18.45	3.61	5.5	52.41	-35.85	5.14E-05
Oct	1995	35.00	5.51	0.21	1.89	1.43	3.74	54.16	-54.58	5.14E-05
Nov	1995	35.00	2.36	0.09	0.81	0.81	2.02	52.41	-52.81	5.14E-05
Dec	1995	35.00	0.00	0	0.00	0.13	1.1	0.00	-0.97	0.00E+00
Jan	1996	35.00	0.00	0	0.00	0.35	0.92	0.00	-0.57	0.00E+00
Feb	1996	35.00	0.00	0	0.00	0.24	1.23	0.00	-0.99	0.00E+00
Mar	1996	35.00	0.00	0	0.00	0.92	1.98	0.00	-1.06	0.00E+00
Apr	1996	35.00	28.88	1.1	9.90	3	3.3	52.41	-42.81	5.14E-05
May	1996	35.00	35.44	1.35	12.15	3.69	4.4	54.16	-42.72	5.14E-05
Jun	1996	35.00	17.59	0.67	6.03	1.85	5.76	52.41	-50.29	5.14E-05
Jul	1996	35.00	0.53	0.02	0.18	0.55	7.08	54.16	-60.51	5.14E-05
Aug	1996	35.00	32.81	1.25	11.25	2.72	6.95	54.16	-47.14	5.14E-05
Sep	1996	35.00	6.56	0.25	2.25	1.37	5.5	52.41	-54.29	5.14E-05
Oct	1996	35.00	7.35	0.28	2.52	1.79	3.74	54.16	-53.59	5.14E-05
Nov	1996	35.00	0.00	0	0.00	0.5	2.02	52.41	-53.93	5.14E-05
Dec	1996	35.00	0.00	0	0.00	0.62	1.1	0.00	-0.48	0.00E+00
Jan	1997	35.00	0.00	0	0.00	0.62	0.92	0.00	-0.30	0.00E+00
Feb	1997	35.00	0.00	0	0.00	0.48	1.23	0.00	-0.75	0.00E+00
Mar	1997	35.00	0.00	0	0.00	0.32	1.98	0.00	-1.66	0.00E+00
Apr	1997	35.00	15.75	0.6	5.40	2.52	3.3	52.41	-47.79	5.14E-05

POWERTECH (USA) INC.

1985-1999 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
May	1997	35.00	27.30	1.04	9.36	2.84	4.4	54.16	-46.36	5.14E-05
Jun	1997	35.00	34.13	1.3	11.70	3.17	5.76	52.41	-43.30	5.14E-05
Jul	1997	35.00	67.73	2.58	23.22	4.61	7.08	54.16	-33.41	5.14E-05
Aug	1997	35.00	5.51	0.21	1.89	1.05	6.95	54.16	-58.17	5.14E-05
Sep	1997	35.00	2.36	0.09	0.81	0.73	5.5	52.41	-56.37	5.14E-05
Oct	1997	35.00	1.05	0.04	0.36	0.7	3.74	54.16	-56.84	5.14E-05
Nov	1997	35.00	2.10	0.08	0.72	0.43	2.02	52.41	-53.28	5.14E-05
Dec	1997	35.00	0.00	0	0.00	0.26	1.1	0.00	-0.84	0.00E+00
Jan	1998	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1998	35.00	2.89	0.11	0.99	0.78	1.23	0.00	0.54	0.00E+00
Mar	1998	35.00	19.43	0.74	7.20	2.02	1.98	0.00	7.24	0.00E+00
Apr	1998	35.00	0.00	0	7.24	0.27	3.3	52.41	-48.20	5.14E-05
May	1998	35.00	31.24	1.19	10.71	3.58	4.4	54.16	-44.27	5.14E-05
Jun	1998	35.00	51.71	1.97	17.73	3.36	5.76	52.41	-37.08	5.14E-05
Jul	1998	35.00	45.41	1.73	15.57	3.38	7.08	54.16	-42.29	5.14E-05
Aug	1998	35.00	29.40	1.12	10.08	2.36	6.95	54.16	-48.67	5.14E-05
Sep	1998	35.00	33.60	1.28	11.52	2.08	5.5	52.41	-44.31	5.14E-05
Oct	1998	35.00	44.63	1.7	15.30	4.16	3.74	54.16	-38.44	5.14E-05
Nov	1998	35.00	8.66	0.33	2.97	1.42	2.02	52.41	-50.04	5.14E-05
Dec	1998	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1999	35.00	0.00	0	0.00	0.55	0.92	0.00	-0.37	0.00E+00
Feb	1999	35.00	0.00	0	0.00	0.12	1.23	0.00	-1.11	0.00E+00
Mar	1999	35.00	0.00	0	0.00	0.55	1.98	0.00	-1.43	0.00E+00
Apr	1999	35.00	26.25	1	9.00	3.76	3.3	52.41	-42.95	5.14E-05
May	1999	35.00	2.36	0.09	0.81	1.17	4.4	54.16	-56.58	5.14E-05
Jun	1999	35.00	85.31	3.25	29.25	5.57	5.76	52.41	-23.35	5.14E-05
Jul	1999	35.00	4.99	0.19	1.71	0.98	7.08	54.16	-58.55	5.14E-05
Aug	1999	35.00	31.50	1.2	10.80	1.96	6.95	54.16	-48.35	5.14E-05
Sep	1999	35.00	20.48	0.78	7.02	1.79	5.5	52.41	-49.10	5.14E-05
Oct	1999	35.00	0.00	0	0.00	0.04	3.74	54.16	-57.86	5.14E-05
Nov	1999	35.00	0.79	0.03	0.27	0.56	2.02	52.41	-53.60	5.14E-05
Dec	1999	35.00	0.00	0	0.00	0.12	1.1	0.00	-0.98	0.00E+00
				5.42 (Avg. annual)		16.98 (Avg. annual)	43.98 (Avg. annual)		7.24 (Maximum value)	

Assumes seepage is 0.00 for January, February, March and December due to frozen soils.
Trial is for bare soil, 315 acres irrigated area.

Permeability value is geometric mean of three available permeability values from Dewey test pits.

POWERTECH (USA) INC.

1986-2000 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
Jan	1986	35.00	0.00	0	0.00	0.07	0.92	0.00	-0.85	0.00E+00
Feb	1986	35.00	0.00	0	0.00	1.06	1.23	0.00	-0.17	0.00E+00
Mar	1986	35.00	0.00	0	0.00	0.52	1.98	0.00	-1.46	0.00E+00
Apr	1986	35.00	32.29	1.23	11.07	3.27	3.3	52.41	-41.37	5.14E-05
May	1986	35.00	8.40	0.32	2.88	1.07	4.4	54.16	-54.61	5.14E-05
Jun	1986	35.00	66.15	2.52	22.68	4.87	5.76	52.41	-30.62	5.14E-05
Jul	1986	35.00	5.25	0.2	1.80	1.63	7.08	54.16	-57.81	5.14E-05
Aug	1986	35.00	6.83	0.26	2.34	1.19	6.95	54.16	-57.58	5.14E-05
Sep	1986	35.00	32.03	1.22	10.98	3.52	5.5	52.41	-43.41	5.14E-05
Oct	1986	35.00	55.39	2.11	18.99	3.88	3.74	54.16	-35.03	5.14E-05
Nov	1986	35.00	2.10	0.08	0.72	0.86	2.02	52.41	-52.85	5.14E-05
Dec	1986	35.00	0.00	0	0.00	0.09	1.1	0.00	-1.01	0.00E+00
Jan	1987	35.00	0.00	0	0.00	0.13	0.92	0.00	-0.79	0.00E+00
Feb	1987	35.00	0.00	0	0.00	0.87	1.23	0.00	-0.36	0.00E+00
Mar	1987	35.00	3.15	0.12	1.08	2.22	1.98	0.00	1.32	0.00E+00
Apr	1987	35.00	4.99	0.19	3.03	0.69	3.3	52.41	-51.99	5.14E-05
May	1987	35.00	22.05	0.84	7.56	2.97	4.4	54.16	-48.03	5.14E-05
Jun	1987	35.00	0.79	0.03	0.27	0.59	5.76	52.41	-57.31	5.14E-05
Jul	1987	35.00	15.75	0.6	5.40	1.71	7.08	54.16	-54.13	5.14E-05
Aug	1987	35.00	2.36	0.09	0.81	1.04	6.95	54.16	-59.26	5.14E-05
Sep	1987	35.00	2.63	0.1	0.90	0.76	5.5	52.41	-56.25	5.14E-05
Oct	1987	35.00	0.26	0.01	0.09	0.42	3.74	54.16	-57.39	5.14E-05
Nov	1987	35.00	5.51	0.21	1.89	0.71	2.02	52.41	-51.83	5.14E-05
Dec	1987	35.00	0.26	0.01	0.09	0.25	1.1	0.00	-0.76	0.00E+00
Jan	1988	35.00	0.00	0	0.00	0.63	0.92	0.00	-0.29	0.00E+00
Feb	1988	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1988	35.00	0.00	0	0.00	1.17	1.98	0.00	-0.81	0.00E+00
Apr	1988	35.00	1.58	0.06	0.54	0.63	3.3	52.41	-54.54	5.14E-05
May	1988	35.00	20.21	0.77	6.93	2.64	4.4	54.16	-48.99	5.14E-05
Jun	1988	35.00	42.00	1.6	14.40	2.78	5.76	52.41	-40.99	5.14E-05
Jul	1988	35.00	28.61	1.09	9.81	2.18	7.08	54.16	-49.25	5.14E-05
Aug	1988	35.00	27.83	1.06	9.54	1.87	6.95	54.16	-49.70	5.14E-05
Sep	1988	35.00	1.05	0.04	0.36	0.84	5.5	52.41	-56.71	5.14E-05
Oct	1988	35.00	0.00	0	0.00	0.09	3.74	54.16	-57.81	5.14E-05
Nov	1988	35.00	0.26	0.01	0.09	0.52	2.02	52.41	-53.82	5.14E-05
Dec	1988	35.00	0.00	0	0.00	0.23	1.1	0.00	-0.87	0.00E+00
Jan	1989	35.00	0.00	0	0.00	0.09	0.92	0.00	-0.83	0.00E+00
Feb	1989	35.00	0.00	0	0.00	0.6	1.23	0.00	-0.63	0.00E+00
Mar	1989	35.00	0.53	0.02	0.18	1.14	1.98	0.00	-0.66	0.00E+00
Apr	1989	35.00	10.76	0.41	3.69	1.67	3.3	52.41	-50.35	5.14E-05
May	1989	35.00	3.15	0.12	1.08	1.41	4.4	54.16	-56.07	5.14E-05
Jun	1989	35.00	2.10	0.08	0.72	1.2	5.76	52.41	-56.25	5.14E-05
Jul	1989	35.00	26.51	1.01	9.09	2.21	7.08	54.16	-49.94	5.14E-05
Aug	1989	35.00	14.44	0.55	4.95	1.46	6.95	54.16	-54.70	5.14E-05
Sep	1989	35.00	64.58	2.46	22.14	3.94	5.5	52.41	-31.83	5.14E-05
Oct	1989	35.00	2.89	0.11	0.99	1.07	3.74	54.16	-55.84	5.14E-05
Nov	1989	35.00	0.00	0	0.00	0.23	2.02	52.41	-54.20	5.14E-05
Dec	1989	35.00	0.00	0	0.00	0.56	1.1	0.00	-0.54	0.00E+00
Jan	1990	35.00	0.00	0	0.00	0.08	0.92	0.00	-0.84	0.00E+00
Feb	1990	35.00	0.00	0	0.00	0.4	1.23	0.00	-0.83	0.00E+00
Mar	1990	35.00	0.79	0.03	0.27	1.17	1.98	0.00	-0.54	0.00E+00
Apr	1990	35.00	11.03	0.42	3.78	2.31	3.3	52.41	-49.62	5.14E-05
May	1990	35.00	56.18	2.14	19.26	4.45	4.4	54.16	-34.85	5.14E-05
Jun	1990	35.00	6.56	0.25	2.25	1.22	5.76	52.41	-54.70	5.14E-05
Jul	1990	35.00	54.34	2.07	18.63	3.84	7.08	54.16	-38.77	5.14E-05
Aug	1990	35.00	5.25	0.2	1.80	0.86	6.95	54.16	-58.45	5.14E-05
Sep	1990	35.00	35.18	1.34	12.06	2.48	5.5	52.41	-43.37	5.14E-05
Oct	1990	35.00	1.84	0.07	0.63	0.89	3.74	54.16	-56.38	5.14E-05
Nov	1990	35.00	6.83	0.26	2.34	1.12	2.02	52.41	-50.97	5.14E-05
Dec	1990	35.00	0.79	0.03	0.27	0.32	1.1	0.00	-0.51	0.00E+00
Jan	1991	35.00	0.00	0	0.00	0.15	0.92	0.00	-0.77	0.00E+00
Feb	1991	35.00	0.00	0	0.00	0.9	1.23	0.00	-0.33	0.00E+00
Mar	1991	35.00	0.00	0	0.00	0.35	1.98	0.00	-1.63	0.00E+00
Apr	1991	35.00	4.46	0.17	1.53	1.58	3.3	52.41	-52.60	5.14E-05
May	1991	35.00	56.44	2.15	19.35	4.91	4.4	54.16	-34.30	5.14E-05
Jun	1991	35.00	39.11	1.49	13.41	3.16	5.76	52.41	-41.60	5.14E-05
Jul	1991	35.00	0.26	0.01	0.09	0.36	7.08	54.16	-60.79	5.14E-05
Aug	1991	35.00	13.91	0.53	4.77	1.52	6.95	54.16	-54.82	5.14E-05
Sep	1991	35.00	0.00	0	0.00	0.29	5.5	52.41	-57.62	5.14E-05
Oct	1991	35.00	4.73	0.18	1.62	0.95	3.74	54.16	-55.33	5.14E-05
Nov	1991	35.00	0.26	0.01	0.09	0.51	2.02	52.41	-53.83	5.14E-05
Dec	1991	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1992	35.00	0.00	0	0.00	0.32	0.92	0.00	-0.60	0.00E+00
Feb	1992	35.00	1.84	0.07	0.63	0.51	1.23	0.00	-0.09	0.00E+00

POWERTECH (USA) INC.

1986-2000 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
Mar	1992	35.00	5.78	0.22	1.98	1.07	1.98	0.00	1.07	0.00E+00
Apr	1992	35.00	0.79	0.03	1.34	0.66	3.3	52.41	-53.71	5.14E-05
May	1992	35.00	30.71	1.17	10.53	2.76	4.4	54.16	-45.27	5.14E-05
Jun	1992	35.00	13.39	0.51	4.59	1.88	5.76	52.41	-51.70	5.14E-05
Jul	1992	35.00	45.15	1.72	15.48	3.92	7.08	54.16	-41.84	5.14E-05
Aug	1992	35.00	14.70	0.56	5.04	1.74	6.95	54.16	-54.33	5.14E-05
Sep	1992	35.00	0.00	0	0.00	0.08	5.5	52.41	-57.83	5.14E-05
Oct	1992	35.00	1.58	0.06	0.54	0.61	3.74	54.16	-56.75	5.14E-05
Nov	1992	35.00	0.00	0	0.00	0.2	2.02	52.41	-54.23	5.14E-05
Dec	1992	35.00	0.00	0	0.00	0.33	1.1	0.00	-0.77	0.00E+00
Jan	1993	35.00	0.00	0	0.00	0.26	0.92	0.00	-0.66	0.00E+00
Feb	1993	35.00	0.00	0	0.00	0.13	1.23	0.00	-1.10	0.00E+00
Mar	1993	35.00	5.78	0.22	1.98	3.58	1.98	0.00	3.58	0.00E+00
Apr	1993	35.00	13.91	0.53	8.35	1.71	3.3	52.41	-45.65	5.14E-05
May	1993	35.00	16.80	0.64	5.76	1.98	4.4	54.16	-50.82	5.14E-05
Jun	1993	35.00	101.85	3.88	34.92	6.14	5.76	52.41	-17.11	5.14E-05
Jul	1993	35.00	28.61	1.09	9.81	2.67	7.08	54.16	-48.76	5.14E-05
Aug	1993	35.00	20.21	0.77	6.93	1.82	6.95	54.16	-52.36	5.14E-05
Sep	1993	35.00	2.10	0.08	0.72	1	5.5	52.41	-56.19	5.14E-05
Oct	1993	35.00	12.60	0.48	4.32	1.48	3.74	54.16	-52.10	5.14E-05
Nov	1993	35.00	0.00	0	0.00	0.72	2.02	52.41	-53.71	5.14E-05
Dec	1993	35.00	0.00	0	0.00	0.82	1.1	0.00	-0.28	0.00E+00
Jan	1994	35.00	0.00	0	0.00	0.6	0.92	0.00	-0.32	0.00E+00
Feb	1994	35.00	0.00	0	0.00	0.36	1.23	0.00	-0.87	0.00E+00
Mar	1994	35.00	0.00	0	0.00	0.73	1.98	0.00	-1.25	0.00E+00
Apr	1994	35.00	9.98	0.38	3.42	1.62	3.3	52.41	-50.67	5.14E-05
May	1994	35.00	11.55	0.44	3.96	1.47	4.4	54.16	-53.13	5.14E-05
Jun	1994	35.00	6.30	0.24	2.16	1.22	5.76	52.41	-54.79	5.14E-05
Jul	1994	35.00	16.28	0.62	5.58	2.04	7.08	54.16	-53.62	5.14E-05
Aug	1994	35.00	1.05	0.04	0.36	0.45	6.95	54.16	-60.30	5.14E-05
Sep	1994	35.00	0.00	0	0.00	0.32	5.5	52.41	-57.59	5.14E-05
Oct	1994	35.00	12.86	0.49	4.41	2.19	3.74	54.16	-51.30	5.14E-05
Nov	1994	35.00	0.00	0	0.00	0.3	2.02	52.41	-54.13	5.14E-05
Dec	1994	35.00	0.00	0	0.00	0.71	1.1	0.00	-0.39	0.00E+00
Jan	1995	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1995	35.00	0.00	0	0.00	0.7	1.23	0.00	-0.53	0.00E+00
Mar	1995	35.00	0.00	0	0.00	0.63	1.98	0.00	-1.35	0.00E+00
Apr	1995	35.00	1.31	0.05	0.45	1.36	3.3	52.41	-53.90	5.14E-05
May	1995	35.00	38.59	1.47	13.23	4.42	4.4	54.16	-40.91	5.14E-05
Jun	1995	35.00	39.64	1.51	13.59	3.09	5.76	52.41	-41.49	5.14E-05
Jul	1995	35.00	1.31	0.05	0.45	1.07	7.08	54.16	-59.72	5.14E-05
Aug	1995	35.00	1.58	0.06	0.54	0.55	6.95	54.16	-60.02	5.14E-05
Sep	1995	35.00	53.81	2.05	18.45	3.61	5.5	52.41	-35.85	5.14E-05
Oct	1995	35.00	5.51	0.21	1.89	1.43	3.74	54.16	-54.58	5.14E-05
Nov	1995	35.00	2.36	0.09	0.81	0.81	2.02	52.41	-52.81	5.14E-05
Dec	1995	35.00	0.00	0	0.00	0.13	1.1	0.00	-0.97	0.00E+00
Jan	1996	35.00	0.00	0	0.00	0.35	0.92	0.00	-0.57	0.00E+00
Feb	1996	35.00	0.00	0	0.00	0.24	1.23	0.00	-0.99	0.00E+00
Mar	1996	35.00	0.00	0	0.00	0.92	1.98	0.00	-1.06	0.00E+00
Apr	1996	35.00	28.88	1.1	9.90	3	3.3	52.41	-42.81	5.14E-05
May	1996	35.00	35.44	1.35	12.15	3.69	4.4	54.16	-42.72	5.14E-05
Jun	1996	35.00	17.59	0.67	6.03	1.85	5.76	52.41	-50.29	5.14E-05
Jul	1996	35.00	0.53	0.02	0.18	0.55	7.08	54.16	-60.51	5.14E-05
Aug	1996	35.00	32.81	1.25	11.25	2.72	6.95	54.16	-47.14	5.14E-05
Sep	1996	35.00	6.56	0.25	2.25	1.37	5.5	52.41	-54.29	5.14E-05
Oct	1996	35.00	7.35	0.28	2.52	1.79	3.74	54.16	-53.59	5.14E-05
Nov	1996	35.00	0.00	0	0.00	0.5	2.02	52.41	-53.93	5.14E-05
Dec	1996	35.00	0.00	0	0.00	0.62	1.1	0.00	-0.48	0.00E+00
Jan	1997	35.00	0.00	0	0.00	0.62	0.92	0.00	-0.30	0.00E+00
Feb	1997	35.00	0.00	0	0.00	0.48	1.23	0.00	-0.75	0.00E+00
Mar	1997	35.00	0.00	0	0.00	0.32	1.98	0.00	-1.66	0.00E+00
Apr	1997	35.00	15.75	0.6	5.40	2.52	3.3	52.41	-47.79	5.14E-05
May	1997	35.00	27.30	1.04	9.36	2.84	4.4	54.16	-46.36	5.14E-05
Jun	1997	35.00	34.13	1.3	11.70	3.17	5.76	52.41	-43.30	5.14E-05
Jul	1997	35.00	67.73	2.58	23.22	4.61	7.08	54.16	-33.41	5.14E-05
Aug	1997	35.00	5.51	0.21	1.89	1.05	6.95	54.16	-58.17	5.14E-05
Sep	1997	35.00	2.36	0.09	0.81	0.73	5.5	52.41	-56.37	5.14E-05
Oct	1997	35.00	1.05	0.04	0.36	0.7	3.74	54.16	-56.84	5.14E-05
Nov	1997	35.00	2.10	0.08	0.72	0.43	2.02	52.41	-53.28	5.14E-05
Dec	1997	35.00	0.00	0	0.00	0.26	1.1	0.00	-0.84	0.00E+00
Jan	1998	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1998	35.00	2.89	0.11	0.99	0.78	1.23	0.00	0.54	0.00E+00
Mar	1998	35.00	19.43	0.74	7.20	2.02	1.98	0.00	7.24	0.00E+00
Apr	1998	35.00	0.00	0	7.24	0.27	3.3	52.41	-48.20	5.14E-05

POWERTECH (USA) INC.

1986-2000 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
May	1998	35.00	31.24	1.19	10.71	3.58	4.4	54.16	-44.27	5.14E-05
Jun	1998	35.00	51.71	1.97	17.73	3.36	5.76	52.41	-37.08	5.14E-05
Jul	1998	35.00	45.41	1.73	15.57	3.38	7.08	54.16	-42.29	5.14E-05
Aug	1998	35.00	29.40	1.12	10.08	2.36	6.95	54.16	-48.67	5.14E-05
Sep	1998	35.00	33.60	1.28	11.52	2.08	5.5	52.41	-44.31	5.14E-05
Oct	1998	35.00	44.63	1.7	15.30	4.16	3.74	54.16	-38.44	5.14E-05
Nov	1998	35.00	8.66	0.33	2.97	1.42	2.02	52.41	-50.04	5.14E-05
Dec	1998	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1999	35.00	0.00	0	0.00	0.55	0.92	0.00	-0.37	0.00E+00
Feb	1999	35.00	0.00	0	0.00	0.12	1.23	0.00	-1.11	0.00E+00
Mar	1999	35.00	0.00	0	0.00	0.55	1.98	0.00	-1.43	0.00E+00
Apr	1999	35.00	26.25	1	9.00	3.76	3.3	52.41	-42.95	5.14E-05
May	1999	35.00	2.36	0.09	0.81	1.17	4.4	54.16	-56.58	5.14E-05
Jun	1999	35.00	85.31	3.25	29.25	5.57	5.76	52.41	-23.35	5.14E-05
Jul	1999	35.00	4.99	0.19	1.71	0.98	7.08	54.16	-58.55	5.14E-05
Aug	1999	35.00	31.50	1.2	10.80	1.96	6.95	54.16	-48.35	5.14E-05
Sep	1999	35.00	20.48	0.78	7.02	1.79	5.5	52.41	-49.10	5.14E-05
Oct	1999	35.00	0.00	0	0.00	0.04	3.74	54.16	-57.86	5.14E-05
Nov	1999	35.00	0.79	0.03	0.27	0.56	2.02	52.41	-53.60	5.14E-05
Dec	1999	35.00	0.00	0	0.00	0.12	1.1	0.00	-0.98	0.00E+00
Jan	2000	35.00	0.00	0	0.00	0.16	0.92	0.00	-0.76	0.00E+00
Feb	2000	35.00	0.26	0.01	0.09	1.09	1.23	0.00	-0.05	0.00E+00
Mar	2000	35.00	8.14	0.31	2.79	1.48	1.98	0.00	2.29	0.00E+00
Apr	2000	35.00	69.56	2.65	26.14	4.74	3.3	52.41	-24.83	5.14E-05
May	2000	35.00	0.53	0.02	0.18	0.78	4.4	54.16	-57.60	5.14E-05
Jun	2000	35.00	0.00	0	0.00	0.43	5.76	52.41	-57.74	5.14E-05
Jul	2000	35.00	16.54	0.63	5.67	2.24	7.08	54.16	-53.33	5.14E-05
Aug	2000	35.00	1.58	0.06	0.54	0.69	6.95	54.16	-59.88	5.14E-05
Sep	2000	35.00	4.46	0.17	1.53	1.03	5.5	52.41	-55.35	5.14E-05
Oct	2000	35.00	2.89	0.11	0.99	1.08	3.74	54.16	-55.83	5.14E-05
Nov	2000	35.00	0.00	0	0.00	0.43	2.02	52.41	-54.00	5.14E-05
Dec	2000	35.00	0.00	0	0.00	0.36	1.1	0.00	-0.74	0.00E+00
				5.48 (Avg. annual)		17.06 (Avg. annual)	43.98 (Avg. annual)		7.24 (Maximum value)	

Assumes seepage is 0.00 for January, February, March and December due to frozen soils.
Trial is for bare soil, 315 acres irrigated area.

Permeability value is geometric mean of three available permeability values from Dewey test pits.

POWERTECH (USA) INC.

1988-2002 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
Jan	1988	35.00	0.00	0	0.00	0.24	0.92	0.00	-0.68	0.00E+00
Feb	1988	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1988	35.00	0.00	0	0.00	1.17	1.98	0.00	-0.81	0.00E+00
Apr	1988	35.00	1.58	0.06	0.54	0.63	3.3	52.41	-54.54	5.14E-05
May	1988	35.00	20.21	0.77	6.93	2.64	4.4	54.16	-48.99	5.14E-05
Jun	1988	35.00	40.43	1.54	13.86	2.78	5.76	52.41	-41.53	5.14E-05
Jul	1988	35.00	22.05	0.84	7.56	2.18	7.08	54.16	-51.50	5.14E-05
Aug	1988	35.00	27.83	1.06	9.54	1.87	6.95	54.16	-49.70	5.14E-05
Sep	1988	35.00	1.05	0.04	0.36	0.84	5.5	52.41	-56.71	5.14E-05
Oct	1988	35.00	0.00	0	0.00	0.09	3.74	54.16	-57.81	5.14E-05
Nov	1988	35.00	0.26	0.01	0.09	0.52	2.02	52.41	-53.82	5.14E-05
Dec	1988	35.00	0.00	0	0.00	0.23	1.1	0.00	-0.87	0.00E+00
Jan	1989	35.00	0.00	0	0.00	0.09	0.92	0.00	-0.83	0.00E+00
Feb	1989	35.00	0.00	0	0.00	0.6	1.23	0.00	-0.63	0.00E+00
Mar	1989	35.00	0.53	0.02	0.18	1.14	1.98	0.00	-0.66	0.00E+00
Apr	1989	35.00	10.76	0.41	3.69	1.67	3.3	52.41	-50.35	5.14E-05
May	1989	35.00	3.15	0.12	1.08	1.41	4.4	54.16	-56.07	5.14E-05
Jun	1989	35.00	2.10	0.08	0.72	1.2	5.76	52.41	-56.25	5.14E-05
Jul	1989	35.00	20.21	0.77	6.93	2.21	7.08	54.16	-52.10	5.14E-05
Aug	1989	35.00	14.44	0.55	4.95	1.46	6.95	54.16	-54.70	5.14E-05
Sep	1989	35.00	64.58	2.46	22.14	3.94	5.5	52.41	-31.83	5.14E-05
Oct	1989	35.00	2.89	0.11	0.99	1.07	3.74	54.16	-55.84	5.14E-05
Nov	1989	35.00	0.00	0	0.00	0.23	2.02	52.41	-54.20	5.14E-05
Dec	1989	35.00	0.00	0	0.00	0.56	1.1	0.00	-0.54	0.00E+00
Jan	1990	35.00	0.00	0	0.00	0.08	0.92	0.00	-0.84	0.00E+00
Feb	1990	35.00	0.00	0	0.00	0.4	1.23	0.00	-0.83	0.00E+00
Mar	1990	35.00	0.79	0.03	0.27	1.17	1.98	0.00	-0.54	0.00E+00
Apr	1990	35.00	11.03	0.42	3.78	2.31	3.3	52.41	-49.62	5.14E-05
May	1990	35.00	53.03	2.02	18.18	4.45	4.4	54.16	-35.93	5.14E-05
Jun	1990	35.00	6.56	0.25	2.25	1.22	5.76	52.41	-54.70	5.14E-05
Jul	1990	35.00	54.34	2.07	18.63	3.84	7.08	54.16	-38.77	5.14E-05
Aug	1990	35.00	4.99	0.19	1.71	0.86	6.95	54.16	-58.54	5.14E-05
Sep	1990	35.00	35.18	1.34	12.06	2.48	5.5	52.41	-43.37	5.14E-05
Oct	1990	35.00	1.84	0.07	0.63	0.89	3.74	54.16	-56.38	5.14E-05
Nov	1990	35.00	6.83	0.26	2.34	1.12	2.02	52.41	-50.97	5.14E-05
Dec	1990	35.00	0.79	0.03	0.27	0.32	1.1	0.00	-0.51	0.00E+00
Jan	1991	35.00	0.00	0	0.00	0.15	0.92	0.00	-0.77	0.00E+00
Feb	1991	35.00	0.00	0	0.00	0.9	1.23	0.00	-0.33	0.00E+00
Mar	1991	35.00	0.00	0	0.00	0.35	1.98	0.00	-1.63	0.00E+00
Apr	1991	35.00	4.46	0.17	1.53	1.58	3.3	52.41	-52.60	5.14E-05
May	1991	35.00	56.44	2.15	19.35	4.91	4.4	54.16	-34.30	5.14E-05
Jun	1991	35.00	39.11	1.49	13.41	3.16	5.76	52.41	-41.60	5.14E-05
Jul	1991	35.00	0.26	0.01	0.09	0.36	7.08	54.16	-60.79	5.14E-05
Aug	1991	35.00	13.91	0.53	4.77	1.52	6.95	54.16	-54.82	5.14E-05
Sep	1991	35.00	0.00	0	0.00	0.29	5.5	52.41	-57.62	5.14E-05
Oct	1991	35.00	4.73	0.18	1.62	0.95	3.74	54.16	-55.33	5.14E-05
Nov	1991	35.00	0.26	0.01	0.09	0.51	2.02	52.41	-53.83	5.14E-05
Dec	1991	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1992	35.00	0.00	0	0.00	0.32	0.92	0.00	-0.60	0.00E+00
Feb	1992	35.00	1.84	0.07	0.63	0.51	1.23	0.00	-0.09	0.00E+00
Mar	1992	35.00	5.78	0.22	1.98	1.07	1.98	0.00	1.07	0.00E+00
Apr	1992	35.00	0.79	0.03	1.34	0.66	3.3	52.41	-53.71	5.14E-05
May	1992	35.00	30.71	1.17	10.53	2.76	4.4	54.16	-45.27	5.14E-05
Jun	1992	35.00	13.39	0.51	4.59	1.88	5.76	52.41	-51.70	5.14E-05
Jul	1992	35.00	45.15	1.72	15.48	3.92	7.08	54.16	-41.84	5.14E-05
Aug	1992	35.00	9.19	0.35	3.15	1.74	6.95	54.16	-56.22	5.14E-05
Sep	1992	35.00	0.00	0	0.00	0.08	5.5	52.41	-57.83	5.14E-05
Oct	1992	35.00	1.58	0.06	0.54	0.61	3.74	54.16	-56.75	5.14E-05
Nov	1992	35.00	0.00	0	0.00	0.2	2.02	52.41	-54.23	5.14E-05
Dec	1992	35.00	0.00	0	0.00	0.33	1.1	0.00	-0.77	0.00E+00
Jan	1993	35.00	0.00	0	0.00	0.26	0.92	0.00	-0.66	0.00E+00
Feb	1993	35.00	0.00	0	0.00	0.13	1.23	0.00	-1.10	0.00E+00
Mar	1993	35.00	5.78	0.22	1.98	3.58	1.98	0.00	3.58	0.00E+00
Apr	1993	35.00	13.91	0.53	8.35	1.71	3.3	52.41	-45.65	5.14E-05
May	1993	35.00	16.80	0.64	5.76	1.98	4.4	54.16	-50.82	5.14E-05
Jun	1993	35.00	101.85	3.88	34.92	6.14	5.76	52.41	-17.11	5.14E-05
Jul	1993	35.00	28.61	1.09	9.81	2.67	7.08	54.16	-48.76	5.14E-05
Aug	1993	35.00	20.21	0.77	6.93	1.82	6.95	54.16	-52.36	5.14E-05
Sep	1993	35.00	2.10	0.08	0.72	1	5.5	52.41	-56.19	5.14E-05
Oct	1993	35.00	12.60	0.48	4.32	1.48	3.74	54.16	-52.10	5.14E-05
Nov	1993	35.00	0.00	0	0.00	0.72	2.02	52.41	-53.71	5.14E-05
Dec	1993	35.00	0.00	0	0.00	0.82	1.1	0.00	-0.28	0.00E+00
Jan	1994	35.00	0.00	0	0.00	0.6	0.92	0.00	-0.32	0.00E+00
Feb	1994	35.00	0.00	0	0.00	0.36	1.23	0.00	-0.87	0.00E+00

POWERTECH (USA) INC.

1988-2002 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
Mar	1994	35.00	0.00	0	0.00	0.73	1.98	0.00	-1.25	0.00E+00
Apr	1994	35.00	9.98	0.38	3.42	1.62	3.3	52.41	-50.67	5.14E-05
May	1994	35.00	11.55	0.44	3.96	1.47	4.4	54.16	-53.13	5.14E-05
Jun	1994	35.00	6.30	0.24	2.16	1.22	5.76	52.41	-54.79	5.14E-05
Jul	1994	35.00	16.28	0.62	5.58	2.04	7.08	54.16	-53.62	5.14E-05
Aug	1994	35.00	1.05	0.04	0.36	0.45	6.95	54.16	-60.30	5.14E-05
Sep	1994	35.00	0.00	0	0.00	0.32	5.5	52.41	-57.59	5.14E-05
Oct	1994	35.00	12.86	0.49	4.41	2.19	3.74	54.16	-51.30	5.14E-05
Nov	1994	35.00	0.00	0	0.00	0.3	2.02	52.41	-54.13	5.14E-05
Dec	1994	35.00	0.00	0	0.00	0.71	1.1	0.00	-0.39	0.00E+00
Jan	1995	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1995	35.00	0.00	0	0.00	0.7	1.23	0.00	-0.53	0.00E+00
Mar	1995	35.00	0.00	0	0.00	0.63	1.98	0.00	-1.35	0.00E+00
Apr	1995	35.00	1.31	0.05	0.45	1.36	3.3	52.41	-53.90	5.14E-05
May	1995	35.00	38.59	1.47	13.23	4.42	4.4	54.16	-40.91	5.14E-05
Jun	1995	35.00	39.64	1.51	13.59	3.09	5.76	52.41	-41.49	5.14E-05
Jul	1995	35.00	1.31	0.05	0.45	1.07	7.08	54.16	-59.72	5.14E-05
Aug	1995	35.00	1.58	0.06	0.54	0.55	6.95	54.16	-60.02	5.14E-05
Sep	1995	35.00	53.81	2.05	18.45	3.61	5.5	52.41	-35.85	5.14E-05
Oct	1995	35.00	5.51	0.21	1.89	1.43	3.74	54.16	-54.58	5.14E-05
Nov	1995	35.00	2.36	0.09	0.81	0.81	2.02	52.41	-52.81	5.14E-05
Dec	1995	35.00	0.00	0	0.00	0.13	1.1	0.00	-0.97	0.00E+00
Jan	1996	35.00	0.00	0	0.00	0.35	0.92	0.00	-0.57	0.00E+00
Feb	1996	35.00	0.00	0	0.00	0.24	1.23	0.00	-0.99	0.00E+00
Mar	1996	35.00	0.00	0	0.00	0.92	1.98	0.00	-1.06	0.00E+00
Apr	1996	35.00	28.88	1.1	9.90	3	3.3	52.41	-42.81	5.14E-05
May	1996	35.00	35.44	1.35	12.15	3.69	4.4	54.16	-42.72	5.14E-05
Jun	1996	35.00	17.59	0.67	6.03	1.85	5.76	52.41	-50.29	5.14E-05
Jul	1996	35.00	0.53	0.02	0.18	0.55	7.08	54.16	-60.51	5.14E-05
Aug	1996	35.00	32.81	1.25	11.25	2.72	6.95	54.16	-47.14	5.14E-05
Sep	1996	35.00	6.56	0.25	2.25	1.37	5.5	52.41	-54.29	5.14E-05
Oct	1996	35.00	7.35	0.28	2.52	1.79	3.74	54.16	-53.59	5.14E-05
Nov	1996	35.00	0.00	0	0.00	0.5	2.02	52.41	-53.93	5.14E-05
Dec	1996	35.00	0.00	0	0.00	0.62	1.1	0.00	-0.48	0.00E+00
Jan	1997	35.00	0.00	0	0.00	0.62	0.92	0.00	-0.30	0.00E+00
Feb	1997	35.00	0.00	0	0.00	0.48	1.23	0.00	-0.75	0.00E+00
Mar	1997	35.00	0.00	0	0.00	0.32	1.98	0.00	-1.66	0.00E+00
Apr	1997	35.00	15.75	0.6	5.40	2.52	3.3	52.41	-47.79	5.14E-05
May	1997	35.00	27.30	1.04	9.36	2.84	4.4	54.16	-46.36	5.14E-05
Jun	1997	35.00	34.13	1.3	11.70	3.17	5.76	52.41	-43.30	5.14E-05
Jul	1997	35.00	67.73	2.58	23.22	4.61	7.08	54.16	-33.41	5.14E-05
Aug	1997	35.00	5.51	0.21	1.89	1.05	6.95	54.16	-58.17	5.14E-05
Sep	1997	35.00	2.36	0.09	0.81	0.73	5.5	52.41	-56.37	5.14E-05
Oct	1997	35.00	1.05	0.04	0.36	0.7	3.74	54.16	-56.84	5.14E-05
Nov	1997	35.00	2.10	0.08	0.72	0.43	2.02	52.41	-53.28	5.14E-05
Dec	1997	35.00	0.00	0	0.00	0.26	1.1	0.00	-0.84	0.00E+00
Jan	1998	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1998	35.00	2.89	0.11	0.99	0.78	1.23	0.00	0.54	0.00E+00
Mar	1998	35.00	19.43	0.74	7.20	2.02	1.98	0.00	7.24	0.00E+00
Apr	1998	35.00	0.00	0	7.24	0.27	3.3	52.41	-48.20	5.14E-05
May	1998	35.00	31.24	1.19	10.71	3.58	4.4	54.16	-44.27	5.14E-05
Jun	1998	35.00	51.71	1.97	17.73	3.36	5.76	52.41	-37.08	5.14E-05
Jul	1998	35.00	45.41	1.73	15.57	3.38	7.08	54.16	-42.29	5.14E-05
Aug	1998	35.00	29.40	1.12	10.08	2.36	6.95	54.16	-48.67	5.14E-05
Sep	1998	35.00	33.60	1.28	11.52	2.08	5.5	52.41	-44.31	5.14E-05
Oct	1998	35.00	44.63	1.7	15.30	4.16	3.74	54.16	-38.44	5.14E-05
Nov	1998	35.00	8.66	0.33	2.97	1.42	2.02	52.41	-50.04	5.14E-05
Dec	1998	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1999	35.00	0.00	0	0.00	0.55	0.92	0.00	-0.37	0.00E+00
Feb	1999	35.00	0.00	0	0.00	0.12	1.23	0.00	-1.11	0.00E+00
Mar	1999	35.00	0.00	0	0.00	0.55	1.98	0.00	-1.43	0.00E+00
Apr	1999	35.00	26.25	1	9.00	3.76	3.3	52.41	-42.95	5.14E-05
May	1999	35.00	2.36	0.09	0.81	1.17	4.4	54.16	-56.58	5.14E-05
Jun	1999	35.00	85.31	3.25	29.25	5.57	5.76	52.41	-23.35	5.14E-05
Jul	1999	35.00	4.99	0.19	1.71	0.98	7.08	54.16	-58.55	5.14E-05
Aug	1999	35.00	31.50	1.2	10.80	1.96	6.95	54.16	-48.35	5.14E-05
Sep	1999	35.00	20.48	0.78	7.02	1.79	5.5	52.41	-49.10	5.14E-05
Oct	1999	35.00	0.00	0	0.00	0.04	3.74	54.16	-57.86	5.14E-05
Nov	1999	35.00	0.79	0.03	0.27	0.56	2.02	52.41	-53.60	5.14E-05
Dec	1999	35.00	0.00	0	0.00	0.12	1.1	0.00	-0.98	0.00E+00
Jan	2000	35.00	0.00	0	0.00	0.16	0.92	0.00	-0.76	0.00E+00
Feb	2000	35.00	0.26	0.01	0.09	1.09	1.23	0.00	-0.05	0.00E+00
Mar	2000	35.00	8.14	0.31	2.79	1.48	1.98	0.00	2.29	0.00E+00
Apr	2000	35.00	69.56	2.65	26.14	4.74	3.3	52.41	-24.83	5.14E-05

1988-2002 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
May	2000	35.00	0.53	0.02	0.18	0.78	4.4	54.16	-57.60	5.14E-05
Jun	2000	35.00	0.00	0	0.00	0.43	5.76	52.41	-57.74	5.14E-05
Jul	2000	35.00	16.54	0.63	5.67	2.24	7.08	54.16	-53.33	5.14E-05
Aug	2000	35.00	1.58	0.06	0.54	0.69	6.95	54.16	-59.88	5.14E-05
Sep	2000	35.00	4.46	0.17	1.53	1.03	5.5	52.41	-55.35	5.14E-05
Oct	2000	35.00	2.89	0.11	0.99	1.08	3.74	54.16	-55.83	5.14E-05
Nov	2000	35.00	0.00	0	0.00	0.43	2.02	52.41	-54.00	5.14E-05
Dec	2000	35.00	0.00	0	0.00	0.36	1.1	0.00	-0.74	0.00E+00
Jan	2001	35.00	0.00	0	0.00	0.06	0.92	0.00	-0.86	0.00E+00
Feb	2001	35.00	0.00	0	0.00	0.58	1.23	0.00	-0.65	0.00E+00
Mar	2001	35.00	0.00	0	0.00	0.95	1.98	0.00	-1.03	0.00E+00
Apr	2001	35.00	19.69	0.75	6.75	2.46	3.3	52.41	-46.50	5.14E-05
May	2001	35.00	10.76	0.41	3.69	1.67	4.4	54.16	-53.20	5.14E-05
Jun	2001	35.00	38.06	1.45	13.05	3.22	5.76	52.41	-41.90	5.14E-05
Jul	2001	35.00	90.56	3.45	31.05	4.96	7.08	54.16	-25.23	5.14E-05
Aug	2001	35.00	6.83	0.26	2.34	1.26	6.95	54.16	-57.51	5.14E-05
Sep	2001	35.00	0.00	0	0.00	0.33	5.5	52.41	-57.58	5.14E-05
Oct	2001	35.00	6.30	0.24	2.16	1.18	3.74	54.16	-54.56	5.14E-05
Nov	2001	35.00	5.78	0.22	1.98	1.3	2.02	52.41	-51.15	5.14E-05
Dec	2001	35.00	0.00	0	0.00	0.13	1.1	0.00	-0.97	0.00E+00
Jan	2002	35.00	0.00	0	0.00	0.04	0.92	0.00	-0.88	0.00E+00
Feb	2002	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	2002	35.00	0.00	0	0.00	1.44	1.98	0.00	-0.54	0.00E+00
Apr	2002	35.00	4.99	0.19	1.71	1.69	3.3	52.41	-52.31	5.14E-05
May	2002	35.00	6.04	0.23	2.07	1.68	4.4	54.16	-54.81	5.14E-05
Jun	2002	35.00	6.04	0.23	2.07	1.23	5.76	52.41	-54.87	5.14E-05
Jul	2002	35.00	1.58	0.06	0.54	0.74	7.08	54.16	-59.96	5.14E-05
Aug	2002	35.00	31.24	1.19	10.71	2.38	6.95	54.16	-48.02	5.14E-05
Sep	2002	35.00	27.83	1.06	9.54	2.47	5.5	52.41	-45.90	5.14E-05
Oct	2002	35.00	2.63	0.1	0.90	0.82	3.74	54.16	-56.18	5.14E-05
Nov	2002	35.00	0.26	0.01	0.09	0.33	2.02	52.41	-54.01	5.14E-05
Dec	2002	35.00	0.00	0	0.00	0.08	1.1	0.00	-1.02	0.00E+00
				5.40 (Avg. annual)		16.82 (Avg. annual)	43.98 (Avg. annual)		7.24 (Maximum value)	

Assumes seepage is 0.00 for January, February, March and December due to frozen soils.
Trial is for bare soil, 315 acres irrigated area.

Permeability value is geometric mean of three available permeability values from Dewey test pits.

POWERTECH (USA) INC.

2002-1988 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
Jan	2002	35.00	0.00	0	0.00	0.04	0.92	0.00	-0.88	0.00E+00
Feb	2002	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	2002	35.00	0.00	0	0.00	1.44	1.98	0.00	-0.54	0.00E+00
Apr	2002	35.00	4.99	0.19	1.71	1.69	3.3	52.41	-52.31	5.14E-05
May	2002	35.00	6.04	0.23	2.07	1.68	4.4	54.16	-54.81	5.14E-05
Jun	2002	35.00	6.04	0.23	2.07	1.23	5.76	52.41	-54.87	5.14E-05
Jul	2002	35.00	1.58	0.06	0.54	0.74	7.08	54.16	-59.96	5.14E-05
Aug	2002	35.00	30.98	1.18	10.62	2.38	6.95	54.16	-48.11	5.14E-05
Sep	2002	35.00	16.80	0.64	5.76	2.47	5.5	52.41	-49.68	5.14E-05
Oct	2002	35.00	2.63	0.1	0.90	0.82	3.74	54.16	-56.18	5.14E-05
Nov	2002	35.00	0.26	0.01	0.09	0.33	2.02	52.41	-54.01	5.14E-05
Dec	2002	35.00	0.00	0	0.00	0.08	1.1	0.00	-1.02	0.00E+00
Jan	2003	35.00	0.00	0	0.00	0.47	0.92	0.00	-0.45	0.00E+00
Feb	2003	35.00	0.00	0	0.00	0.43	1.23	0.00	-0.80	0.00E+00
Mar	2003	35.00	13.65	0.52	4.68	1.92	1.98	0.00	4.62	0.00E+00
Apr	2003	35.00	15.49	0.59	9.93	1.96	3.3	52.41	-43.82	5.14E-05
May	2003	35.00	12.34	0.47	4.23	1.95	4.4	54.16	-52.38	5.14E-05
Jun	2003	35.00	14.18	0.54	4.86	2.8	5.76	52.41	-50.51	5.14E-05
Jul	2003	35.00	0.00	0	0.00	0.05	7.08	54.16	-61.19	5.14E-05
Aug	2003	35.00	21.26	0.81	7.29	1.89	6.95	54.16	-51.93	5.14E-05
Sep	2003	35.00	10.76	0.41	3.69	1.58	5.5	52.41	-52.64	5.14E-05
Oct	2003	35.00	0.53	0.02	0.18	0.6	3.74	54.16	-57.12	5.14E-05
Nov	2003	35.00	0.26	0.01	0.09	0.44	2.02	52.41	-53.90	5.14E-05
Dec	2003	35.00	2.10	0.08	0.72	0.6	1.1	0.00	0.22	0.00E+00
Jan	2004	35.00	0.00	0	0.22	0.3	0.92	0.00	-0.40	0.00E+00
Feb	2004	35.00	0.00	0	0.00	1.3	1.23	0.00	0.07	0.00E+00
Mar	2004	35.00	0.00	0	0.07	0.06	1.98	0.00	-1.85	0.00E+00
Apr	2004	35.00	0.00	0	0.00	0.32	3.3	52.41	-55.39	5.14E-05
May	2004	35.00	1.31	0.05	0.45	0.97	4.4	54.16	-57.14	5.14E-05
Jun	2004	35.00	1.05	0.04	0.36	1.26	5.76	52.41	-56.55	5.14E-05
Jul	2004	35.00	9.45	0.36	3.24	2.21	7.08	54.16	-55.79	5.14E-05
Aug	2004	35.00	1.58	0.06	0.54	0.98	6.95	54.16	-59.59	5.14E-05
Sep	2004	35.00	23.63	0.9	8.10	2.61	5.5	52.41	-47.20	5.14E-05
Oct	2004	35.00	18.11	0.69	6.21	1.89	3.74	54.16	-49.80	5.14E-05
Nov	2004	35.00	0.00	0	0.00	0.2	2.02	52.41	-54.23	5.14E-05
Dec	2004	35.00	0.00	0	0.00	0.08	1.1	0.00	-1.02	0.00E+00
Jan	2005	35.00	0.00	0	0.00	0.47	0.92	0.00	-0.45	0.00E+00
Feb	2005	35.00	0.00	0	0.00	0.1	1.23	0.00	-1.13	0.00E+00
Mar	2005	35.00	13.13	0.5	4.50	1.68	1.98	0.00	4.20	0.00E+00
Apr	2005	35.00	27.56	1.05	13.65	2.73	3.3	52.41	-39.33	5.14E-05
May	2005	35.00	16.28	0.62	5.58	2.66	4.4	54.16	-50.32	5.14E-05
Jun	2005	35.00	112.88	4.3	38.70	6.24	5.76	52.41	-13.23	5.14E-05
Jul	2005	35.00	31.76	1.21	10.89	2.07	7.08	54.16	-48.28	5.14E-05
Aug	2005	35.00	22.31	0.85	7.65	1.91	6.95	54.16	-51.55	5.14E-05
Sep	2005	35.00	0.00	0	0.00	0.37	5.5	52.41	-57.54	5.14E-05
Oct	2005	35.00	13.65	0.52	4.68	1.49	3.74	54.16	-51.73	5.14E-05
Nov	2005	35.00	0.00	0	0.00	0.04	2.02	52.41	-54.39	5.14E-05
Dec	2005	35.00	0.00	0	0.00	0.4	1.1	0.00	-0.70	0.00E+00
Jan	2006	35.00	0.00	0	0.00	0.26	0.92	0.00	-0.66	0.00E+00
Feb	2006	35.00	0.00	0	0.00	0.51	1.23	0.00	-0.72	0.00E+00
Mar	2006	35.00	0.00	0	0.00	0.93	1.98	0.00	-1.05	0.00E+00
Apr	2006	35.00	6.04	0.23	2.07	1.35	3.3	52.41	-52.29	5.14E-05
May	2006	35.00	18.11	0.69	6.21	2.11	4.4	54.16	-50.24	5.14E-05
Jun	2006	35.00	6.30	0.24	2.16	1.35	5.76	52.41	-54.66	5.14E-05
Jul	2006	35.00	51.71	1.97	17.73	3.15	7.08	54.16	-40.36	5.14E-05
Aug	2006	35.00	9.45	0.36	3.24	1.34	6.95	54.16	-56.53	5.14E-05
Sep	2006	35.00	8.14	0.31	2.79	0.91	5.5	52.41	-54.21	5.14E-05
Oct	2006	35.00	1.58	0.06	0.54	0.69	3.74	54.16	-56.67	5.14E-05
Nov	2006	35.00	0.00	0	0.00	0.26	2.02	52.41	-54.17	5.14E-05
Dec	2006	35.00	0.00	0	0.00	0.36	1.1	0.00	-0.74	0.00E+00
Jan	2007	35.00	0.00	0	0.00	0.14	0.92	0.00	-0.78	0.00E+00
Feb	2007	35.00	0.00	0	0.00	0.44	1.23	0.00	-0.79	0.00E+00
Mar	2007	35.00	26.25	1	9.00	1.74	1.98	0.00	8.76	0.00E+00
Apr	2007	35.00	2.89	0.11	9.75	1.09	3.3	52.41	-44.87	5.14E-05
May	2007	35.00	16.01	0.61	5.49	1.72	4.4	54.16	-51.35	5.14E-05
Jun	2007	35.00	1.31	0.05	0.45	0.67	5.76	52.41	-57.05	5.14E-05
Jul	2007	35.00	55.65	2.12	19.08	3.5	7.08	54.16	-38.66	5.14E-05
Aug	2007	35.00	16.01	0.61	5.49	2.05	6.95	54.16	-53.57	5.14E-05
Sep	2007	35.00	1.31	0.05	0.45	0.83	5.5	52.41	-56.63	5.14E-05
Oct	2007	35.00	13.13	0.5	4.50	1.72	3.74	54.16	-51.68	5.14E-05
Nov	2007	35.00	0.00	0	0.00	0.06	2.02	52.41	-54.37	5.14E-05
Dec	2007	35.00	0.00	0	0.00	0.37	1.1	0.00	-0.73	0.00E+00
Jan	1980	35.00	0.00	0	0.00	0.59	0.92	0.00	-0.33	0.00E+00
Feb	1980	35.00	0.00	0	0.00	0.77	1.23	0.00	-0.46	0.00E+00

POWERTECH (USA) INC.

2002-1988 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
Mar	1980	35.00	0.00	0	0.00	2.82	1.98	0.00	0.84	0.00E+00
Apr	1980	35.00	21.53	0.82	8.22	1.72	3.3	52.41	-45.77	5.14E-05
May	1980	35.00	30.19	1.15	10.35	3.33	4.4	54.16	-44.88	5.14E-05
Jun	1980	35.00	28.35	1.08	9.72	1.99	5.76	52.41	-46.46	5.14E-05
Jul	1980	35.00	3.41	0.13	1.17	0.97	7.08	54.16	-59.10	5.14E-05
Aug	1980	35.00	14.96	0.57	5.13	1.85	6.95	54.16	-54.13	5.14E-05
Sep	1980	35.00	2.10	0.08	0.72	0.39	5.5	52.41	-56.80	5.14E-05
Oct	1980	35.00	5.78	0.22	1.98	1.01	3.74	54.16	-54.91	5.14E-05
Nov	1980	35.00	3.68	0.14	1.26	0.62	2.02	52.41	-52.55	5.14E-05
Dec	1980	35.00	0.00	0	0.00	0.68	1.1	0.00	-0.42	0.00E+00
Jan	1981	35.00	0.00	0	0.00	0.08	0.92	0.00	-0.84	0.00E+00
Feb	1981	35.00	0.00	0	0.00	0.27	1.23	0.00	-0.96	0.00E+00
Mar	1981	35.00	5.78	0.22	1.98	0.66	1.98	0.00	0.66	0.00E+00
Apr	1981	35.00	1.31	0.05	1.11	0.74	3.3	52.41	-53.86	5.14E-05
May	1981	35.00	27.30	1.04	9.36	3.22	4.4	54.16	-45.98	5.14E-05
Jun	1981	35.00	22.31	0.85	7.65	1.73	5.76	52.41	-48.79	5.14E-05
Jul	1981	35.00	23.36	0.89	8.01	2.54	7.08	54.16	-50.69	5.14E-05
Aug	1981	35.00	6.56	0.25	2.25	1	6.95	54.16	-57.86	5.14E-05
Sep	1981	35.00	0.00	0	0.00	0.16	5.5	52.41	-57.75	5.14E-05
Oct	1981	35.00	34.65	1.32	11.88	2.92	3.74	54.16	-43.10	5.14E-05
Nov	1981	35.00	0.00	0	0.00	0.04	2.02	52.41	-54.39	5.14E-05
Dec	1982	35.00	0.00	0	0.00	0.1	1.1	0.00	-1.00	0.00E+00
Jan	1982	35.00	0.00	0	0.00	0.18	0.92	0.00	-0.74	0.00E+00
Feb	1982	35.00	0.00	0	0.00	0.05	1.23	0.00	-1.18	0.00E+00
Mar	1982	35.00	0.00	0	0.00	1.34	1.98	0.00	-0.64	0.00E+00
Apr	1982	35.00	2.36	0.09	0.81	1	3.3	52.41	-53.90	5.14E-05
May	1982	35.00	43.31	1.65	14.85	4.18	4.4	54.16	-39.53	5.14E-05
Jun	1982	35.00	72.71	2.77	24.93	4.45	5.76	52.41	-28.79	5.14E-05
Jul	1982	35.00	19.69	0.75	6.75	2.2	7.08	54.16	-52.29	5.14E-05
Aug	1982	35.00	43.05	1.64	14.76	3.29	6.95	54.16	-43.06	5.14E-05
Sep	1982	35.00	17.59	0.67	6.03	2.42	5.5	52.41	-49.46	5.14E-05
Oct	1982	35.00	9.45	0.36	3.24	1.27	3.74	54.16	-53.39	5.14E-05
Nov	1982	35.00	12.60	0.48	4.32	1.3	2.02	52.41	-48.81	5.14E-05
Dec	1982	35.00	0.00	0	0.00	0.2	1.1	0.00	-0.90	0.00E+00
Jan	1983	35.00	0.00	0	0.00	0.22	0.92	0.00	-0.70	0.00E+00
Feb	1983	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1983	35.00	4.46	0.17	1.53	0.89	1.98	0.00	0.44	0.00E+00
Apr	1983	35.00	1.05	0.04	0.80	0.75	3.3	52.41	-54.16	5.14E-05
May	1983	35.00	11.29	0.43	3.87	1.95	4.4	54.16	-52.74	5.14E-05
Jun	1983	35.00	52.76	2.01	18.09	4.25	5.76	52.41	-35.83	5.14E-05
Jul	1983	35.00	6.30	0.24	2.16	1.05	7.08	54.16	-58.03	5.14E-05
Aug	1983	35.00	46.73	1.78	16.02	3.31	6.95	54.16	-41.78	5.14E-05
Sep	1983	35.00	0.26	0.01	0.09	0.28	5.5	52.41	-57.54	5.14E-05
Oct	1983	35.00	4.46	0.17	1.53	1.6	3.74	54.16	-54.77	5.14E-05
Nov	1983	35.00	12.60	0.48	4.32	1.6	2.02	52.41	-48.51	5.14E-05
Dec	1983	35.00	0.00	0	0.00	0.05	1.1	0.00	-1.05	0.00E+00
Jan	1984	35.00	0.00	0	0.00	1.37	0.92	0.00	0.45	0.00E+00
Feb	1984	35.00	0.00	0	0.45	0.28	1.23	0.00	-0.50	0.00E+00
Mar	1984	35.00	0.26	0.01	0.09	0.8	1.98	0.00	-1.09	0.00E+00
Apr	1984	35.00	33.34	1.27	11.43	3.59	3.3	52.41	-40.69	5.14E-05
May	1984	35.00	29.66	1.13	10.17	2.93	4.4	54.16	-45.46	5.14E-05
Jun	1984	35.00	21.53	0.82	7.38	1.91	5.76	52.41	-48.88	5.14E-05
Jul	1984	35.00	17.06	0.65	5.85	2.38	7.08	54.16	-53.01	5.14E-05
Aug	1984	35.00	16.28	0.62	5.58	1.68	6.95	54.16	-53.85	5.14E-05
Sep	1984	35.00	0.00	0	0.00	0.4	5.5	52.41	-57.51	5.14E-05
Oct	1984	35.00	0.53	0.02	0.18	0.63	3.74	54.16	-57.09	5.14E-05
Nov	1984	35.00	4.46	0.17	1.53	0.57	2.02	52.41	-52.33	5.14E-05
Dec	1984	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1985	35.00	0.00	0	0.00	0.17	0.92	0.00	-0.75	0.00E+00
Feb	1985	35.00	0.00	0	0.00	0.57	1.23	0.00	-0.66	0.00E+00
Mar	1985	35.00	0.00	0	0.00	0.77	1.98	0.00	-1.21	0.00E+00
Apr	1985	35.00	47.51	1.81	16.29	3.15	3.3	52.41	-36.27	5.14E-05
May	1985	35.00	2.63	0.1	0.90	1.05	4.4	54.16	-56.61	5.14E-05
Jun	1985	35.00	1.58	0.06	0.54	1.03	5.76	52.41	-56.60	5.14E-05
Jul	1985	35.00	2.36	0.09	0.81	1.2	7.08	54.16	-59.23	5.14E-05
Aug	1985	35.00	0.00	0	0.00	0.5	6.95	54.16	-60.61	5.14E-05
Sep	1985	35.00	12.60	0.48	4.32	1.99	5.5	52.41	-51.60	5.14E-05
Oct	1985	35.00	1.05	0.04	0.36	0.68	3.74	54.16	-56.86	5.14E-05
Nov	1985	35.00	0.00	0	0.00	0.22	2.02	52.41	-54.21	5.14E-05
Dec	1985	35.00	0.00	0	0.00	0.41	1.1	0.00	-0.69	0.00E+00
Jan	1986	35.00	0.00	0	0.00	1.63	0.92	0.00	0.71	0.00E+00
Feb	1986	35.00	0.00	0	0.71	1.06	1.23	0.00	0.54	0.00E+00
Mar	1986	35.00	0.00	0	0.54	0.52	1.98	0.00	-0.92	0.00E+00
Apr	1986	35.00	32.29	1.23	11.07	3.27	3.3	52.41	-41.37	5.14E-05

POWERTECH (USA) INC.

2002-1988 Estimated Monthly Water Balance for Evap Pond -- Dewey Site (XD Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Dewey Perm. (cm/sec)
May	1986	35.00	8.40	0.32	2.88	1.07	4.4	54.16	-54.61	5.14E-05
Jun	1986	35.00	76.13	2.9	26.10	4.87	5.76	52.41	-27.20	5.14E-05
Jul	1986	35.00	8.93	0.34	3.06	1.63	7.08	54.16	-56.55	5.14E-05
Aug	1986	35.00	6.83	0.26	2.34	1.19	6.95	54.16	-57.58	5.14E-05
Sep	1986	35.00	38.85	1.48	13.32	3.52	5.5	52.41	-41.07	5.14E-05
Oct	1986	35.00	55.39	2.11	18.99	3.88	3.74	54.16	-35.03	5.14E-05
Nov	1986	35.00	2.10	0.08	0.72	0.86	2.02	52.41	-52.85	5.14E-05
Dec	1986	35.00	0.00	0	0.00	0.09	1.1	0.00	-1.01	0.00E+00
Jan	1987	35.00	0.00	0	0.00	0.13	0.92	0.00	-0.79	0.00E+00
Feb	1987	35.00	0.00	0	0.00	0.87	1.23	0.00	-0.36	0.00E+00
Mar	1987	35.00	3.15	0.12	1.08	2.22	1.98	0.00	1.32	0.00E+00
Apr	1987	35.00	4.99	0.19	3.03	0.69	3.3	52.41	-51.99	5.14E-05
May	1987	35.00	26.78	1.02	9.18	2.97	4.4	54.16	-46.41	5.14E-05
Jun	1987	35.00	0.79	0.03	0.27	0.59	5.76	52.41	-57.31	5.14E-05
Jul	1987	35.00	15.75	0.6	5.40	1.71	7.08	54.16	-54.13	5.14E-05
Aug	1987	35.00	2.36	0.09	0.81	1.04	6.95	54.16	-59.26	5.14E-05
Sep	1987	35.00	2.63	0.1	0.90	0.76	5.5	52.41	-56.25	5.14E-05
Oct	1987	35.00	0.26	0.01	0.09	0.42	3.74	54.16	-57.39	5.14E-05
Nov	1987	35.00	5.51	0.21	1.89	0.71	2.02	52.41	-51.83	5.14E-05
Dec	1987	35.00	0.26	0.01	0.09	0.25	1.1	0.00	-0.76	0.00E+00
Jan	1988	35.00	0.00	0	0.00	0.63	0.92	0.00	-0.29	0.00E+00
Feb	1988	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1988	35.00	0.00	0	0.00	1.17	1.98	0.00	-0.81	0.00E+00
Apr	1988	35.00	1.58	0.06	0.54	0.63	3.3	52.41	-54.54	5.14E-05
May	1988	35.00	20.21	0.77	6.93	2.64	4.4	54.16	-48.99	5.14E-05
Jun	1988	35.00	42.00	1.6	14.40	2.78	5.76	52.41	-40.99	5.14E-05
Jul	1988	35.00	28.61	1.09	9.81	2.18	7.08	54.16	-49.25	5.14E-05
Aug	1988	35.00	27.83	1.06	9.54	1.87	6.95	54.16	-49.70	5.14E-05
Sep	1988	35.00	1.05	0.04	0.36	0.84	5.5	52.41	-56.71	5.14E-05
Oct	1988	35.00	0.00	0	0.00	0.09	3.74	54.16	-57.81	5.14E-05
Nov	1988	35.00	0.26	0.01	0.09	0.52	2.02	52.41	-53.82	5.14E-05
Dec	1988	35.00	0.00	0	0.00	0.23	1.1	0.00	-0.87	0.00E+00
				4.78 (Avg. annual)		15.62 (Avg. annual)	43.98 (Avg. annual)		8.76 (Maximum value)	

Assumes seepage is 0.00 for January, February, March and December due to frozen soils.
Trial is for bare soil, 315 acres irrigated area.

Permeability value is geometric mean of three available permeability values from Dewey test pits.

Monthly Runoff Water Balance

Burdock Area

POWERTECH (USA) INC.

1984-1998 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
Jan	1984	35.00	0.00	0	0.00	0.13	0.92	0.00	-0.79	0.00E+00
Feb	1984	35.00	0.00	0	0.00	0.28	1.23	0.00	-0.95	0.00E+00
Mar	1984	35.00	0.26	0.01	0.09	0.8	1.98	0.00	-1.09	0.00E+00
Apr	1984	35.00	28.09	1.07	9.63	3.59	3.3	8.11	1.81	7.95E-06
May	1984	35.00	24.94	0.95	10.36	2.93	4.4	8.38	0.50	7.95E-06
Jun	1984	35.00	5.25	0.2	2.30	1.91	5.76	8.11	-9.66	7.95E-06
Jul	1984	35.00	9.71	0.37	3.33	2.38	7.08	8.38	-9.75	7.95E-06
Aug	1984	35.00	8.66	0.33	2.97	1.68	6.95	8.38	-10.68	7.95E-06
Sep	1984	35.00	0.00	0	0.00	0.4	5.5	8.11	-13.21	7.95E-06
Oct	1984	35.00	0.53	0.02	0.18	0.63	3.74	8.38	-11.31	7.95E-06
Nov	1984	35.00	4.46	0.17	1.53	0.57	2.02	8.11	-8.03	7.95E-06
Dec	1984	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1985	35.00	0.00	0	0.00	0.17	0.92	0.00	-0.75	0.00E+00
Feb	1985	35.00	0.00	0	0.00	0.57	1.23	0.00	-0.66	0.00E+00
Mar	1985	35.00	0.00	0	0.00	0.77	1.98	0.00	-1.21	0.00E+00
Apr	1985	35.00	47.51	1.81	16.29	3.15	3.3	8.11	8.03	7.95E-06
May	1985	35.00	2.63	0.1	8.93	1.05	4.4	8.38	-2.81	7.95E-06
Jun	1985	35.00	1.58	0.06	0.54	1.03	5.76	8.11	-12.30	7.95E-06
Jul	1985	35.00	2.36	0.09	0.81	1.2	7.08	8.38	-13.45	7.95E-06
Aug	1985	35.00	0.00	0	0.00	0.5	6.95	8.38	-14.83	7.95E-06
Sep	1985	35.00	12.34	0.47	4.23	1.99	5.5	8.11	-7.39	7.95E-06
Oct	1985	35.00	1.05	0.04	0.36	0.68	3.74	8.38	-11.08	7.95E-06
Nov	1985	35.00	0.00	0	0.00	0.22	2.02	8.11	-9.91	7.95E-06
Dec	1985	35.00	0.00	0	0.00	0.41	1.1	0.00	-0.69	0.00E+00
Jan	1986	35.00	0.00	0	0.00	1.63	0.92	0.00	0.71	0.00E+00
Feb	1986	35.00	0.00	0	0.71	1.06	1.23	0.00	0.54	0.00E+00
Mar	1986	35.00	0.00	0	0.54	0.52	1.98	0.00	-0.92	0.00E+00
Apr	1986	35.00	32.29	1.23	11.07	3.27	3.3	8.11	2.93	7.95E-06
May	1986	35.00	8.40	0.32	5.81	1.07	4.4	8.38	-5.91	7.95E-06
Jun	1986	35.00	68.51	2.61	23.49	4.87	5.76	8.11	14.49	7.95E-06
Jul	1986	35.00	5.25	0.2	16.29	1.63	7.08	8.38	2.45	7.95E-06
Aug	1986	35.00	6.83	0.26	4.79	1.19	6.95	8.38	-9.35	7.95E-06
Sep	1986	35.00	18.11	0.69	6.21	3.52	5.5	8.11	-3.88	7.95E-06
Oct	1986	35.00	50.93	1.94	17.46	3.88	3.74	8.38	9.22	7.95E-06
Nov	1986	35.00	2.10	0.08	9.94	0.86	2.02	8.11	0.66	7.95E-06
Dec	1986	35.00	0.00	0	0.66	0.09	1.1	0.00	-0.35	0.00E+00
Jan	1987	35.00	0.00	0	0.00	0.13	0.92	0.00	-0.79	0.00E+00
Feb	1987	35.00	0.00	0	0.00	0.87	1.23	0.00	-0.36	0.00E+00
Mar	1987	35.00	3.15	0.12	1.08	2.22	1.98	0.00	1.32	0.00E+00
Apr	1987	35.00	4.99	0.19	3.03	0.69	3.3	8.11	-7.69	7.95E-06
May	1987	35.00	25.20	0.96	8.64	2.97	4.4	8.38	-1.17	7.95E-06
Jun	1987	35.00	0.79	0.03	0.27	0.59	5.76	8.11	-13.01	7.95E-06
Jul	1987	35.00	15.75	0.6	5.40	1.71	7.08	8.38	-8.35	7.95E-06
Aug	1987	35.00	2.36	0.09	0.81	1.04	6.95	8.38	-13.48	7.95E-06
Sep	1987	35.00	1.84	0.07	0.63	0.76	5.5	8.11	-12.22	7.95E-06
Oct	1987	35.00	0.26	0.01	0.09	0.42	3.74	8.38	-11.61	7.95E-06
Nov	1987	35.00	5.51	0.21	1.89	0.71	2.02	8.11	-7.53	7.95E-06
Dec	1987	35.00	0.26	0.01	0.09	0.25	1.1	0.00	-0.76	0.00E+00
Jan	1988	35.00	0.00	0	0.00	0.63	0.92	0.00	-0.29	0.00E+00
Feb	1988	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1988	35.00	0.00	0	0.00	1.17	1.98	0.00	-0.81	0.00E+00
Apr	1988	35.00	1.58	0.06	0.54	0.63	3.3	8.11	-10.24	7.95E-06
May	1988	35.00	20.21	0.77	6.93	2.64	4.4	8.38	-3.21	7.95E-06
Jun	1988	35.00	40.43	1.54	13.86	2.78	5.76	8.11	2.77	7.95E-06
Jul	1988	35.00	23.36	0.89	10.78	2.18	7.08	8.38	-2.51	7.95E-06
Aug	1988	35.00	25.46	0.97	8.73	1.87	6.95	8.38	-4.73	7.95E-06
Sep	1988	35.00	1.05	0.04	0.36	0.84	5.5	8.11	-12.41	7.95E-06
Oct	1988	35.00	0.00	0	0.00	0.09	3.74	8.38	-12.03	7.95E-06
Nov	1988	35.00	0.26	0.01	0.09	0.52	2.02	8.11	-9.52	7.95E-06
Dec	1988	35.00	0.00	0	0.00	0.23	1.1	0.00	-0.87	0.00E+00
Jan	1989	35.00	0.00	0	0.00	0.09	0.92	0.00	-0.83	0.00E+00
Feb	1989	35.00	0.00	0	0.00	0.6	1.23	0.00	-0.63	0.00E+00
Mar	1989	35.00	0.53	0.02	0.18	1.14	1.98	0.00	-0.66	0.00E+00
Apr	1989	35.00	10.76	0.41	3.69	1.67	3.3	8.11	-6.05	7.95E-06
May	1989	35.00	3.15	0.12	1.08	1.41	4.4	8.38	-10.29	7.95E-06
Jun	1989	35.00	2.10	0.08	0.72	1.2	5.76	8.11	-11.95	7.95E-06
Jul	1989	35.00	19.16	0.73	6.57	2.21	7.08	8.38	-6.68	7.95E-06
Aug	1989	35.00	14.44	0.55	4.95	1.46	6.95	8.38	-8.92	7.95E-06
Sep	1989	35.00	55.65	2.12	19.08	3.94	5.5	8.11	9.41	7.95E-06
Oct	1989	35.00	2.89	0.11	10.40	1.07	3.74	8.38	-0.66	7.95E-06
Nov	1989	35.00	0.00	0	0.00	0.23	2.02	8.11	-9.90	7.95E-06
Dec	1989	35.00	0.00	0	0.00	0.56	1.1	0.00	-0.54	0.00E+00
Jan	1990	35.00	0.00	0	0.00	0.08	0.92	0.00	-0.84	0.00E+00
Feb	1990	35.00	0.00	0	0.00	0.4	1.23	0.00	-0.83	0.00E+00

POWERTECH (USA) INC.

1984-1998 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
Mar	1990	35.00	0.79	0.03	0.27	1.17	1.98	0.00	-0.54	0.00E+00
Apr	1990	35.00	11.03	0.42	3.78	2.31	3.3	8.11	-5.32	7.95E-06
May	1990	35.00	61.69	2.35	21.15	4.45	4.4	8.38	12.82	7.95E-06
Jun	1990	35.00	3.15	0.12	13.90	1.22	5.76	8.11	1.24	7.95E-06
Jul	1990	35.00	46.99	1.79	17.35	3.84	7.08	8.38	5.73	7.95E-06
Aug	1990	35.00	4.99	0.19	7.44	0.86	6.95	8.38	-7.03	7.95E-06
Sep	1990	35.00	35.18	1.34	12.06	2.48	5.5	8.11	0.93	7.95E-06
Oct	1990	35.00	1.84	0.07	1.56	0.89	3.74	8.38	-9.68	7.95E-06
Nov	1990	35.00	6.83	0.26	2.34	1.12	2.02	8.11	-6.67	7.95E-06
Dec	1990	35.00	0.79	0.03	0.27	0.32	1.1	0.00	-0.51	0.00E+00
Jan	1991	35.00	0.00	0	0.00	0.15	0.92	0.00	-0.77	0.00E+00
Feb	1991	35.00	0.00	0	0.00	0.9	1.23	0.00	-0.33	0.00E+00
Mar	1991	35.00	0.00	0	0.00	0.35	1.98	0.00	-1.63	0.00E+00
Apr	1991	35.00	4.46	0.17	1.53	1.58	3.3	8.11	-8.30	7.95E-06
May	1991	35.00	63.53	2.42	21.78	4.91	4.4	8.38	13.91	7.95E-06
Jun	1991	35.00	33.34	1.27	25.34	3.16	5.76	8.11	14.62	7.95E-06
Jul	1991	35.00	0.26	0.01	14.71	0.36	7.08	8.38	-0.39	7.95E-06
Aug	1991	35.00	13.91	0.53	4.77	1.52	6.95	8.38	-9.04	7.95E-06
Sep	1991	35.00	0.00	0	0.00	0.29	5.5	8.11	-13.32	7.95E-06
Oct	1991	35.00	4.73	0.18	1.62	0.95	3.74	8.38	-9.55	7.95E-06
Nov	1991	35.00	0.26	0.01	0.09	0.51	2.02	8.11	-9.53	7.95E-06
Dec	1991	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1992	35.00	0.00	0	0.00	0.32	0.92	0.00	-0.60	0.00E+00
Feb	1992	35.00	1.84	0.07	0.63	0.51	1.23	0.00	-0.09	0.00E+00
Mar	1992	35.00	5.78	0.22	1.98	1.07	1.98	0.00	1.07	0.00E+00
Apr	1992	35.00	0.79	0.03	1.34	0.66	3.3	8.11	-9.41	7.95E-06
May	1992	35.00	30.71	1.17	10.53	2.76	4.4	8.38	0.51	7.95E-06
Jun	1992	35.00	11.29	0.43	4.38	1.88	5.76	8.11	-7.62	7.95E-06
Jul	1992	35.00	20.21	0.77	6.93	3.92	7.08	8.38	-4.61	7.95E-06
Aug	1992	35.00	8.40	0.32	2.88	1.74	6.95	8.38	-10.71	7.95E-06
Sep	1992	35.00	0.00	0	0.00	0.08	5.5	8.11	-13.53	7.95E-06
Oct	1992	35.00	1.58	0.06	0.54	0.61	3.74	8.38	-10.97	7.95E-06
Nov	1992	35.00	0.00	0	0.00	0.2	2.02	8.11	-9.93	7.95E-06
Dec	1992	35.00	0.00	0	0.00	0.33	1.1	0.00	-0.77	0.00E+00
Jan	1993	35.00	0.00	0	0.00	0.26	0.92	0.00	-0.66	0.00E+00
Feb	1993	35.00	0.00	0	0.00	0.13	1.23	0.00	-1.10	0.00E+00
Mar	1993	35.00	7.61	0.29	2.61	3.58	1.98	0.00	4.21	0.00E+00
Apr	1993	35.00	9.19	0.35	7.36	1.71	3.3	8.11	-2.34	7.95E-06
May	1993	35.00	13.39	0.51	4.59	1.98	4.4	8.38	-6.21	7.95E-06
Jun	1993	35.00	99.75	3.8	34.20	6.14	5.76	8.11	26.47	7.95E-06
Jul	1993	35.00	22.58	0.86	34.21	2.67	7.08	8.38	21.41	7.95E-06
Aug	1993	35.00	12.60	0.48	25.73	1.82	6.95	8.38	12.22	7.95E-06
Sep	1993	35.00	2.10	0.08	12.94	1	5.5	8.11	0.33	7.95E-06
Oct	1993	35.00	12.60	0.48	4.65	1.48	3.74	8.38	-6.00	7.95E-06
Nov	1993	35.00	0.00	0	0.00	0.72	2.02	8.11	-9.41	7.95E-06
Dec	1993	35.00	0.00	0	0.00	0.82	1.1	0.00	-0.28	0.00E+00
Jan	1994	35.00	0.00	0	0.00	0.6	0.92	0.00	-0.32	0.00E+00
Feb	1994	35.00	0.00	0	0.00	0.36	1.23	0.00	-0.87	0.00E+00
Mar	1994	35.00	0.00	0	0.00	0.73	1.98	0.00	-1.25	0.00E+00
Apr	1994	35.00	9.98	0.38	3.42	1.62	3.3	8.11	-6.37	7.95E-06
May	1994	35.00	11.55	0.44	3.96	1.47	4.4	8.38	-7.35	7.95E-06
Jun	1994	35.00	6.30	0.24	2.16	1.22	5.76	8.11	-10.49	7.95E-06
Jul	1994	35.00	12.08	0.46	4.14	2.04	7.08	8.38	-9.28	7.95E-06
Aug	1994	35.00	1.05	0.04	0.36	0.45	6.95	8.38	-14.52	7.95E-06
Sep	1994	35.00	0.00	0	0.00	0.32	5.5	8.11	-13.29	7.95E-06
Oct	1994	35.00	12.86	0.49	4.41	2.19	3.74	8.38	-5.52	7.95E-06
Nov	1994	35.00	0.00	0	0.00	0.3	2.02	8.11	-9.83	7.95E-06
Dec	1994	35.00	0.00	0	0.00	0.71	1.1	0.00	-0.39	0.00E+00
Jan	1995	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1995	35.00	0.00	0	0.00	0.7	1.23	0.00	-0.53	0.00E+00
Mar	1995	35.00	0.00	0	0.00	0.63	1.98	0.00	-1.35	0.00E+00
Apr	1995	35.00	1.31	0.05	0.45	1.36	3.3	8.11	-9.60	7.95E-06
May	1995	35.00	41.48	1.58	14.22	4.42	4.4	8.38	5.86	7.95E-06
Jun	1995	35.00	24.68	0.94	14.32	3.09	5.76	8.11	3.53	7.95E-06
Jul	1995	35.00	0.79	0.03	3.80	1.07	7.08	8.38	-10.59	7.95E-06
Aug	1995	35.00	0.26	0.01	0.09	0.55	6.95	8.38	-14.69	7.95E-06
Sep	1995	35.00	49.88	1.9	17.10	3.61	5.5	8.11	7.10	7.95E-06
Oct	1995	35.00	5.51	0.21	8.99	1.43	3.74	8.38	-1.71	7.95E-06
Nov	1995	35.00	2.36	0.09	0.81	0.81	2.02	8.11	-8.51	7.95E-06
Dec	1995	35.00	0.00	0	0.00	0.13	1.1	0.00	-0.97	0.00E+00
Jan	1996	35.00	0.00	0	0.00	0.35	0.92	0.00	-0.57	0.00E+00
Feb	1996	35.00	0.00	0	0.00	0.24	1.23	0.00	-0.99	0.00E+00
Mar	1996	35.00	0.00	0	0.00	0.92	1.98	0.00	-1.06	0.00E+00
Apr	1996	35.00	28.88	1.1	9.90	3	3.3	8.11	1.49	7.95E-06

POWERTECH (USA) INC.

1984-1998 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
May	1996	35.00	41.48	1.58	15.71	3.69	4.4	8.38	6.61	7.95E-06
Jun	1996	35.00	9.19	0.35	9.76	1.85	5.76	8.11	-2.26	7.95E-06
Jul	1996	35.00	0.53	0.02	0.18	0.55	7.08	8.38	-14.73	7.95E-06
Aug	1996	35.00	32.81	1.25	11.25	2.72	6.95	8.38	-1.36	7.95E-06
Sep	1996	35.00	3.41	0.13	1.17	1.37	5.5	8.11	-11.07	7.95E-06
Oct	1996	35.00	7.35	0.28	2.52	1.79	3.74	8.38	-7.81	7.95E-06
Nov	1996	35.00	0.00	0	0.00	0.5	2.02	8.11	-9.63	7.95E-06
Dec	1996	35.00	0.00	0	0.00	0.62	1.1	0.00	-0.48	0.00E+00
Jan	1997	35.00	0.00	0	0.00	0.62	0.92	0.00	-0.30	0.00E+00
Feb	1997	35.00	0.00	0	0.00	0.48	1.23	0.00	-0.75	0.00E+00
Mar	1997	35.00	0.00	0	0.00	0.32	1.98	0.00	-1.66	0.00E+00
Apr	1997	35.00	15.75	0.6	5.40	2.52	3.3	8.11	-3.49	7.95E-06
May	1997	35.00	27.30	1.04	9.36	2.84	4.4	8.38	-0.58	7.95E-06
Jun	1997	35.00	22.84	0.87	7.83	3.17	5.76	8.11	-2.87	7.95E-06
Jul	1997	35.00	55.39	2.11	18.99	4.61	7.08	8.38	8.14	7.95E-06
Aug	1997	35.00	5.25	0.2	9.94	1.05	6.95	8.38	-4.35	7.95E-06
Sep	1997	35.00	1.84	0.07	0.63	0.73	5.5	8.11	-12.25	7.95E-06
Oct	1997	35.00	1.05	0.04	0.36	0.7	3.74	8.38	-11.06	7.95E-06
Nov	1997	35.00	2.10	0.08	0.72	0.43	2.02	8.11	-8.98	7.95E-06
Dec	1997	35.00	0.00	0	0.00	0.26	1.1	0.00	-0.84	0.00E+00
Jan	1998	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1998	35.00	2.89	0.11	0.99	0.78	1.23	0.00	0.54	0.00E+00
Mar	1998	35.00	18.90	0.72	7.02	2.02	1.98	0.00	7.06	0.00E+00
Apr	1998	35.00	0.00	0	7.06	0.27	3.3	8.11	-4.08	7.95E-06
May	1998	35.00	30.71	1.17	10.53	3.58	4.4	8.38	1.33	7.95E-06
Jun	1998	35.00	44.63	1.7	16.63	3.36	5.76	8.11	6.11	7.95E-06
Jul	1998	35.00	38.06	1.45	19.16	3.38	7.08	8.38	7.08	7.95E-06
Aug	1998	35.00	15.23	0.58	12.30	2.36	6.95	8.38	-0.67	7.95E-06
Sep	1998	35.00	32.81	1.25	11.25	2.08	5.5	8.11	-0.28	7.95E-06
Oct	1998	35.00	41.21	1.57	14.13	4.16	3.74	8.38	6.17	7.95E-06
Nov	1998	35.00	5.25	0.2	7.97	1.42	2.02	8.11	-0.75	7.95E-06
Dec	1998	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
				4.68 (Avg. annual)		16.88 (Avg. annual)	43.98 (Avg. annual)		26.47 (Maximum value)	

Assumes seepage is 0.00 for January, February, March and December due to frozen soils.
Trial is for bare soil, 315 acres irrigated area.

Permeability value is geometric mean of three available permeability values from Burdock test pits.

POWERTECH (USA) INC.

1985-1999 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
Jan	1985	35.00	0.00	0	0.00	0.17	0.92	0.00	-0.75	0.00E+00
Feb	1985	35.00	0.00	0	0.00	0.57	1.23	0.00	-0.66	0.00E+00
Mar	1985	35.00	0.00	0	0.00	0.77	1.98	0.00	-1.21	0.00E+00
Apr	1985	35.00	47.51	1.81	16.29	3.15	3.3	8.11	8.03	7.95E-06
May	1985	35.00	2.63	0.1	8.93	1.05	4.4	8.38	-2.81	7.95E-06
Jun	1985	35.00	1.58	0.06	0.54	1.03	5.76	8.11	-12.30	7.95E-06
Jul	1985	35.00	2.36	0.09	0.81	1.2	7.08	8.38	-13.45	7.95E-06
Aug	1985	35.00	0.00	0	0.00	0.5	6.95	8.38	-14.83	7.95E-06
Sep	1985	35.00	12.34	0.47	4.23	1.99	5.5	8.11	-7.39	7.95E-06
Oct	1985	35.00	1.05	0.04	0.36	0.68	3.74	8.38	-11.08	7.95E-06
Nov	1985	35.00	0.00	0	0.00	0.22	2.02	8.11	-9.91	7.95E-06
Dec	1985	35.00	0.00	0	0.00	0.41	1.1	0.00	-0.69	0.00E+00
Jan	1986	35.00	0.00	0	0.00	1.63	0.92	0.00	0.71	0.00E+00
Feb	1986	35.00	0.00	0	0.71	1.06	1.23	0.00	0.54	0.00E+00
Mar	1986	35.00	0.00	0	0.54	0.52	1.98	0.00	-0.92	0.00E+00
Apr	1986	35.00	32.29	1.23	11.07	3.27	3.3	8.11	2.93	7.95E-06
May	1986	35.00	8.40	0.32	5.81	1.07	4.4	8.38	-5.91	7.95E-06
Jun	1986	35.00	65.89	2.51	22.59	4.87	5.76	8.11	13.59	7.95E-06
Jul	1986	35.00	5.25	0.2	15.39	1.63	7.08	8.38	1.55	7.95E-06
Aug	1986	35.00	6.83	0.26	3.89	1.19	6.95	8.38	-10.25	7.95E-06
Sep	1986	35.00	18.11	0.69	6.21	3.52	5.5	8.11	-3.88	7.95E-06
Oct	1986	35.00	49.09	1.87	16.83	3.88	3.74	8.38	8.59	7.95E-06
Nov	1986	35.00	2.10	0.08	9.31	0.86	2.02	8.11	0.03	7.95E-06
Dec	1986	35.00	0.00	0	0.03	0.09	1.1	0.00	-0.98	0.00E+00
Jan	1987	35.00	0.00	0	0.00	0.13	0.92	0.00	-0.79	0.00E+00
Feb	1987	35.00	0.00	0	0.00	0.87	1.23	0.00	-0.36	0.00E+00
Mar	1987	35.00	3.15	0.12	1.08	2.22	1.98	0.00	1.32	0.00E+00
Apr	1987	35.00	4.99	0.19	3.03	0.69	3.3	8.11	-7.69	7.95E-06
May	1987	35.00	25.20	0.96	8.64	2.97	4.4	8.38	-1.17	7.95E-06
Jun	1987	35.00	0.79	0.03	0.27	0.59	5.76	8.11	-13.01	7.95E-06
Jul	1987	35.00	15.75	0.6	5.40	1.71	7.08	8.38	-8.35	7.95E-06
Aug	1987	35.00	2.36	0.09	0.81	1.04	6.95	8.38	-13.48	7.95E-06
Sep	1987	35.00	1.84	0.07	0.63	0.76	5.5	8.11	-12.22	7.95E-06
Oct	1987	35.00	0.26	0.01	0.09	0.42	3.74	8.38	-11.61	7.95E-06
Nov	1987	35.00	5.51	0.21	1.89	0.71	2.02	8.11	-7.53	7.95E-06
Dec	1987	35.00	0.26	0.01	0.09	0.25	1.1	0.00	-0.76	0.00E+00
Jan	1988	35.00	0.00	0	0.00	0.63	0.92	0.00	-0.29	0.00E+00
Feb	1988	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1988	35.00	0.00	0	0.00	1.17	1.98	0.00	-0.81	0.00E+00
Apr	1988	35.00	1.58	0.06	0.54	0.63	3.3	8.11	-10.24	7.95E-06
May	1988	35.00	20.21	0.77	6.93	2.64	4.4	8.38	-3.21	7.95E-06
Jun	1988	35.00	40.43	1.54	13.86	2.78	5.76	8.11	2.77	7.95E-06
Jul	1988	35.00	23.36	0.89	10.78	2.18	7.08	8.38	-2.51	7.95E-06
Aug	1988	35.00	25.46	0.97	8.73	1.87	6.95	8.38	-4.73	7.95E-06
Sep	1988	35.00	1.05	0.04	0.36	0.84	5.5	8.11	-12.41	7.95E-06
Oct	1988	35.00	0.00	0	0.00	0.09	3.74	8.38	-12.03	7.95E-06
Nov	1988	35.00	0.26	0.01	0.09	0.52	2.02	8.11	-9.52	7.95E-06
Dec	1988	35.00	0.00	0	0.00	0.23	1.1	0.00	-0.87	0.00E+00
Jan	1989	35.00	0.00	0	0.00	0.09	0.92	0.00	-0.83	0.00E+00
Feb	1989	35.00	0.00	0	0.00	0.6	1.23	0.00	-0.63	0.00E+00
Mar	1989	35.00	0.53	0.02	0.18	1.14	1.98	0.00	-0.66	0.00E+00
Apr	1989	35.00	10.76	0.41	3.69	1.67	3.3	8.11	-6.05	7.95E-06
May	1989	35.00	3.15	0.12	1.08	1.41	4.4	8.38	-10.29	7.95E-06
Jun	1989	35.00	2.10	0.08	0.72	1.2	5.76	8.11	-11.95	7.95E-06
Jul	1989	35.00	19.16	0.73	6.57	2.21	7.08	8.38	-6.68	7.95E-06
Aug	1989	35.00	14.44	0.55	4.95	1.46	6.95	8.38	-8.92	7.95E-06
Sep	1989	35.00	55.65	2.12	19.08	3.94	5.5	8.11	9.41	7.95E-06
Oct	1989	35.00	2.89	0.11	10.40	1.07	3.74	8.38	-0.66	7.95E-06
Nov	1989	35.00	0.00	0	0.00	0.23	2.02	8.11	-9.90	7.95E-06
Dec	1989	35.00	0.00	0	0.00	0.56	1.1	0.00	-0.54	0.00E+00
Jan	1990	35.00	0.00	0	0.00	0.08	0.92	0.00	-0.84	0.00E+00
Feb	1990	35.00	0.00	0	0.00	0.4	1.23	0.00	-0.83	0.00E+00
Mar	1990	35.00	0.79	0.03	0.27	1.17	1.98	0.00	-0.54	0.00E+00
Apr	1990	35.00	11.03	0.42	3.78	2.31	3.3	8.11	-5.32	7.95E-06
May	1990	35.00	61.69	2.35	21.15	4.45	4.4	8.38	12.82	7.95E-06
Jun	1990	35.00	3.15	0.12	13.90	1.22	5.76	8.11	1.24	7.95E-06
Jul	1990	35.00	46.99	1.79	17.35	3.84	7.08	8.38	5.73	7.95E-06
Aug	1990	35.00	4.99	0.19	7.44	0.86	6.95	8.38	-7.03	7.95E-06
Sep	1990	35.00	35.18	1.34	12.06	2.48	5.5	8.11	0.93	7.95E-06
Oct	1990	35.00	1.84	0.07	1.56	0.89	3.74	8.38	-9.68	7.95E-06
Nov	1990	35.00	6.83	0.26	2.34	1.12	2.02	8.11	-6.67	7.95E-06
Dec	1990	35.00	0.79	0.03	0.27	0.32	1.1	0.00	-0.51	0.00E+00
Jan	1991	35.00	0.00	0	0.00	0.15	0.92	0.00	-0.77	0.00E+00
Feb	1991	35.00	0.00	0	0.00	0.9	1.23	0.00	-0.33	0.00E+00

POWERTECH (USA) INC.

1985-1999 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
Mar	1991	35.00	0.00	0	0.00	0.35	1.98	0.00	-1.63	0.00E+00
Apr	1991	35.00	4.46	0.17	1.53	1.58	3.3	8.11	-8.30	7.95E-06
May	1991	35.00	63.53	2.42	21.78	4.91	4.4	8.38	13.91	7.95E-06
Jun	1991	35.00	33.34	1.27	25.34	3.16	5.76	8.11	14.62	7.95E-06
Jul	1991	35.00	0.26	0.01	14.71	0.36	7.08	8.38	-0.39	7.95E-06
Aug	1991	35.00	13.91	0.53	4.77	1.52	6.95	8.38	-9.04	7.95E-06
Sep	1991	35.00	0.00	0	0.00	0.29	5.5	8.11	-13.32	7.95E-06
Oct	1991	35.00	4.73	0.18	1.62	0.95	3.74	8.38	-9.55	7.95E-06
Nov	1991	35.00	0.26	0.01	0.09	0.51	2.02	8.11	-9.53	7.95E-06
Dec	1991	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1992	35.00	0.00	0	0.00	0.32	0.92	0.00	-0.60	0.00E+00
Feb	1992	35.00	1.84	0.07	0.63	0.51	1.23	0.00	-0.09	0.00E+00
Mar	1992	35.00	5.78	0.22	1.98	1.07	1.98	0.00	1.07	0.00E+00
Apr	1992	35.00	0.79	0.03	1.34	0.66	3.3	8.11	-9.41	7.95E-06
May	1992	35.00	30.71	1.17	10.53	2.76	4.4	8.38	0.51	7.95E-06
Jun	1992	35.00	11.29	0.43	4.38	1.88	5.76	8.11	-7.62	7.95E-06
Jul	1992	35.00	20.21	0.77	6.93	3.92	7.08	8.38	-4.61	7.95E-06
Aug	1992	35.00	8.40	0.32	2.88	1.74	6.95	8.38	-10.71	7.95E-06
Sep	1992	35.00	0.00	0	0.00	0.08	5.5	8.11	-13.53	7.95E-06
Oct	1992	35.00	1.58	0.06	0.54	0.61	3.74	8.38	-10.97	7.95E-06
Nov	1992	35.00	0.00	0	0.00	0.2	2.02	8.11	-9.93	7.95E-06
Dec	1992	35.00	0.00	0	0.00	0.33	1.1	0.00	-0.77	0.00E+00
Jan	1993	35.00	0.00	0	0.00	0.26	0.92	0.00	-0.66	0.00E+00
Feb	1993	35.00	0.00	0	0.00	0.13	1.23	0.00	-1.10	0.00E+00
Mar	1993	35.00	7.61	0.29	2.61	3.58	1.98	0.00	4.21	0.00E+00
Apr	1993	35.00	9.19	0.35	7.36	1.71	3.3	8.11	-2.34	7.95E-06
May	1993	35.00	13.39	0.51	4.59	1.98	4.4	8.38	-6.21	7.95E-06
Jun	1993	35.00	99.75	3.8	34.20	6.14	5.76	8.11	26.47	7.95E-06
Jul	1993	35.00	22.58	0.86	34.21	2.67	7.08	8.38	21.41	7.95E-06
Aug	1993	35.00	12.60	0.48	25.73	1.82	6.95	8.38	12.22	7.95E-06
Sep	1993	35.00	2.10	0.08	12.94	1	5.5	8.11	0.33	7.95E-06
Oct	1993	35.00	12.60	0.48	4.65	1.48	3.74	8.38	-6.00	7.95E-06
Nov	1993	35.00	0.00	0	0.00	0.72	2.02	8.11	-9.41	7.95E-06
Dec	1993	35.00	0.00	0	0.00	0.82	1.1	0.00	-0.28	0.00E+00
Jan	1994	35.00	0.00	0	0.00	0.6	0.92	0.00	-0.32	0.00E+00
Feb	1994	35.00	0.00	0	0.00	0.36	1.23	0.00	-0.87	0.00E+00
Mar	1994	35.00	0.00	0	0.00	0.73	1.98	0.00	-1.25	0.00E+00
Apr	1994	35.00	9.98	0.38	3.42	1.62	3.3	8.11	-6.37	7.95E-06
May	1994	35.00	11.55	0.44	3.96	1.47	4.4	8.38	-7.35	7.95E-06
Jun	1994	35.00	6.30	0.24	2.16	1.22	5.76	8.11	-10.49	7.95E-06
Jul	1994	35.00	12.08	0.46	4.14	2.04	7.08	8.38	-9.28	7.95E-06
Aug	1994	35.00	1.05	0.04	0.36	0.45	6.95	8.38	-14.52	7.95E-06
Sep	1994	35.00	0.00	0	0.00	0.32	5.5	8.11	-13.29	7.95E-06
Oct	1994	35.00	12.86	0.49	4.41	2.19	3.74	8.38	-5.52	7.95E-06
Nov	1994	35.00	0.00	0	0.00	0.3	2.02	8.11	-9.83	7.95E-06
Dec	1994	35.00	0.00	0	0.00	0.71	1.1	0.00	-0.39	0.00E+00
Jan	1995	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1995	35.00	0.00	0	0.00	0.7	1.23	0.00	-0.53	0.00E+00
Mar	1995	35.00	0.00	0	0.00	0.63	1.98	0.00	-1.35	0.00E+00
Apr	1995	35.00	1.31	0.05	0.45	1.36	3.3	8.11	-9.60	7.95E-06
May	1995	35.00	41.48	1.58	14.22	4.42	4.4	8.38	5.86	7.95E-06
Jun	1995	35.00	24.68	0.94	14.32	3.09	5.76	8.11	3.53	7.95E-06
Jul	1995	35.00	0.79	0.03	3.80	1.07	7.08	8.38	-10.59	7.95E-06
Aug	1995	35.00	0.26	0.01	0.09	0.55	6.95	8.38	-14.69	7.95E-06
Sep	1995	35.00	49.88	1.9	17.10	3.61	5.5	8.11	7.10	7.95E-06
Oct	1995	35.00	5.51	0.21	8.99	1.43	3.74	8.38	-1.71	7.95E-06
Nov	1995	35.00	2.36	0.09	0.81	0.81	2.02	8.11	-8.51	7.95E-06
Dec	1995	35.00	0.00	0	0.00	0.13	1.1	0.00	-0.97	0.00E+00
Jan	1996	35.00	0.00	0	0.00	0.35	0.92	0.00	-0.57	0.00E+00
Feb	1996	35.00	0.00	0	0.00	0.24	1.23	0.00	-0.99	0.00E+00
Mar	1996	35.00	0.00	0	0.00	0.92	1.98	0.00	-1.06	0.00E+00
Apr	1996	35.00	28.88	1.1	9.90	3	3.3	8.11	1.49	7.95E-06
May	1996	35.00	41.48	1.58	15.71	3.69	4.4	8.38	6.61	7.95E-06
Jun	1996	35.00	9.19	0.35	9.76	1.85	5.76	8.11	-2.26	7.95E-06
Jul	1996	35.00	0.53	0.02	0.18	0.55	7.08	8.38	-14.73	7.95E-06
Aug	1996	35.00	32.81	1.25	11.25	2.72	6.95	8.38	-1.36	7.95E-06
Sep	1996	35.00	3.41	0.13	1.17	1.37	5.5	8.11	-11.07	7.95E-06
Oct	1996	35.00	7.35	0.28	2.52	1.79	3.74	8.38	-7.81	7.95E-06
Nov	1996	35.00	0.00	0	0.00	0.5	2.02	8.11	-9.63	7.95E-06
Dec	1996	35.00	0.00	0	0.00	0.62	1.1	0.00	-0.48	0.00E+00
Jan	1997	35.00	0.00	0	0.00	0.62	0.92	0.00	-0.30	0.00E+00
Feb	1997	35.00	0.00	0	0.00	0.48	1.23	0.00	-0.75	0.00E+00
Mar	1997	35.00	0.00	0	0.00	0.32	1.98	0.00	-1.66	0.00E+00
Apr	1997	35.00	15.75	0.6	5.40	2.52	3.3	8.11	-3.49	7.95E-06

POWERTECH (USA) INC.

1985-1999 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
May	1997	35.00	27.30	1.04	9.36	2.84	4.4	8.38	-0.58	7.95E-06
Jun	1997	35.00	22.84	0.87	7.83	3.17	5.76	8.11	-2.87	7.95E-06
Jul	1997	35.00	55.39	2.11	18.99	4.61	7.08	8.38	8.14	7.95E-06
Aug	1997	35.00	5.25	0.2	9.94	1.05	6.95	8.38	-4.35	7.95E-06
Sep	1997	35.00	1.84	0.07	0.63	0.73	5.5	8.11	-12.25	7.95E-06
Oct	1997	35.00	1.05	0.04	0.36	0.7	3.74	8.38	-11.06	7.95E-06
Nov	1997	35.00	2.10	0.08	0.72	0.43	2.02	8.11	-8.98	7.95E-06
Dec	1997	35.00	0.00	0	0.00	0.26	1.1	0.00	-0.84	0.00E+00
Jan	1998	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1998	35.00	2.89	0.11	0.99	0.78	1.23	0.00	0.54	0.00E+00
Mar	1998	35.00	18.90	0.72	7.02	2.02	1.98	0.00	7.06	0.00E+00
Apr	1998	35.00	0.00	0	7.06	0.27	3.3	8.11	-4.08	7.95E-06
May	1998	35.00	30.71	1.17	10.53	3.58	4.4	8.38	1.33	7.95E-06
Jun	1998	35.00	44.63	1.7	16.63	3.36	5.76	8.11	6.11	7.95E-06
Jul	1998	35.00	38.06	1.45	19.16	3.38	7.08	8.38	7.08	7.95E-06
Aug	1998	35.00	15.23	0.58	12.30	2.36	6.95	8.38	-0.67	7.95E-06
Sep	1998	35.00	32.81	1.25	11.25	2.08	5.5	8.11	-0.28	7.95E-06
Oct	1998	35.00	41.21	1.57	14.13	4.16	3.74	8.38	6.17	7.95E-06
Nov	1998	35.00	5.25	0.2	7.97	1.42	2.02	8.11	-0.75	7.95E-06
Dec	1998	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1999	35.00	0.00	0	0.00	0.55	0.92	0.00	-0.37	0.00E+00
Feb	1999	35.00	0.00	0	0.00	0.12	1.23	0.00	-1.11	0.00E+00
Mar	1999	35.00	0.00	0	0.00	0.55	1.98	0.00	-1.43	0.00E+00
Apr	1999	35.00	26.25	1	9.00	3.76	3.3	8.11	1.35	7.95E-06
May	1999	35.00	2.36	0.09	2.16	1.17	4.4	8.38	-9.46	7.95E-06
Jun	1999	35.00	71.93	2.74	24.66	5.57	5.76	8.11	16.36	7.95E-06
Jul	1999	35.00	3.15	0.12	17.44	0.98	7.08	8.38	2.95	7.95E-06
Aug	1999	35.00	31.50	1.2	13.75	1.96	6.95	8.38	0.38	7.95E-06
Sep	1999	35.00	10.24	0.39	3.89	1.79	5.5	8.11	-7.93	7.95E-06
Oct	1999	35.00	0.00	0	0.00	0.04	3.74	8.38	-12.08	7.95E-06
Nov	1999	35.00	0.79	0.03	0.27	0.56	2.02	8.11	-9.30	7.95E-06
Dec	1999	35.00	0.00	0	0.00	0.12	1.1	0.00	-0.98	0.00E+00
				4.83 (Avg. annual)		16.98 (Avg. annual)	43.98 (Avg. annual)		26.47 (Maximum value)	

Assumes seepage is 0.00 for January, February, March and December due to frozen soils.
Trial is for bare soil, 315 acres irrigated area.

Permeability value is geometric mean of three available permeability values from Burdock test pits.

POWERTECH (USA) INC.

1986-2000 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
Jan	1986	35.00	0.00	0	0.00	0.07	0.92	0.00	-0.85	0.00E+00
Feb	1986	35.00	0.00	0	0.00	1.06	1.23	0.00	-0.17	0.00E+00
Mar	1986	35.00	0.00	0	0.00	0.52	1.98	0.00	-1.46	0.00E+00
Apr	1986	35.00	32.29	1.23	11.07	3.27	3.3	8.11	2.93	7.95E-06
May	1986	35.00	8.40	0.32	5.81	1.07	4.4	8.38	-5.91	7.95E-06
Jun	1986	35.00	65.89	2.51	22.59	4.87	5.76	8.11	13.59	7.95E-06
Jul	1986	35.00	5.25	0.2	15.39	1.63	7.08	8.38	1.55	7.95E-06
Aug	1986	35.00	6.83	0.26	3.89	1.19	6.95	8.38	-10.25	7.95E-06
Sep	1986	35.00	18.11	0.69	6.21	3.52	5.5	8.11	-3.88	7.95E-06
Oct	1986	35.00	42.79	1.63	14.67	3.88	3.74	8.38	6.43	7.95E-06
Nov	1986	35.00	2.10	0.08	7.15	0.86	2.02	8.11	-2.13	7.95E-06
Dec	1986	35.00	0.00	0	0.00	0.09	1.1	0.00	-1.01	0.00E+00
Jan	1987	35.00	0.00	0	0.00	0.13	0.92	0.00	-0.79	0.00E+00
Feb	1987	35.00	0.00	0	0.00	0.87	1.23	0.00	-0.36	0.00E+00
Mar	1987	35.00	3.15	0.12	1.08	2.22	1.98	0.00	1.32	0.00E+00
Apr	1987	35.00	4.99	0.19	3.03	0.69	3.3	8.11	-7.69	7.95E-06
May	1987	35.00	23.89	0.91	8.19	2.97	4.4	8.38	-1.62	7.95E-06
Jun	1987	35.00	0.79	0.03	0.27	0.59	5.76	8.11	-13.01	7.95E-06
Jul	1987	35.00	15.75	0.6	5.40	1.71	7.08	8.38	-8.35	7.95E-06
Aug	1987	35.00	2.36	0.09	0.81	1.04	6.95	8.38	-13.48	7.95E-06
Sep	1987	35.00	1.84	0.07	0.63	0.76	5.5	8.11	-12.22	7.95E-06
Oct	1987	35.00	0.26	0.01	0.09	0.42	3.74	8.38	-11.61	7.95E-06
Nov	1987	35.00	5.51	0.21	1.89	0.71	2.02	8.11	-7.53	7.95E-06
Dec	1987	35.00	0.26	0.01	0.09	0.25	1.1	0.00	-0.76	0.00E+00
Jan	1988	35.00	0.00	0	0.00	0.63	0.92	0.00	-0.29	0.00E+00
Feb	1988	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1988	35.00	0.00	0	0.00	1.17	1.98	0.00	-0.81	0.00E+00
Apr	1988	35.00	1.58	0.06	0.54	0.63	3.3	8.11	-10.24	7.95E-06
May	1988	35.00	20.21	0.77	6.93	2.64	4.4	8.38	-3.21	7.95E-06
Jun	1988	35.00	40.43	1.54	13.86	2.78	5.76	8.11	2.77	7.95E-06
Jul	1988	35.00	23.36	0.89	10.78	2.18	7.08	8.38	-2.51	7.95E-06
Aug	1988	35.00	25.46	0.97	8.73	1.87	6.95	8.38	-4.73	7.95E-06
Sep	1988	35.00	1.05	0.04	0.36	0.84	5.5	8.11	-12.41	7.95E-06
Oct	1988	35.00	0.00	0	0.00	0.09	3.74	8.38	-12.03	7.95E-06
Nov	1988	35.00	0.26	0.01	0.09	0.52	2.02	8.11	-9.52	7.95E-06
Dec	1988	35.00	0.00	0	0.00	0.23	1.1	0.00	-0.87	0.00E+00
Jan	1989	35.00	0.00	0	0.00	0.09	0.92	0.00	-0.83	0.00E+00
Feb	1989	35.00	0.00	0	0.00	0.6	1.23	0.00	-0.63	0.00E+00
Mar	1989	35.00	0.53	0.02	0.18	1.14	1.98	0.00	-0.66	0.00E+00
Apr	1989	35.00	10.76	0.41	3.69	1.67	3.3	8.11	-6.05	7.95E-06
May	1989	35.00	3.15	0.12	1.08	1.41	4.4	8.38	-10.29	7.95E-06
Jun	1989	35.00	2.10	0.08	0.72	1.2	5.76	8.11	-11.95	7.95E-06
Jul	1989	35.00	19.16	0.73	6.57	2.21	7.08	8.38	-6.68	7.95E-06
Aug	1989	35.00	14.44	0.55	4.95	1.46	6.95	8.38	-8.92	7.95E-06
Sep	1989	35.00	55.65	2.12	19.08	3.94	5.5	8.11	9.41	7.95E-06
Oct	1989	35.00	2.89	0.11	10.40	1.07	3.74	8.38	-0.66	7.95E-06
Nov	1989	35.00	0.00	0	0.00	0.23	2.02	8.11	-9.90	7.95E-06
Dec	1989	35.00	0.00	0	0.00	0.56	1.1	0.00	-0.54	0.00E+00
Jan	1990	35.00	0.00	0	0.00	0.08	0.92	0.00	-0.84	0.00E+00
Feb	1990	35.00	0.00	0	0.00	0.4	1.23	0.00	-0.83	0.00E+00
Mar	1990	35.00	0.79	0.03	0.27	1.17	1.98	0.00	-0.54	0.00E+00
Apr	1990	35.00	11.03	0.42	3.78	2.31	3.3	8.11	-5.32	7.95E-06
May	1990	35.00	61.69	2.35	21.15	4.45	4.4	8.38	12.82	7.95E-06
Jun	1990	35.00	3.15	0.12	13.90	1.22	5.76	8.11	1.24	7.95E-06
Jul	1990	35.00	46.99	1.79	17.35	3.84	7.08	8.38	5.73	7.95E-06
Aug	1990	35.00	4.99	0.19	7.44	0.86	6.95	8.38	-7.03	7.95E-06
Sep	1990	35.00	35.18	1.34	12.06	2.48	5.5	8.11	0.93	7.95E-06
Oct	1990	35.00	1.84	0.07	1.56	0.89	3.74	8.38	-9.68	7.95E-06
Nov	1990	35.00	6.83	0.26	2.34	1.12	2.02	8.11	-6.67	7.95E-06
Dec	1990	35.00	0.79	0.03	0.27	0.32	1.1	0.00	-0.51	0.00E+00
Jan	1991	35.00	0.00	0	0.00	0.15	0.92	0.00	-0.77	0.00E+00
Feb	1991	35.00	0.00	0	0.00	0.9	1.23	0.00	-0.33	0.00E+00
Mar	1991	35.00	0.00	0	0.00	0.35	1.98	0.00	-1.63	0.00E+00
Apr	1991	35.00	4.46	0.17	1.53	1.58	3.3	8.11	-8.30	7.95E-06
May	1991	35.00	63.53	2.42	21.78	4.91	4.4	8.38	13.91	7.95E-06
Jun	1991	35.00	33.34	1.27	25.34	3.16	5.76	8.11	14.62	7.95E-06
Jul	1991	35.00	0.26	0.01	14.71	0.36	7.08	8.38	-0.39	7.95E-06
Aug	1991	35.00	13.91	0.53	4.77	1.52	6.95	8.38	-9.04	7.95E-06
Sep	1991	35.00	0.00	0	0.00	0.29	5.5	8.11	-13.32	7.95E-06
Oct	1991	35.00	4.73	0.18	1.62	0.95	3.74	8.38	-9.55	7.95E-06
Nov	1991	35.00	0.26	0.01	0.09	0.51	2.02	8.11	-9.53	7.95E-06
Dec	1991	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1992	35.00	0.00	0	0.00	0.32	0.92	0.00	-0.60	0.00E+00
Feb	1992	35.00	1.84	0.07	0.63	0.51	1.23	0.00	-0.09	0.00E+00

POWERTECH (USA) INC.

1986-2000 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
Mar	1992	35.00	5.78	0.22	1.98	1.07	1.98	0.00	1.07	0.00E+00
Apr	1992	35.00	0.79	0.03	1.34	0.66	3.3	8.11	-9.41	7.95E-06
May	1992	35.00	30.71	1.17	10.53	2.76	4.4	8.38	0.51	7.95E-06
Jun	1992	35.00	11.29	0.43	4.38	1.88	5.76	8.11	-7.62	7.95E-06
Jul	1992	35.00	20.21	0.77	6.93	3.92	7.08	8.38	-4.61	7.95E-06
Aug	1992	35.00	8.40	0.32	2.88	1.74	6.95	8.38	-10.71	7.95E-06
Sep	1992	35.00	0.00	0	0.00	0.08	5.5	8.11	-13.53	7.95E-06
Oct	1992	35.00	1.58	0.06	0.54	0.61	3.74	8.38	-10.97	7.95E-06
Nov	1992	35.00	0.00	0	0.00	0.2	2.02	8.11	-9.93	7.95E-06
Dec	1992	35.00	0.00	0	0.00	0.33	1.1	0.00	-0.77	0.00E+00
Jan	1993	35.00	0.00	0	0.00	0.26	0.92	0.00	-0.66	0.00E+00
Feb	1993	35.00	0.00	0	0.00	0.13	1.23	0.00	-1.10	0.00E+00
Mar	1993	35.00	7.61	0.29	2.61	3.58	1.98	0.00	4.21	0.00E+00
Apr	1993	35.00	9.19	0.35	7.36	1.71	3.3	8.11	-2.34	7.95E-06
May	1993	35.00	13.39	0.51	4.59	1.98	4.4	8.38	-6.21	7.95E-06
Jun	1993	35.00	99.75	3.8	34.20	6.14	5.76	8.11	26.47	7.95E-06
Jul	1993	35.00	22.58	0.86	34.21	2.67	7.08	8.38	21.41	7.95E-06
Aug	1993	35.00	12.60	0.48	25.73	1.82	6.95	8.38	12.22	7.95E-06
Sep	1993	35.00	2.10	0.08	12.94	1	5.5	8.11	0.33	7.95E-06
Oct	1993	35.00	12.60	0.48	4.65	1.48	3.74	8.38	-6.00	7.95E-06
Nov	1993	35.00	0.00	0	0.00	0.72	2.02	8.11	-9.41	7.95E-06
Dec	1993	35.00	0.00	0	0.00	0.82	1.1	0.00	-0.28	0.00E+00
Jan	1994	35.00	0.00	0	0.00	0.6	0.92	0.00	-0.32	0.00E+00
Feb	1994	35.00	0.00	0	0.00	0.36	1.23	0.00	-0.87	0.00E+00
Mar	1994	35.00	0.00	0	0.00	0.73	1.98	0.00	-1.25	0.00E+00
Apr	1994	35.00	9.98	0.38	3.42	1.62	3.3	8.11	-6.37	7.95E-06
May	1994	35.00	11.55	0.44	3.96	1.47	4.4	8.38	-7.35	7.95E-06
Jun	1994	35.00	6.30	0.24	2.16	1.22	5.76	8.11	-10.49	7.95E-06
Jul	1994	35.00	12.08	0.46	4.14	2.04	7.08	8.38	-9.28	7.95E-06
Aug	1994	35.00	1.05	0.04	0.36	0.45	6.95	8.38	-14.52	7.95E-06
Sep	1994	35.00	0.00	0	0.00	0.32	5.5	8.11	-13.29	7.95E-06
Oct	1994	35.00	12.86	0.49	4.41	2.19	3.74	8.38	-5.52	7.95E-06
Nov	1994	35.00	0.00	0	0.00	0.3	2.02	8.11	-9.83	7.95E-06
Dec	1994	35.00	0.00	0	0.00	0.71	1.1	0.00	-0.39	0.00E+00
Jan	1995	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1995	35.00	0.00	0	0.00	0.7	1.23	0.00	-0.53	0.00E+00
Mar	1995	35.00	0.00	0	0.00	0.63	1.98	0.00	-1.35	0.00E+00
Apr	1995	35.00	1.31	0.05	0.45	1.36	3.3	8.11	-9.60	7.95E-06
May	1995	35.00	41.48	1.58	14.22	4.42	4.4	8.38	5.86	7.95E-06
Jun	1995	35.00	24.68	0.94	14.32	3.09	5.76	8.11	3.53	7.95E-06
Jul	1995	35.00	0.79	0.03	3.80	1.07	7.08	8.38	-10.59	7.95E-06
Aug	1995	35.00	0.26	0.01	0.09	0.55	6.95	8.38	-14.69	7.95E-06
Sep	1995	35.00	49.88	1.9	17.10	3.61	5.5	8.11	7.10	7.95E-06
Oct	1995	35.00	5.51	0.21	8.99	1.43	3.74	8.38	-1.71	7.95E-06
Nov	1995	35.00	2.36	0.09	0.81	0.81	2.02	8.11	-8.51	7.95E-06
Dec	1995	35.00	0.00	0	0.00	0.13	1.1	0.00	-0.97	0.00E+00
Jan	1996	35.00	0.00	0	0.00	0.35	0.92	0.00	-0.57	0.00E+00
Feb	1996	35.00	0.00	0	0.00	0.24	1.23	0.00	-0.99	0.00E+00
Mar	1996	35.00	0.00	0	0.00	0.92	1.98	0.00	-1.06	0.00E+00
Apr	1996	35.00	28.88	1.1	9.90	3	3.3	8.11	1.49	7.95E-06
May	1996	35.00	41.48	1.58	15.71	3.69	4.4	8.38	6.61	7.95E-06
Jun	1996	35.00	9.19	0.35	9.76	1.85	5.76	8.11	-2.26	7.95E-06
Jul	1996	35.00	0.53	0.02	0.18	0.55	7.08	8.38	-14.73	7.95E-06
Aug	1996	35.00	32.81	1.25	11.25	2.72	6.95	8.38	-1.36	7.95E-06
Sep	1996	35.00	3.41	0.13	1.17	1.37	5.5	8.11	-11.07	7.95E-06
Oct	1996	35.00	7.35	0.28	2.52	1.79	3.74	8.38	-7.81	7.95E-06
Nov	1996	35.00	0.00	0	0.00	0.5	2.02	8.11	-9.63	7.95E-06
Dec	1996	35.00	0.00	0	0.00	0.62	1.1	0.00	-0.48	0.00E+00
Jan	1997	35.00	0.00	0	0.00	0.62	0.92	0.00	-0.30	0.00E+00
Feb	1997	35.00	0.00	0	0.00	0.48	1.23	0.00	-0.75	0.00E+00
Mar	1997	35.00	0.00	0	0.00	0.32	1.98	0.00	-1.66	0.00E+00
Apr	1997	35.00	15.75	0.6	5.40	2.52	3.3	8.11	-3.49	7.95E-06
May	1997	35.00	27.30	1.04	9.36	2.84	4.4	8.38	-0.58	7.95E-06
Jun	1997	35.00	22.84	0.87	7.83	3.17	5.76	8.11	-2.87	7.95E-06
Jul	1997	35.00	55.39	2.11	18.99	4.61	7.08	8.38	8.14	7.95E-06
Aug	1997	35.00	5.25	0.2	9.94	1.05	6.95	8.38	-4.35	7.95E-06
Sep	1997	35.00	1.84	0.07	0.63	0.73	5.5	8.11	-12.25	7.95E-06
Oct	1997	35.00	1.05	0.04	0.36	0.7	3.74	8.38	-11.06	7.95E-06
Nov	1997	35.00	2.10	0.08	0.72	0.43	2.02	8.11	-8.98	7.95E-06
Dec	1997	35.00	0.00	0	0.00	0.26	1.1	0.00	-0.84	0.00E+00
Jan	1998	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1998	35.00	2.89	0.11	0.99	0.78	1.23	0.00	0.54	0.00E+00
Mar	1998	35.00	18.90	0.72	7.02	2.02	1.98	0.00	7.06	0.00E+00
Apr	1998	35.00	0.00	0	7.06	0.27	3.3	8.11	-4.08	7.95E-06

POWERTECH (USA) INC.

1986-2000 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
May	1998	35.00	30.71	1.17	10.53	3.58	4.4	8.38	1.33	7.95E-06
Jun	1998	35.00	44.63	1.7	16.63	3.36	5.76	8.11	6.11	7.95E-06
Jul	1998	35.00	38.06	1.45	19.16	3.38	7.08	8.38	7.08	7.95E-06
Aug	1998	35.00	15.23	0.58	12.30	2.36	6.95	8.38	-0.67	7.95E-06
Sep	1998	35.00	32.81	1.25	11.25	2.08	5.5	8.11	-0.28	7.95E-06
Oct	1998	35.00	41.21	1.57	14.13	4.16	3.74	8.38	6.17	7.95E-06
Nov	1998	35.00	5.25	0.2	7.97	1.42	2.02	8.11	-0.75	7.95E-06
Dec	1998	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1999	35.00	0.00	0	0.00	0.55	0.92	0.00	-0.37	0.00E+00
Feb	1999	35.00	0.00	0	0.00	0.12	1.23	0.00	-1.11	0.00E+00
Mar	1999	35.00	0.00	0	0.00	0.55	1.98	0.00	-1.43	0.00E+00
Apr	1999	35.00	26.25	1	9.00	3.76	3.3	8.11	1.35	7.95E-06
May	1999	35.00	2.36	0.09	2.16	1.17	4.4	8.38	-9.46	7.95E-06
Jun	1999	35.00	71.93	2.74	24.66	5.57	5.76	8.11	16.36	7.95E-06
Jul	1999	35.00	3.15	0.12	17.44	0.98	7.08	8.38	2.95	7.95E-06
Aug	1999	35.00	31.50	1.2	13.75	1.96	6.95	8.38	0.38	7.95E-06
Sep	1999	35.00	10.24	0.39	3.89	1.79	5.5	8.11	-7.93	7.95E-06
Oct	1999	35.00	0.00	0	0.00	0.04	3.74	8.38	-12.08	7.95E-06
Nov	1999	35.00	0.79	0.03	0.27	0.56	2.02	8.11	-9.30	7.95E-06
Dec	1999	35.00	0.00	0	0.00	0.12	1.1	0.00	-0.98	0.00E+00
Jan	2000	35.00	0.00	0	0.00	0.16	0.92	0.00	-0.76	0.00E+00
Feb	2000	35.00	0.26	0.01	0.09	1.09	1.23	0.00	-0.05	0.00E+00
Mar	2000	35.00	8.14	0.31	2.79	1.48	1.98	0.00	2.29	0.00E+00
Apr	2000	35.00	69.56	2.65	26.14	4.74	3.3	8.11	19.47	7.95E-06
May	2000	35.00	0.53	0.02	19.65	0.78	4.4	8.38	7.64	7.95E-06
Jun	2000	35.00	0.00	0	7.64	0.43	5.76	8.11	-5.80	7.95E-06
Jul	2000	35.00	13.13	0.5	4.50	2.24	7.08	8.38	-8.72	7.95E-06
Aug	2000	35.00	1.58	0.06	0.54	0.69	6.95	8.38	-14.10	7.95E-06
Sep	2000	35.00	3.94	0.15	1.35	1.03	5.5	8.11	-11.23	7.95E-06
Oct	2000	35.00	2.89	0.11	0.99	1.08	3.74	8.38	-10.05	7.95E-06
Nov	2000	35.00	0.00	0	0.00	0.43	2.02	8.11	-9.70	7.95E-06
Dec	2000	35.00	0.00	0	0.00	0.36	1.1	0.00	-0.74	0.00E+00
				4.89 (Avg. annual)		17.06 (Avg. annual)	43.98 (Avg. annual)		26.47 (Maximum value)	

Assumes seepage is 0.00 for January, February, March and December due to frozen soils.
Trial is for bare soil, 315 acres irrigated area.

Permeability value is geometric mean of three available permeability values from Burdock test pits.

POWERTECH (USA) INC.

1988-2002 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
Jan	1988	35.00	0.00	0	0.00	0.24	0.92	0.00	-0.68	0.00E+00
Feb	1988	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1988	35.00	0.00	0	0.00	1.17	1.98	0.00	-0.81	0.00E+00
Apr	1988	35.00	1.58	0.06	0.54	0.63	3.3	8.11	-10.24	7.95E-06
May	1988	35.00	20.21	0.77	6.93	2.64	4.4	8.38	-3.21	7.95E-06
Jun	1988	35.00	40.43	1.54	13.86	2.78	5.76	8.11	2.77	7.95E-06
Jul	1988	35.00	22.05	0.84	10.33	2.18	7.08	8.38	-2.96	7.95E-06
Aug	1988	35.00	25.46	0.97	8.73	1.87	6.95	8.38	-4.73	7.95E-06
Sep	1988	35.00	1.05	0.04	0.36	0.84	5.5	8.11	-12.41	7.95E-06
Oct	1988	35.00	0.00	0	0.00	0.09	3.74	8.38	-12.03	7.95E-06
Nov	1988	35.00	0.26	0.01	0.09	0.52	2.02	8.11	-9.52	7.95E-06
Dec	1988	35.00	0.00	0	0.00	0.23	1.1	0.00	-0.87	0.00E+00
Jan	1989	35.00	0.00	0	0.00	0.09	0.92	0.00	-0.83	0.00E+00
Feb	1989	35.00	0.00	0	0.00	0.6	1.23	0.00	-0.63	0.00E+00
Mar	1989	35.00	0.53	0.02	0.18	1.14	1.98	0.00	-0.66	0.00E+00
Apr	1989	35.00	10.76	0.41	3.69	1.67	3.3	8.11	-6.05	7.95E-06
May	1989	35.00	3.15	0.12	1.08	1.41	4.4	8.38	-10.29	7.95E-06
Jun	1989	35.00	2.10	0.08	0.72	1.2	5.76	8.11	-11.95	7.95E-06
Jul	1989	35.00	19.16	0.73	6.57	2.21	7.08	8.38	-6.68	7.95E-06
Aug	1989	35.00	14.44	0.55	4.95	1.46	6.95	8.38	-8.92	7.95E-06
Sep	1989	35.00	52.24	1.99	17.91	3.94	5.5	8.11	8.24	7.95E-06
Oct	1989	35.00	2.89	0.11	9.23	1.07	3.74	8.38	-1.83	7.95E-06
Nov	1989	35.00	0.00	0	0.00	0.23	2.02	8.11	-9.90	7.95E-06
Dec	1989	35.00	0.00	0	0.00	0.56	1.1	0.00	-0.54	0.00E+00
Jan	1990	35.00	0.00	0	0.00	0.08	0.92	0.00	-0.84	0.00E+00
Feb	1990	35.00	0.00	0	0.00	0.4	1.23	0.00	-0.83	0.00E+00
Mar	1990	35.00	0.79	0.03	0.27	1.17	1.98	0.00	-0.54	0.00E+00
Apr	1990	35.00	11.03	0.42	3.78	2.31	3.3	8.11	-5.32	7.95E-06
May	1990	35.00	61.43	2.34	21.06	4.45	4.4	8.38	12.73	7.95E-06
Jun	1990	35.00	3.15	0.12	13.81	1.22	5.76	8.11	1.15	7.95E-06
Jul	1990	35.00	46.99	1.79	17.26	3.84	7.08	8.38	5.64	7.95E-06
Aug	1990	35.00	4.99	0.19	7.35	0.86	6.95	8.38	-7.12	7.95E-06
Sep	1990	35.00	35.18	1.34	12.06	2.48	5.5	8.11	0.93	7.95E-06
Oct	1990	35.00	1.84	0.07	1.56	0.89	3.74	8.38	-9.68	7.95E-06
Nov	1990	35.00	6.83	0.26	2.34	1.12	2.02	8.11	-6.67	7.95E-06
Dec	1990	35.00	0.79	0.03	0.27	0.32	1.1	0.00	-0.51	0.00E+00
Jan	1991	35.00	0.00	0	0.00	0.15	0.92	0.00	-0.77	0.00E+00
Feb	1991	35.00	0.00	0	0.00	0.9	1.23	0.00	-0.33	0.00E+00
Mar	1991	35.00	0.00	0	0.00	0.35	1.98	0.00	-1.63	0.00E+00
Apr	1991	35.00	4.46	0.17	1.53	1.58	3.3	8.11	-8.30	7.95E-06
May	1991	35.00	63.53	2.42	21.78	4.91	4.4	8.38	13.91	7.95E-06
Jun	1991	35.00	33.34	1.27	25.34	3.16	5.76	8.11	14.62	7.95E-06
Jul	1991	35.00	0.26	0.01	14.71	0.36	7.08	8.38	-0.39	7.95E-06
Aug	1991	35.00	13.91	0.53	4.77	1.52	6.95	8.38	-9.04	7.95E-06
Sep	1991	35.00	0.00	0	0.00	0.29	5.5	8.11	-13.32	7.95E-06
Oct	1991	35.00	4.73	0.18	1.62	0.95	3.74	8.38	-9.55	7.95E-06
Nov	1991	35.00	0.26	0.01	0.09	0.51	2.02	8.11	-9.53	7.95E-06
Dec	1991	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1992	35.00	0.00	0	0.00	0.32	0.92	0.00	-0.60	0.00E+00
Feb	1992	35.00	1.84	0.07	0.63	0.51	1.23	0.00	-0.09	0.00E+00
Mar	1992	35.00	5.78	0.22	1.98	1.07	1.98	0.00	1.07	0.00E+00
Apr	1992	35.00	0.79	0.03	1.34	0.66	3.3	8.11	-9.41	7.95E-06
May	1992	35.00	30.71	1.17	10.53	2.76	4.4	8.38	0.51	7.95E-06
Jun	1992	35.00	11.29	0.43	4.38	1.88	5.76	8.11	-7.62	7.95E-06
Jul	1992	35.00	20.21	0.77	6.93	3.92	7.08	8.38	-4.61	7.95E-06
Aug	1992	35.00	8.40	0.32	2.88	1.74	6.95	8.38	-10.71	7.95E-06
Sep	1992	35.00	0.00	0	0.00	0.08	5.5	8.11	-13.53	7.95E-06
Oct	1992	35.00	1.58	0.06	0.54	0.61	3.74	8.38	-10.97	7.95E-06
Nov	1992	35.00	0.00	0	0.00	0.2	2.02	8.11	-9.93	7.95E-06
Dec	1992	35.00	0.00	0	0.00	0.33	1.1	0.00	-0.77	0.00E+00
Jan	1993	35.00	0.00	0	0.00	0.26	0.92	0.00	-0.66	0.00E+00
Feb	1993	35.00	0.00	0	0.00	0.13	1.23	0.00	-1.10	0.00E+00
Mar	1993	35.00	7.61	0.29	2.61	3.58	1.98	0.00	4.21	0.00E+00
Apr	1993	35.00	9.19	0.35	7.36	1.71	3.3	8.11	-2.34	7.95E-06
May	1993	35.00	13.39	0.51	4.59	1.98	4.4	8.38	-6.21	7.95E-06
Jun	1993	35.00	99.75	3.8	34.20	6.14	5.76	8.11	26.47	7.95E-06
Jul	1993	35.00	22.58	0.86	34.21	2.67	7.08	8.38	21.41	7.95E-06
Aug	1993	35.00	12.60	0.48	25.73	1.82	6.95	8.38	12.22	7.95E-06
Sep	1993	35.00	2.10	0.08	12.94	1	5.5	8.11	0.33	7.95E-06
Oct	1993	35.00	12.60	0.48	4.65	1.48	3.74	8.38	-6.00	7.95E-06
Nov	1993	35.00	0.00	0	0.00	0.72	2.02	8.11	-9.41	7.95E-06
Dec	1993	35.00	0.00	0	0.00	0.82	1.1	0.00	-0.28	0.00E+00
Jan	1994	35.00	0.00	0	0.00	0.6	0.92	0.00	-0.32	0.00E+00
Feb	1994	35.00	0.00	0	0.00	0.36	1.23	0.00	-0.87	0.00E+00

POWERTECH (USA) INC.

1988-2002 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
Mar	1994	35.00	0.00	0	0.00	0.73	1.98	0.00	-1.25	0.00E+00
Apr	1994	35.00	9.98	0.38	3.42	1.62	3.3	8.11	-6.37	7.95E-06
May	1994	35.00	11.55	0.44	3.96	1.47	4.4	8.38	-7.35	7.95E-06
Jun	1994	35.00	6.30	0.24	2.16	1.22	5.76	8.11	-10.49	7.95E-06
Jul	1994	35.00	12.08	0.46	4.14	2.04	7.08	8.38	-9.28	7.95E-06
Aug	1994	35.00	1.05	0.04	0.36	0.45	6.95	8.38	-14.52	7.95E-06
Sep	1994	35.00	0.00	0	0.00	0.32	5.5	8.11	-13.29	7.95E-06
Oct	1994	35.00	12.86	0.49	4.41	2.19	3.74	8.38	-5.52	7.95E-06
Nov	1994	35.00	0.00	0	0.00	0.3	2.02	8.11	-9.83	7.95E-06
Dec	1994	35.00	0.00	0	0.00	0.71	1.1	0.00	-0.39	0.00E+00
Jan	1995	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1995	35.00	0.00	0	0.00	0.7	1.23	0.00	-0.53	0.00E+00
Mar	1995	35.00	0.00	0	0.00	0.63	1.98	0.00	-1.35	0.00E+00
Apr	1995	35.00	1.31	0.05	0.45	1.36	3.3	8.11	-9.60	7.95E-06
May	1995	35.00	41.48	1.58	14.22	4.42	4.4	8.38	5.86	7.95E-06
Jun	1995	35.00	24.68	0.94	14.32	3.09	5.76	8.11	3.53	7.95E-06
Jul	1995	35.00	0.79	0.03	3.80	1.07	7.08	8.38	-10.59	7.95E-06
Aug	1995	35.00	0.26	0.01	0.09	0.55	6.95	8.38	-14.69	7.95E-06
Sep	1995	35.00	49.88	1.9	17.10	3.61	5.5	8.11	7.10	7.95E-06
Oct	1995	35.00	5.51	0.21	8.99	1.43	3.74	8.38	-1.71	7.95E-06
Nov	1995	35.00	2.36	0.09	0.81	0.81	2.02	8.11	-8.51	7.95E-06
Dec	1995	35.00	0.00	0	0.00	0.13	1.1	0.00	-0.97	0.00E+00
Jan	1996	35.00	0.00	0	0.00	0.35	0.92	0.00	-0.57	0.00E+00
Feb	1996	35.00	0.00	0	0.00	0.24	1.23	0.00	-0.99	0.00E+00
Mar	1996	35.00	0.00	0	0.00	0.92	1.98	0.00	-1.06	0.00E+00
Apr	1996	35.00	28.88	1.1	9.90	3	3.3	8.11	1.49	7.95E-06
May	1996	35.00	41.48	1.58	15.71	3.69	4.4	8.38	6.61	7.95E-06
Jun	1996	35.00	9.19	0.35	9.76	1.85	5.76	8.11	-2.26	7.95E-06
Jul	1996	35.00	0.53	0.02	0.18	0.55	7.08	8.38	-14.73	7.95E-06
Aug	1996	35.00	32.81	1.25	11.25	2.72	6.95	8.38	-1.36	7.95E-06
Sep	1996	35.00	3.41	0.13	1.17	1.37	5.5	8.11	-11.07	7.95E-06
Oct	1996	35.00	7.35	0.28	2.52	1.79	3.74	8.38	-7.81	7.95E-06
Nov	1996	35.00	0.00	0	0.00	0.5	2.02	8.11	-9.63	7.95E-06
Dec	1996	35.00	0.00	0	0.00	0.62	1.1	0.00	-0.48	0.00E+00
Jan	1997	35.00	0.00	0	0.00	0.62	0.92	0.00	-0.30	0.00E+00
Feb	1997	35.00	0.00	0	0.00	0.48	1.23	0.00	-0.75	0.00E+00
Mar	1997	35.00	0.00	0	0.00	0.32	1.98	0.00	-1.66	0.00E+00
Apr	1997	35.00	15.75	0.6	5.40	2.52	3.3	8.11	-3.49	7.95E-06
May	1997	35.00	27.30	1.04	9.36	2.84	4.4	8.38	-0.58	7.95E-06
Jun	1997	35.00	22.84	0.87	7.83	3.17	5.76	8.11	-2.87	7.95E-06
Jul	1997	35.00	55.39	2.11	18.99	4.61	7.08	8.38	8.14	7.95E-06
Aug	1997	35.00	5.25	0.2	9.94	1.05	6.95	8.38	-4.35	7.95E-06
Sep	1997	35.00	1.84	0.07	0.63	0.73	5.5	8.11	-12.25	7.95E-06
Oct	1997	35.00	1.05	0.04	0.36	0.7	3.74	8.38	-11.06	7.95E-06
Nov	1997	35.00	2.10	0.08	0.72	0.43	2.02	8.11	-8.98	7.95E-06
Dec	1997	35.00	0.00	0	0.00	0.26	1.1	0.00	-0.84	0.00E+00
Jan	1998	35.00	0.00	0	0.00	0.52	0.92	0.00	-0.40	0.00E+00
Feb	1998	35.00	2.89	0.11	0.99	0.78	1.23	0.00	0.54	0.00E+00
Mar	1998	35.00	18.90	0.72	7.02	2.02	1.98	0.00	7.06	0.00E+00
Apr	1998	35.00	0.00	0	7.06	0.27	3.3	8.11	-4.08	7.95E-06
May	1998	35.00	30.71	1.17	10.53	3.58	4.4	8.38	1.33	7.95E-06
Jun	1998	35.00	44.63	1.7	16.63	3.36	5.76	8.11	6.11	7.95E-06
Jul	1998	35.00	38.06	1.45	19.16	3.38	7.08	8.38	7.08	7.95E-06
Aug	1998	35.00	15.23	0.58	12.30	2.36	6.95	8.38	-0.67	7.95E-06
Sep	1998	35.00	32.81	1.25	11.25	2.08	5.5	8.11	-0.28	7.95E-06
Oct	1998	35.00	41.21	1.57	14.13	4.16	3.74	8.38	6.17	7.95E-06
Nov	1998	35.00	5.25	0.2	7.97	1.42	2.02	8.11	-0.75	7.95E-06
Dec	1998	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1999	35.00	0.00	0	0.00	0.55	0.92	0.00	-0.37	0.00E+00
Feb	1999	35.00	0.00	0	0.00	0.12	1.23	0.00	-1.11	0.00E+00
Mar	1999	35.00	0.00	0	0.00	0.55	1.98	0.00	-1.43	0.00E+00
Apr	1999	35.00	26.25	1	9.00	3.76	3.3	8.11	1.35	7.95E-06
May	1999	35.00	2.36	0.09	2.16	1.17	4.4	8.38	-9.46	7.95E-06
Jun	1999	35.00	71.93	2.74	24.66	5.57	5.76	8.11	16.36	7.95E-06
Jul	1999	35.00	3.15	0.12	17.44	0.98	7.08	8.38	2.95	7.95E-06
Aug	1999	35.00	31.50	1.2	13.75	1.96	6.95	8.38	0.38	7.95E-06
Sep	1999	35.00	10.24	0.39	3.89	1.79	5.5	8.11	-7.93	7.95E-06
Oct	1999	35.00	0.00	0	0.00	0.04	3.74	8.38	-12.08	7.95E-06
Nov	1999	35.00	0.79	0.03	0.27	0.56	2.02	8.11	-9.30	7.95E-06
Dec	1999	35.00	0.00	0	0.00	0.12	1.1	0.00	-0.98	0.00E+00
Jan	2000	35.00	0.00	0	0.00	0.16	0.92	0.00	-0.76	0.00E+00
Feb	2000	35.00	0.26	0.01	0.09	1.09	1.23	0.00	-0.05	0.00E+00
Mar	2000	35.00	8.14	0.31	2.79	1.48	1.98	0.00	2.29	0.00E+00
Apr	2000	35.00	69.56	2.65	26.14	4.74	3.3	8.11	19.47	7.95E-06

POWERTECH (USA) INC.

1988-2002 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
May	2000	35.00	0.53	0.02	19.65	0.78	4.4	8.38	7.64	7.95E-06
Jun	2000	35.00	0.00	0	7.64	0.43	5.76	8.11	-5.80	7.95E-06
Jul	2000	35.00	13.13	0.5	4.50	2.24	7.08	8.38	-8.72	7.95E-06
Aug	2000	35.00	1.58	0.06	0.54	0.69	6.95	8.38	-14.10	7.95E-06
Sep	2000	35.00	3.94	0.15	1.35	1.03	5.5	8.11	-11.23	7.95E-06
Oct	2000	35.00	2.89	0.11	0.99	1.08	3.74	8.38	-10.05	7.95E-06
Nov	2000	35.00	0.00	0	0.00	0.43	2.02	8.11	-9.70	7.95E-06
Dec	2000	35.00	0.00	0	0.00	0.36	1.1	0.00	-0.74	0.00E+00
Jan	2001	35.00	0.00	0	0.00	0.06	0.92	0.00	-0.86	0.00E+00
Feb	2001	35.00	0.00	0	0.00	0.58	1.23	0.00	-0.65	0.00E+00
Mar	2001	35.00	0.00	0	0.00	0.95	1.98	0.00	-1.03	0.00E+00
Apr	2001	35.00	19.69	0.75	6.75	2.46	3.3	8.11	-2.20	7.95E-06
May	2001	35.00	10.76	0.41	3.69	1.67	4.4	8.38	-7.42	7.95E-06
Jun	2001	35.00	31.24	1.19	10.71	3.22	5.76	8.11	0.06	7.95E-06
Jul	2001	35.00	82.95	3.16	28.50	4.96	7.08	8.38	17.99	7.95E-06
Aug	2001	35.00	6.83	0.26	20.33	1.26	6.95	8.38	6.26	7.95E-06
Sep	2001	35.00	0.00	0	6.26	0.33	5.5	8.11	-7.02	7.95E-06
Oct	2001	35.00	6.30	0.24	2.16	1.18	3.74	8.38	-8.78	7.95E-06
Nov	2001	35.00	5.78	0.22	1.98	1.3	2.02	8.11	-6.85	7.95E-06
Dec	2001	35.00	0.00	0	0.00	0.13	1.1	0.00	-0.97	0.00E+00
Jan	2002	35.00	0.00	0	0.00	0.04	0.92	0.00	-0.88	0.00E+00
Feb	2002	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	2002	35.00	0.00	0	0.00	1.44	1.98	0.00	-0.54	0.00E+00
Apr	2002	35.00	4.99	0.19	1.71	1.69	3.3	8.11	-8.01	7.95E-06
May	2002	35.00	6.04	0.23	2.07	1.68	4.4	8.38	-9.03	7.95E-06
Jun	2002	35.00	6.04	0.23	2.07	1.23	5.76	8.11	-10.57	7.95E-06
Jul	2002	35.00	1.58	0.06	0.54	0.74	7.08	8.38	-14.18	7.95E-06
Aug	2002	35.00	30.98	1.18	10.62	2.38	6.95	8.38	-2.33	7.95E-06
Sep	2002	35.00	16.80	0.64	5.76	2.47	5.5	8.11	-5.38	7.95E-06
Oct	2002	35.00	2.63	0.1	0.90	0.82	3.74	8.38	-10.40	7.95E-06
Nov	2002	35.00	0.26	0.01	0.09	0.33	2.02	8.11	-9.71	7.95E-06
Dec	2002	35.00	0.00	0	0.00	0.08	1.1	0.00	-1.02	0.00E+00
				4.86 (Avg. annual)		16.82 (Avg. annual)	43.98 (Avg. annual)		26.47 (Maximum value)	

Assumes seepage is 0.00 for January, February, March and December due to frozen soils.
Trial is for bare soil, 315 acres irrigated area.

Permeability value is geometric mean of three available permeability values from Burdock test pits.

POWERTECH (USA) INC.

2002-1988 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
Jan	2002	35.00	0.00	0	0.00	0.04	0.92	0.00	-0.88	0.00E+00
Feb	2002	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	2002	35.00	0.00	0	0.00	1.44	1.98	0.00	-0.54	0.00E+00
Apr	2002	35.00	4.99	0.19	1.71	1.69	3.3	8.11	-8.01	7.95E-06
May	2002	35.00	6.04	0.23	2.07	1.68	4.4	8.38	-9.03	7.95E-06
Jun	2002	35.00	6.04	0.23	2.07	1.23	5.76	8.11	-10.57	7.95E-06
Jul	2002	35.00	1.58	0.06	0.54	0.74	7.08	8.38	-14.18	7.95E-06
Aug	2002	35.00	30.98	1.18	10.62	2.38	6.95	8.38	-2.33	7.95E-06
Sep	2002	35.00	16.80	0.64	5.76	2.47	5.5	8.11	-5.38	7.95E-06
Oct	2002	35.00	2.63	0.1	0.90	0.82	3.74	8.38	-10.40	7.95E-06
Nov	2002	35.00	0.26	0.01	0.09	0.33	2.02	8.11	-9.71	7.95E-06
Dec	2002	35.00	0.00	0	0.00	0.08	1.1	0.00	-1.02	0.00E+00
Jan	2003	35.00	0.00	0	0.00	0.47	0.92	0.00	-0.45	0.00E+00
Feb	2003	35.00	0.00	0	0.00	0.43	1.23	0.00	-0.80	0.00E+00
Mar	2003	35.00	6.83	0.26	2.34	1.92	1.98	0.00	2.28	0.00E+00
Apr	2003	35.00	15.49	0.59	7.59	1.96	3.3	8.11	-1.86	7.95E-06
May	2003	35.00	12.34	0.47	4.23	1.95	4.4	8.38	-6.60	7.95E-06
Jun	2003	35.00	11.03	0.42	3.78	2.8	5.76	8.11	-7.29	7.95E-06
Jul	2003	35.00	0.00	0	0.00	0.05	7.08	8.38	-15.41	7.95E-06
Aug	2003	35.00	21.26	0.81	7.29	1.89	6.95	8.38	-6.15	7.95E-06
Sep	2003	35.00	10.76	0.41	3.69	1.58	5.5	8.11	-8.34	7.95E-06
Oct	2003	35.00	0.53	0.02	0.18	0.6	3.74	8.38	-11.34	7.95E-06
Nov	2003	35.00	0.26	0.01	0.09	0.44	2.02	8.11	-9.60	7.95E-06
Dec	2003	35.00	2.10	0.08	0.72	0.6	1.1	0.00	0.22	0.00E+00
Jan	2004	35.00	0.00	0	0.22	0.3	0.92	0.00	-0.40	0.00E+00
Feb	2004	35.00	0.00	0	0.00	1.3	1.23	0.00	0.07	0.00E+00
Mar	2004	35.00	0.00	0	0.07	0.06	1.98	0.00	-1.85	0.00E+00
Apr	2004	35.00	0.00	0	0.00	0.32	3.3	8.11	-11.09	7.95E-06
May	2004	35.00	1.31	0.05	0.45	0.97	4.4	8.38	-11.36	7.95E-06
Jun	2004	35.00	1.05	0.04	0.36	1.26	5.76	8.11	-12.25	7.95E-06
Jul	2004	35.00	9.45	0.36	3.24	2.21	7.08	8.38	-10.01	7.95E-06
Aug	2004	35.00	1.58	0.06	0.54	0.98	6.95	8.38	-13.81	7.95E-06
Sep	2004	35.00	18.38	0.7	6.30	2.61	5.5	8.11	-4.70	7.95E-06
Oct	2004	35.00	18.11	0.69	6.21	1.89	3.74	8.38	-4.02	7.95E-06
Nov	2004	35.00	0.00	0	0.00	0.2	2.02	8.11	-9.93	7.95E-06
Dec	2004	35.00	0.00	0	0.00	0.08	1.1	0.00	-1.02	0.00E+00
Jan	2005	35.00	0.00	0	0.00	0.47	0.92	0.00	-0.45	0.00E+00
Feb	2005	35.00	0.00	0	0.00	0.1	1.23	0.00	-1.13	0.00E+00
Mar	2005	35.00	13.13	0.5	4.50	1.68	1.98	0.00	4.20	0.00E+00
Apr	2005	35.00	27.56	1.05	13.65	2.73	3.3	8.11	4.97	7.95E-06
May	2005	35.00	16.28	0.62	10.55	2.66	4.4	8.38	0.42	7.95E-06
Jun	2005	35.00	109.46	4.17	37.95	6.24	5.76	8.11	30.32	7.95E-06
Jul	2005	35.00	23.63	0.9	38.42	2.07	7.08	8.38	25.03	7.95E-06
Aug	2005	35.00	13.91	0.53	29.80	1.91	6.95	8.38	16.37	7.95E-06
Sep	2005	35.00	0.00	0	16.37	0.37	5.5	8.11	3.13	7.95E-06
Oct	2005	35.00	13.65	0.52	7.81	1.49	3.74	8.38	-2.82	7.95E-06
Nov	2005	35.00	0.00	0	0.00	0.04	2.02	8.11	-10.09	7.95E-06
Dec	2005	35.00	0.00	0	0.00	0.4	1.1	0.00	-0.70	0.00E+00
Jan	2006	35.00	0.00	0	0.00	0.26	0.92	0.00	-0.66	0.00E+00
Feb	2006	35.00	0.00	0	0.00	0.51	1.23	0.00	-0.72	0.00E+00
Mar	2006	35.00	0.00	0	0.00	0.93	1.98	0.00	-1.05	0.00E+00
Apr	2006	35.00	6.04	0.23	2.07	1.35	3.3	8.11	-7.99	7.95E-06
May	2006	35.00	18.11	0.69	6.21	2.11	4.4	8.38	-4.46	7.95E-06
Jun	2006	35.00	6.30	0.24	2.16	1.35	5.76	8.11	-10.36	7.95E-06
Jul	2006	35.00	45.15	1.72	15.48	3.15	7.08	8.38	3.17	7.95E-06
Aug	2006	35.00	5.25	0.2	4.97	1.34	6.95	8.38	-9.03	7.95E-06
Sep	2006	35.00	4.73	0.18	1.62	0.91	5.5	8.11	-11.08	7.95E-06
Oct	2006	35.00	1.58	0.06	0.54	0.69	3.74	8.38	-10.89	7.95E-06
Nov	2006	35.00	0.00	0	0.00	0.26	2.02	8.11	-9.87	7.95E-06
Dec	2006	35.00	0.00	0	0.00	0.36	1.1	0.00	-0.74	0.00E+00
Jan	2007	35.00	0.00	0	0.00	0.14	0.92	0.00	-0.78	0.00E+00
Feb	2007	35.00	0.00	0	0.00	0.44	1.23	0.00	-0.79	0.00E+00
Mar	2007	35.00	26.25	1	9.00	1.74	1.98	0.00	8.76	0.00E+00
Apr	2007	35.00	2.89	0.11	9.75	1.09	3.3	8.11	-0.57	7.95E-06
May	2007	35.00	16.01	0.61	5.49	1.72	4.4	8.38	-5.57	7.95E-06
Jun	2007	35.00	1.31	0.05	0.45	0.67	5.76	8.11	-12.75	7.95E-06
Jul	2007	35.00	46.20	1.76	15.84	3.5	7.08	8.38	3.88	7.95E-06
Aug	2007	35.00	9.45	0.36	7.12	2.05	6.95	8.38	-6.17	7.95E-06
Sep	2007	35.00	1.31	0.05	0.45	0.83	5.5	8.11	-12.33	7.95E-06
Oct	2007	35.00	13.13	0.5	4.50	1.72	3.74	8.38	-5.90	7.95E-06
Nov	2007	35.00	0.00	0	0.00	0.06	2.02	8.11	-10.07	7.95E-06
Dec	2007	35.00	0.00	0	0.00	0.37	1.1	0.00	-0.73	0.00E+00
Jan	1980	35.00	0.00	0	0.00	0.59	0.92	0.00	-0.33	0.00E+00
Feb	1980	35.00	0.00	0	0.00	0.77	1.23	0.00	-0.46	0.00E+00

POWERTECH (USA) INC.

2002-1988 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
Mar	1980	35.00	18.38	0.7	6.30	2.82	1.98	0.00	7.14	0.00E+00
Apr	1980	35.00	22.31	0.85	14.79	1.72	3.3	8.11	5.10	7.95E-06
May	1980	35.00	36.75	1.4	17.70	3.33	4.4	8.38	8.24	7.95E-06
Jun	1980	35.00	23.89	0.91	16.43	1.99	5.76	8.11	4.55	7.95E-06
Jul	1980	35.00	3.15	0.12	5.63	0.97	7.08	8.38	-8.86	7.95E-06
Aug	1980	35.00	14.96	0.57	5.13	1.85	6.95	8.38	-8.35	7.95E-06
Sep	1980	35.00	0.26	0.01	0.09	0.39	5.5	8.11	-13.13	7.95E-06
Oct	1980	35.00	5.78	0.22	1.98	1.01	3.74	8.38	-9.13	7.95E-06
Nov	1980	35.00	3.68	0.14	1.26	0.62	2.02	8.11	-8.25	7.95E-06
Dec	1980	35.00	0.00	0	0.00	0.68	1.1	0.00	-0.42	0.00E+00
Jan	1981	35.00	0.00	0	0.00	0.08	0.92	0.00	-0.84	0.00E+00
Feb	1981	35.00	0.00	0	0.00	0.27	1.23	0.00	-0.96	0.00E+00
Mar	1981	35.00	5.78	0.22	1.98	0.66	1.98	0.00	0.66	0.00E+00
Apr	1981	35.00	1.31	0.05	1.11	0.74	3.3	8.11	-9.56	7.95E-06
May	1981	35.00	27.30	1.04	9.36	3.22	4.4	8.38	-0.20	7.95E-06
Jun	1981	35.00	14.96	0.57	5.13	1.73	5.76	8.11	-7.01	7.95E-06
Jul	1981	35.00	22.84	0.87	7.83	2.54	7.08	8.38	-5.09	7.95E-06
Aug	1981	35.00	3.41	0.13	1.17	1	6.95	8.38	-13.16	7.95E-06
Sep	1981	35.00	0.00	0	0.00	0.16	5.5	8.11	-13.45	7.95E-06
Oct	1981	35.00	34.65	1.32	11.88	2.92	3.74	8.38	2.68	7.95E-06
Nov	1981	35.00	0.00	0	2.68	0.04	2.02	8.11	-7.42	7.95E-06
Dec	1982	35.00	0.00	0	0.00	0.1	1.1	0.00	-1.00	0.00E+00
Jan	1982	35.00	0.00	0	0.00	0.18	0.92	0.00	-0.74	0.00E+00
Feb	1982	35.00	0.00	0	0.00	0.05	1.23	0.00	-1.18	0.00E+00
Mar	1982	35.00	0.00	0	0.00	1.34	1.98	0.00	-0.64	0.00E+00
Apr	1982	35.00	2.36	0.09	0.81	1	3.3	8.11	-9.60	7.95E-06
May	1982	35.00	50.14	1.91	17.19	4.18	4.4	8.38	8.59	7.95E-06
Jun	1982	35.00	56.70	2.16	28.03	4.45	5.76	8.11	18.60	7.95E-06
Jul	1982	35.00	11.81	0.45	22.65	2.2	7.08	8.38	9.39	7.95E-06
Aug	1982	35.00	25.46	0.97	18.12	3.29	6.95	8.38	6.08	7.95E-06
Sep	1982	35.00	12.08	0.46	10.22	2.42	5.5	8.11	-0.98	7.95E-06
Oct	1982	35.00	7.09	0.27	2.43	1.27	3.74	8.38	-8.42	7.95E-06
Nov	1982	35.00	12.60	0.48	4.32	1.3	2.02	8.11	-4.51	7.95E-06
Dec	1982	35.00	0.00	0	0.00	0.2	1.1	0.00	-0.90	0.00E+00
Jan	1983	35.00	0.00	0	0.00	0.22	0.92	0.00	-0.70	0.00E+00
Feb	1983	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1983	35.00	4.46	0.17	1.53	0.89	1.98	0.00	0.44	0.00E+00
Apr	1983	35.00	1.05	0.04	0.80	0.75	3.3	8.11	-9.86	7.95E-06
May	1983	35.00	11.29	0.43	3.87	1.95	4.4	8.38	-6.96	7.95E-06
Jun	1983	35.00	48.56	1.85	16.65	4.25	5.76	8.11	7.03	7.95E-06
Jul	1983	35.00	6.30	0.24	9.19	1.05	7.08	8.38	-5.23	7.95E-06
Aug	1983	35.00	33.86	1.29	11.61	3.31	6.95	8.38	-0.41	7.95E-06
Sep	1983	35.00	0.26	0.01	0.09	0.28	5.5	8.11	-13.24	7.95E-06
Oct	1983	35.00	4.46	0.17	1.53	1.6	3.74	8.38	-8.99	7.95E-06
Nov	1983	35.00	12.60	0.48	4.32	1.6	2.02	8.11	-4.21	7.95E-06
Dec	1983	35.00	0.00	0	0.00	0.05	1.1	0.00	-1.05	0.00E+00
Jan	1984	35.00	0.00	0	0.00	1.37	0.92	0.00	0.45	0.00E+00
Feb	1984	35.00	0.00	0	0.45	0.28	1.23	0.00	-0.50	0.00E+00
Mar	1984	35.00	0.26	0.01	0.09	0.8	1.98	0.00	-1.09	0.00E+00
Apr	1984	35.00	28.09	1.07	9.63	3.59	3.3	8.11	1.81	7.95E-06
May	1984	35.00	35.96	1.37	14.14	2.93	4.4	8.38	4.28	7.95E-06
Jun	1984	35.00	5.78	0.22	6.26	1.91	5.76	8.11	-5.70	7.95E-06
Jul	1984	35.00	9.71	0.37	3.33	2.38	7.08	8.38	-9.75	7.95E-06
Aug	1984	35.00	8.66	0.33	2.97	1.68	6.95	8.38	-10.68	7.95E-06
Sep	1984	35.00	0.00	0	0.00	0.4	5.5	8.11	-13.21	7.95E-06
Oct	1984	35.00	0.53	0.02	0.18	0.63	3.74	8.38	-11.31	7.95E-06
Nov	1984	35.00	4.46	0.17	1.53	0.57	2.02	8.11	-8.03	7.95E-06
Dec	1984	35.00	0.00	0	0.00	0.35	1.1	0.00	-0.75	0.00E+00
Jan	1985	35.00	0.00	0	0.00	0.17	0.92	0.00	-0.75	0.00E+00
Feb	1985	35.00	0.00	0	0.00	0.57	1.23	0.00	-0.66	0.00E+00
Mar	1985	35.00	0.00	0	0.00	0.77	1.98	0.00	-1.21	0.00E+00
Apr	1985	35.00	47.51	1.81	16.29	3.15	3.3	8.11	8.03	7.95E-06
May	1985	35.00	2.63	0.1	8.93	1.05	4.4	8.38	-2.81	7.95E-06
Jun	1985	35.00	1.58	0.06	0.54	1.03	5.76	8.11	-12.30	7.95E-06
Jul	1985	35.00	2.36	0.09	0.81	1.2	7.08	8.38	-13.45	7.95E-06
Aug	1985	35.00	0.00	0	0.00	0.5	6.95	8.38	-14.83	7.95E-06
Sep	1985	35.00	12.34	0.47	4.23	1.99	5.5	8.11	-7.39	7.95E-06
Oct	1985	35.00	1.05	0.04	0.36	0.68	3.74	8.38	-11.08	7.95E-06
Nov	1985	35.00	0.00	0	0.00	0.22	2.02	8.11	-9.91	7.95E-06
Dec	1985	35.00	0.00	0	0.00	0.41	1.1	0.00	-0.69	0.00E+00
Jan	1986	35.00	0.00	0	0.00	1.63	0.92	0.00	0.71	0.00E+00
Feb	1986	35.00	0.00	0	0.71	1.06	1.23	0.00	0.54	0.00E+00
Mar	1986	35.00	0.00	0	0.54	0.52	1.98	0.00	-0.92	0.00E+00
Apr	1986	35.00	32.29	1.23	11.07	3.27	3.3	8.11	2.93	7.95E-06

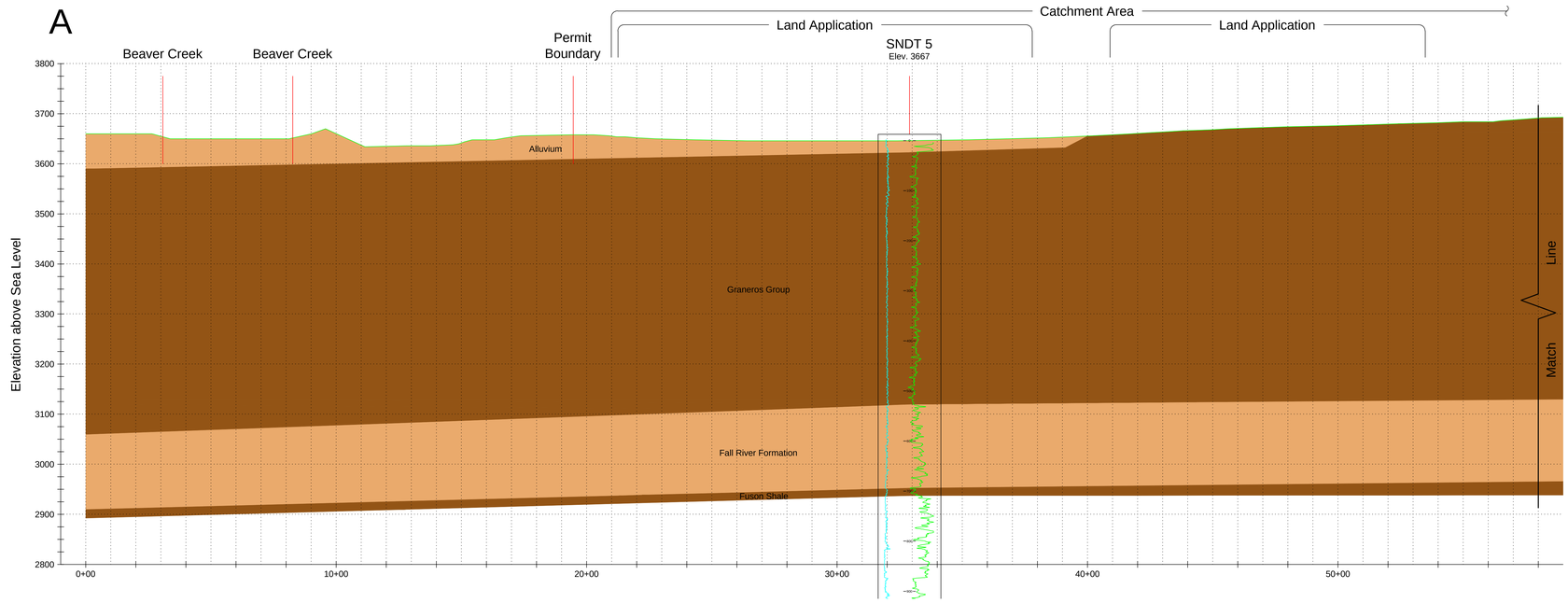
POWERTECH (USA) INC.

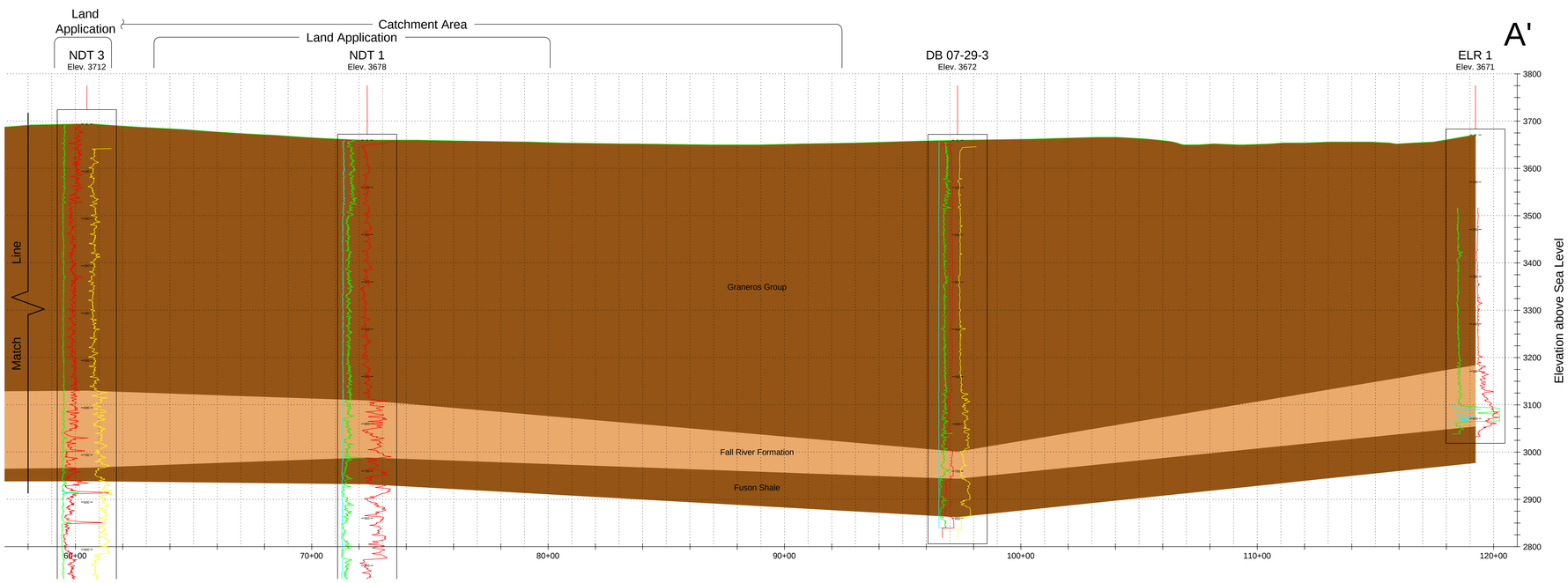
2002-1988 Estimated Monthly Water Balance for Evap Pond -- Burdock Site (XB Run)

		Assumed Pond Area (ac)	Mon. Runoff Vol (ac-ft)	Mon. Runoff (in)	Beg. Mon. Pond Depth (in/mo)	Mon. Precip (in/mo)	Mo. PET (in/mo)	Mo. Seepage (in/mo)	End Mon. Pond Depth (in/mo)	Burdock Perm. (cm/sec)
May	1986	35.00	8.40	0.32	5.81	1.07	4.4	8.38	-5.91	7.95E-06
Jun	1986	35.00	68.51	2.61	23.49	4.87	5.76	8.11	14.49	7.95E-06
Jul	1986	35.00	5.25	0.2	16.29	1.63	7.08	8.38	2.45	7.95E-06
Aug	1986	35.00	6.83	0.26	4.79	1.19	6.95	8.38	-9.35	7.95E-06
Sep	1986	35.00	18.11	0.69	6.21	3.52	5.5	8.11	-3.88	7.95E-06
Oct	1986	35.00	50.93	1.94	17.46	3.88	3.74	8.38	9.22	7.95E-06
Nov	1986	35.00	2.10	0.08	9.94	0.86	2.02	8.11	0.66	7.95E-06
Dec	1986	35.00	0.00	0	0.66	0.09	1.1	0.00	-0.35	0.00E+00
Jan	1987	35.00	0.00	0	0.00	0.13	0.92	0.00	-0.79	0.00E+00
Feb	1987	35.00	0.00	0	0.00	0.87	1.23	0.00	-0.36	0.00E+00
Mar	1987	35.00	3.15	0.12	1.08	2.22	1.98	0.00	1.32	0.00E+00
Apr	1987	35.00	4.99	0.19	3.03	0.69	3.3	8.11	-7.69	7.95E-06
May	1987	35.00	25.20	0.96	8.64	2.97	4.4	8.38	-1.17	7.95E-06
Jun	1987	35.00	0.79	0.03	0.27	0.59	5.76	8.11	-13.01	7.95E-06
Jul	1987	35.00	15.75	0.6	5.40	1.71	7.08	8.38	-8.35	7.95E-06
Aug	1987	35.00	2.36	0.09	0.81	1.04	6.95	8.38	-13.48	7.95E-06
Sep	1987	35.00	1.84	0.07	0.63	0.76	5.5	8.11	-12.22	7.95E-06
Oct	1987	35.00	0.26	0.01	0.09	0.42	3.74	8.38	-11.61	7.95E-06
Nov	1987	35.00	5.51	0.21	1.89	0.71	2.02	8.11	-7.53	7.95E-06
Dec	1987	35.00	0.26	0.01	0.09	0.25	1.1	0.00	-0.76	0.00E+00
Jan	1988	35.00	0.00	0	0.00	0.63	0.92	0.00	-0.29	0.00E+00
Feb	1988	35.00	0.00	0	0.00	0.21	1.23	0.00	-1.02	0.00E+00
Mar	1988	35.00	0.00	0	0.00	1.17	1.98	0.00	-0.81	0.00E+00
Apr	1988	35.00	1.58	0.06	0.54	0.63	3.3	8.11	-10.24	7.95E-06
May	1988	35.00	20.21	0.77	6.93	2.64	4.4	8.38	-3.21	7.95E-06
Jun	1988	35.00	40.43	1.54	13.86	2.78	5.76	8.11	2.77	7.95E-06
Jul	1988	35.00	23.36	0.89	10.78	2.18	7.08	8.38	-2.51	7.95E-06
Aug	1988	35.00	25.46	0.97	8.73	1.87	6.95	8.38	-4.73	7.95E-06
Sep	1988	35.00	1.05	0.04	0.36	0.84	5.5	8.11	-12.41	7.95E-06
Oct	1988	35.00	0.00	0	0.00	0.09	3.74	8.38	-12.03	7.95E-06
Nov	1988	35.00	0.26	0.01	0.09	0.52	2.02	8.11	-9.52	7.95E-06
Dec	1988	35.00	0.00	0	0.00	0.23	1.1	0.00	-0.87	0.00E+00
				4.29 (Avg. annual)		15.62 (Avg. annual)	43.98 (Avg. annual)		30.32 (Maximum value)	

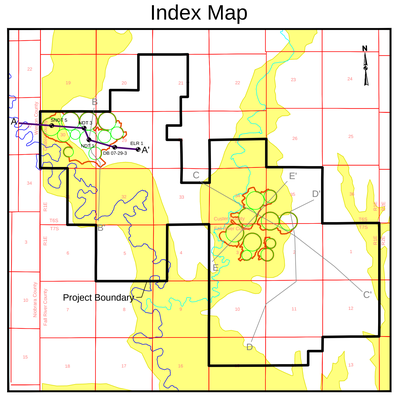
Assumes seepage is 0.00 for January, February, March and December due to frozen soils.
Trial is for bare soil, 315 acres irrigated area.

Permeability value is geometric mean of three available permeability values from Burdock test pits.





Index Map



Cross Section Legend

- Confining Clays and Shale
- Sand

Index Map Legend

- Project Boundary
- Land Application
- Alluvium
- Perennial Streams
- Ephemeral Streams
- Catchment Areas

Horizontal Scale

Feet: 0, 100, 200, 400, 600, 800

Meters: 0, 50, 100, 200

Vertical Scale

Feet: 0, 50, 100, 200, 300, 400

Meters: 0, 25, 50, 100

CONSULTANT

REVISIONS

#	DRAWN	CHECKED	APPROVED	DATE

REF 866

CHECK SCALES

If this bar does not measure 1 inch this map is not at its original scale

PLOT DATE 14-Jun-2012 DATE 14-Jun-2012

DRAWN Hetrick, Lichnovsky PDF FILE Plate 3.6-5_SectionA-A.pdf COORD NAD 27, South Dakota State Plane South (feet)

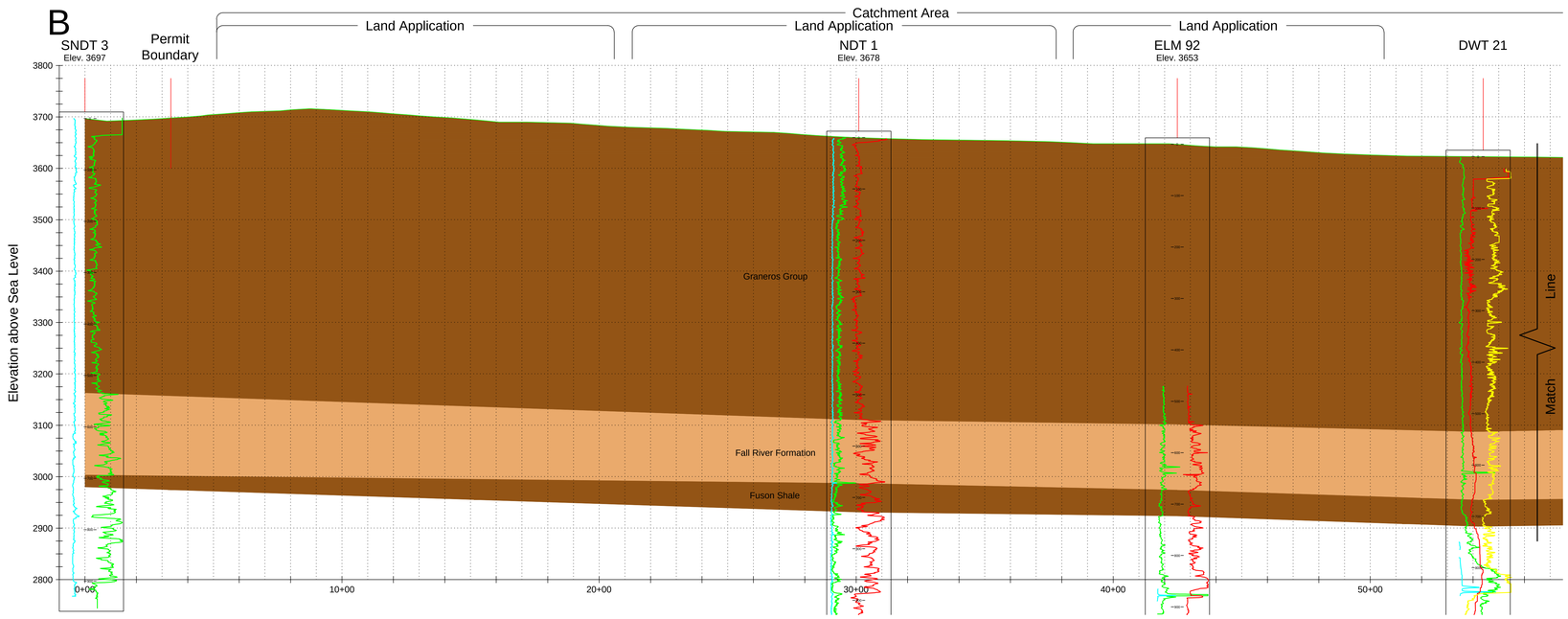
CHECKED J. Bonner, J. Mays CAD FILE p:\dewey-burdock\submittals\groundwater discharge permit\finals\plates\sectiona-a.dwg

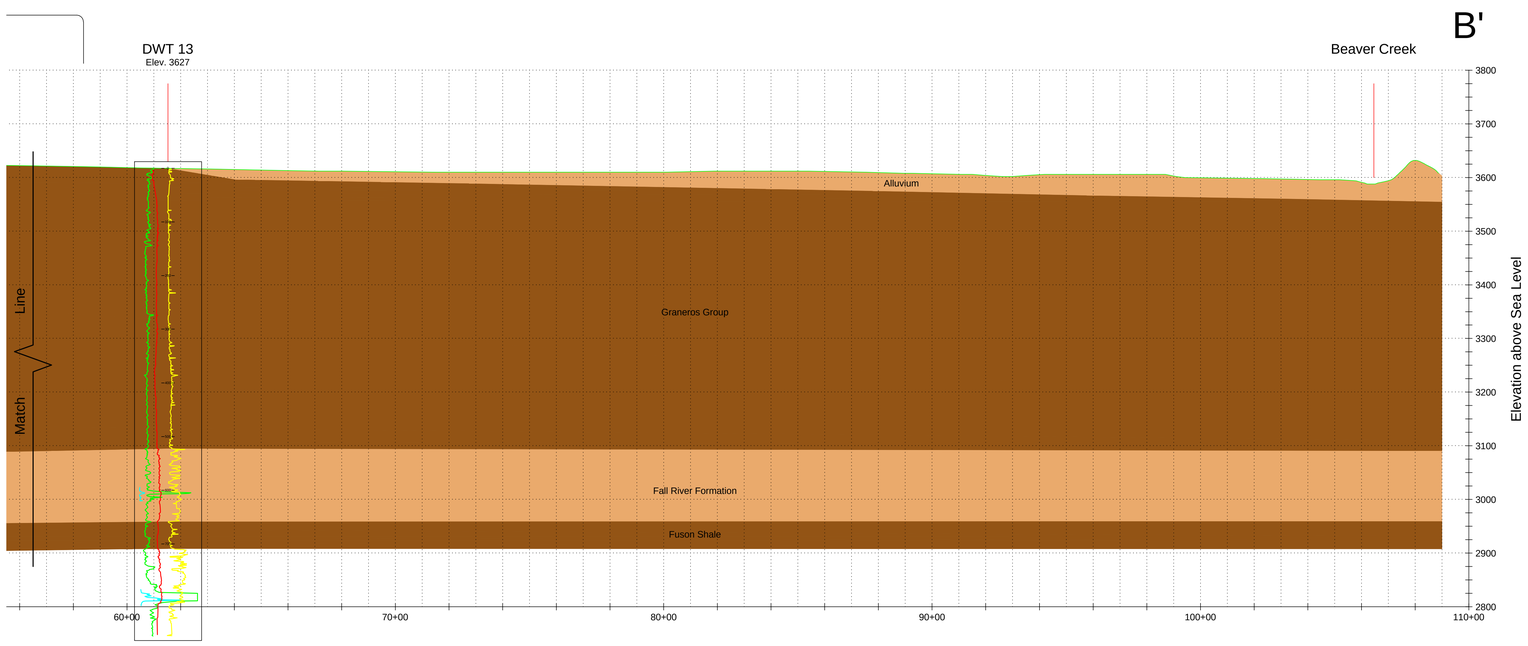
POWERTECH (USA) INC.

Plate 3.6-5

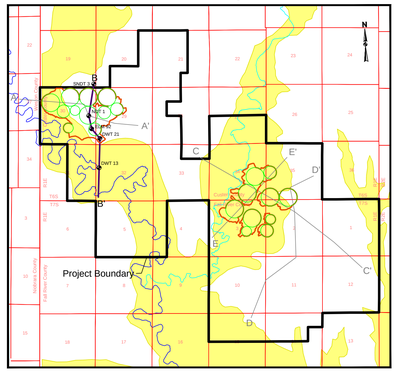
Cross Section A - A'

Dewey-Burdock Project





Index Map



Cross Section Legend

- Confining Clays and Shale
- Sand

Index Map Legend

- Project Boundary
- Land Application
- Alluvium
- Perennial Streams
- Ephemeral Streams
- Catchment Areas

Horizontal Scale

Feet: 0 100 200 400 600 800

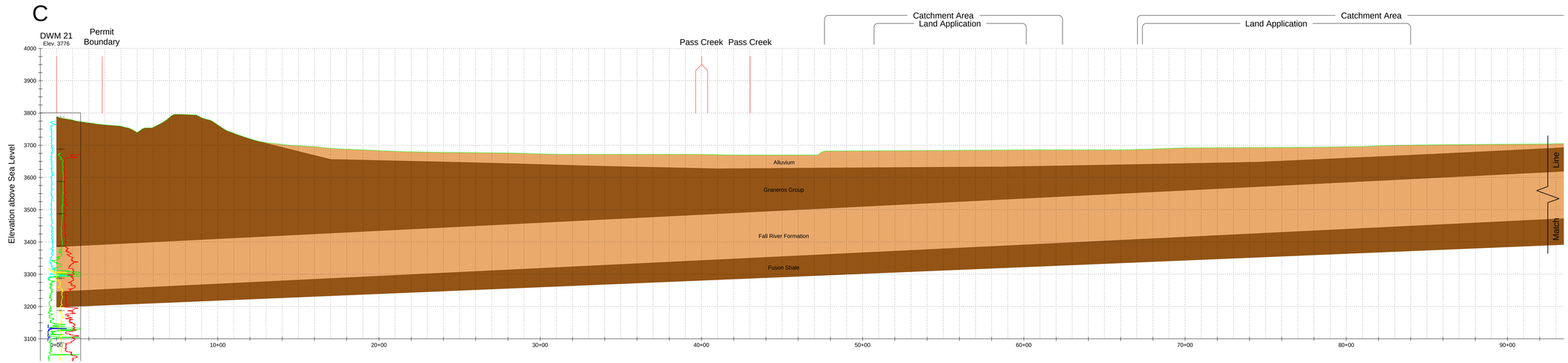
Meters: 0 50 100 200

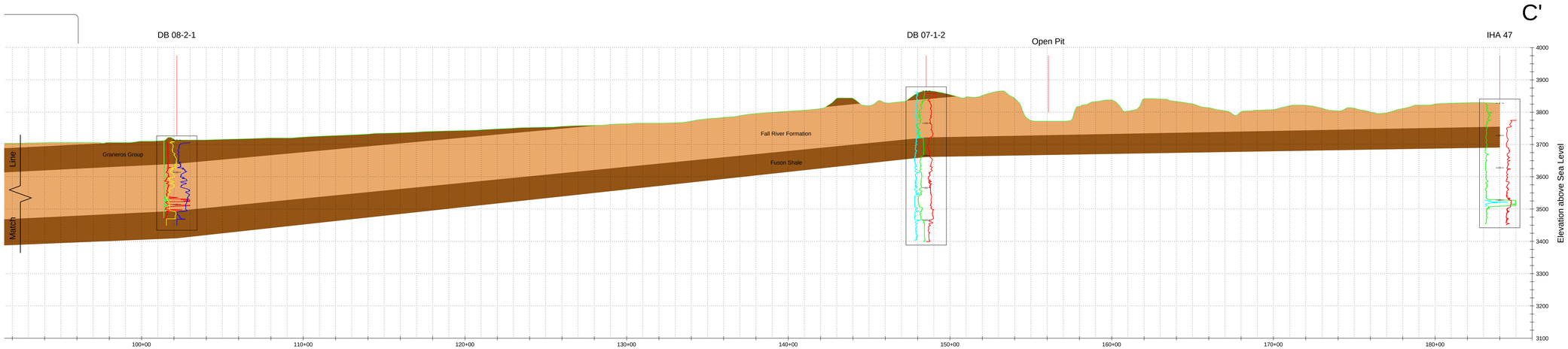
Vertical Scale

Feet: 0 50 100 200 300 400

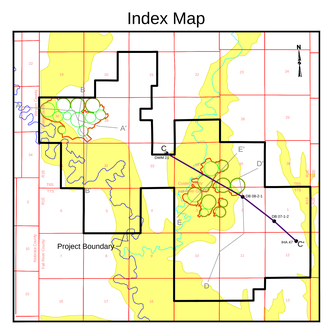
Meters: 0 25 50 100

CONSULTANT	REVISIONS # / DRAWN / CHECKED / APPROVED / DATE				POWERTECH (USA) INC.
REF 867					Plate 3.6-6
CHECK SCALES					Cross Section B - B'
If this bar does not measure 1 inch this map is not at its original scale	PLOT DATE 14-Jun-2012	DATE 14-Jun-2012			Dewey-Burdock Project
	DRAWN Hetrick, Lichnovsky	PDF FILE Plate 3.6-6_SectionB-B.pdf		COORD NAD 27, South Dakota State Plane South (feet)	
ANSI E 36" x 48"	CHECKED J. Bonner, J. Mays	CAD FILE p:\dewey-burdock\submittals\groundwater discharge permit\final\plates\sectionb-b.dwg			





Index Map



Cross Section Legend

- Confining Clays and Shale
- Sand

Index Map Legend

- Project Boundary
- Land Application
- Alluvium
- Perennial Streams
- Ephemeral Streams
- Catchment Areas

Horizontal Scale

Feet: 0, 100, 200, 400, 600, 800

Meters: 0, 50, 100, 200

Vertical Scale

Feet: 0, 50, 100, 200, 300, 400

Meters: 0, 25, 50, 100

DRAWN	CHECKED	APPROVED	DATE		
14-Jun-2012			14-Jun-2012		
Hetrick, Lichnovsky					
J. Bonner, J. Mays					

REVISIONS

#	DRAWN	CHECKED	APPROVED	DATE

DWG 868

CHECK SCALES

If this bar does not measure 1 inch this sheet is not at its original scale

SCALE 1" = 1'-0"

POWERTECH (USA) INC.

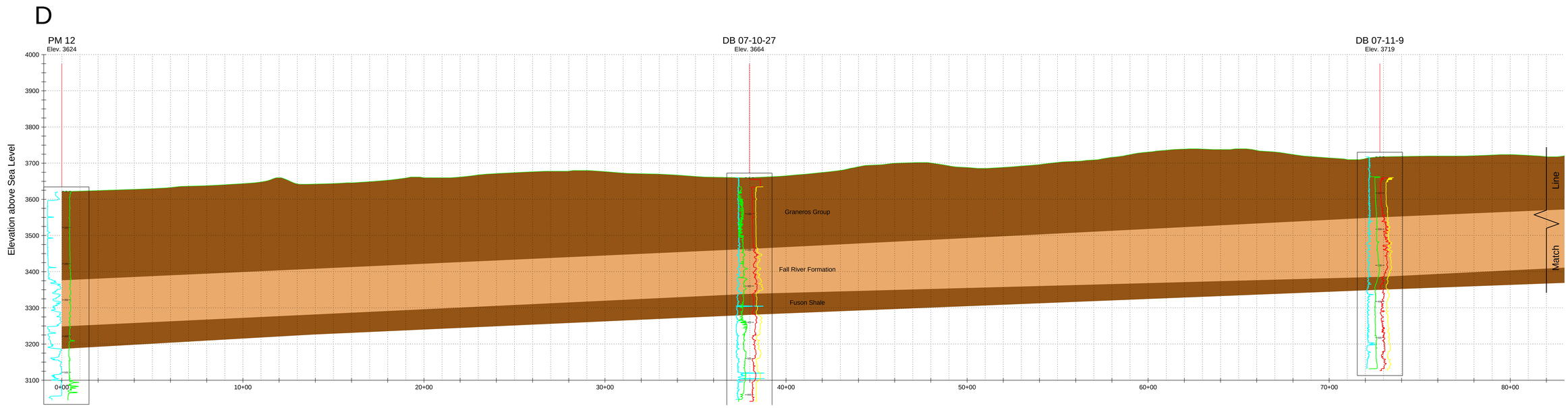
Plate 3.6-7

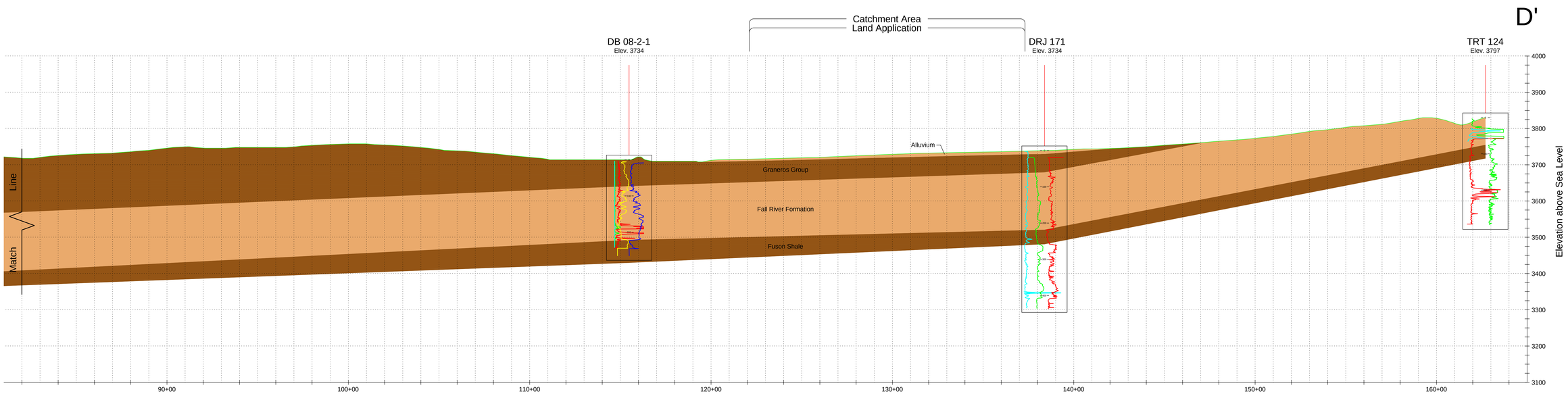
Cross Section C - C'

Dewey-Burdock Project

COORD NAD 27, South Dakota State Plane South (feet)

DGN FILE p:\dewey-burdock\submittals\groundwater discharge permit\final\plates\sectionc-c.dwg





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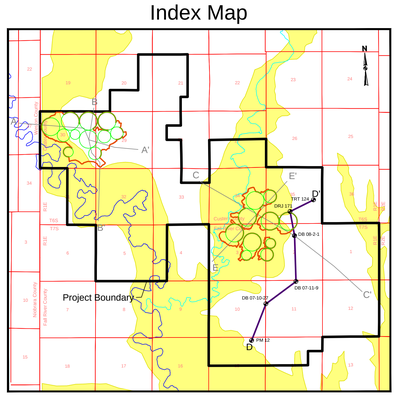


Cross Section Legend

- Confining Clays and Shale
- Sand

Index Map Legend

- Project Boundary
- Land Application
- Alluvium
- Perennial Streams
- Ephemeral Streams
- Catchment Areas

Horizontal Scale

Feet: 0 100 200 400 600 800

Meters: 0 50 100 200

Vertical Scale

Feet: 0 50 100 200 300 400

Meters: 0 25 50 100

CONSULTANT

REVISIONS

#	DRAWN	CHECKED	APPROVED	DATE

POWERTECH (USA) INC.

Plate 3.6-8

Cross Section D - D'

Dewey-Burdock Project

REF 869

CHECK SCALES

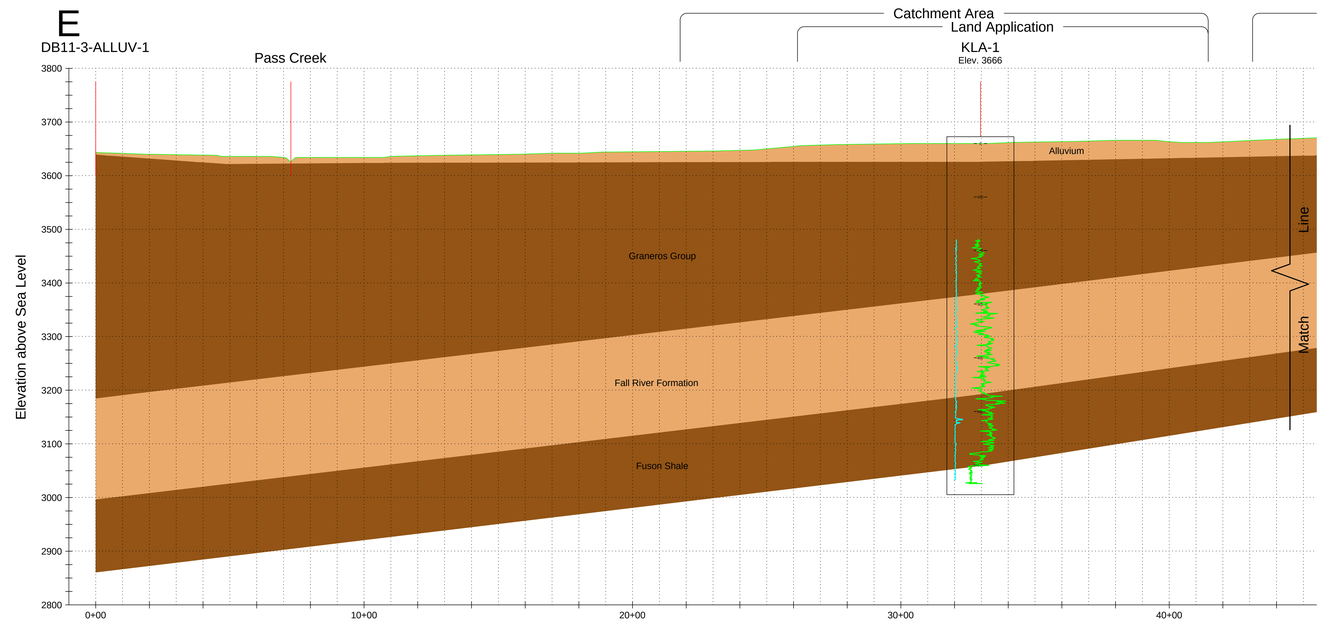
If this bar does not measure 1 inch this drawing is not at its original scale

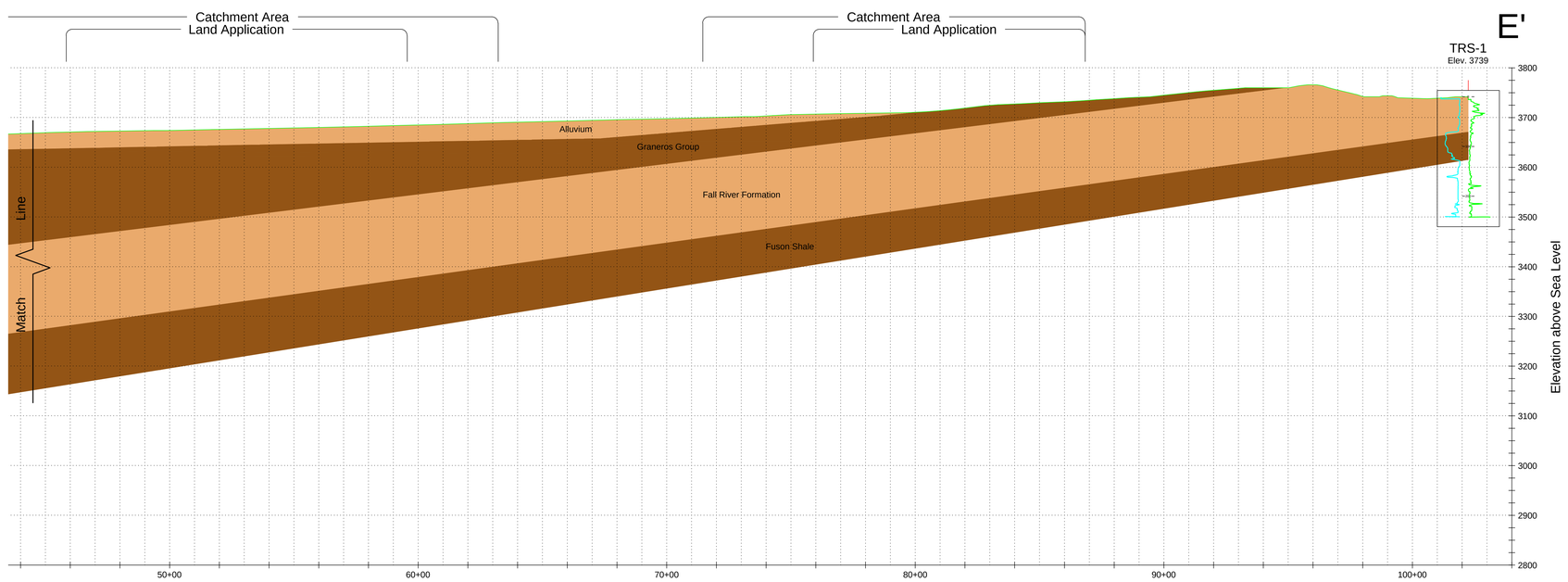
AVG E 30' x 40'

PLOT DATE 14-Jun-2012 | DATE 14-Jun-2012

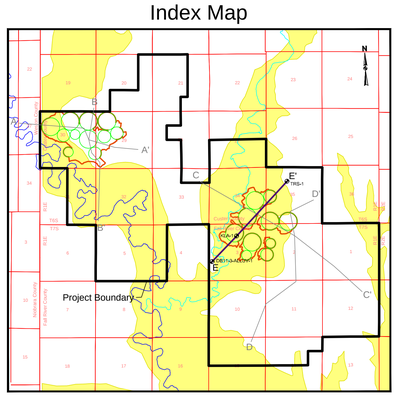
DRAWN Hetrick, Lichnovsky | PDF FILE Plate 3.6-8_SectionD-D.pdf | COORD NAD 27, South Dakota State Plane South (feet)

CHECKED J. Bonner, J. Mays | CAD FILE p:\dewey-burdock\submittals\groundwater discharge permit\final\plates\sectiond-d.dwg





Index Map



Cross Section Legend

- Confining Clays and Shale
- Sand

Horizontal Scale

Feet: 0 100 200 400 600 800

Meters: 0 50 100 200

Vertical Scale

Feet: 0 50 100 200 300 400

Meters: 0 25 50 100

Index Map Legend

- Project Boundary
- Land Application
- Alluvium
- Perennial Streams
- Ephemeral Streams
- Catchment Areas

CONSULTANT	REVISIONS #	DRAWN	CHECKED	APPROVED	DATE
REF 870					
CHECK SCALES					
If this bar does not measure 1 inch this map is not at its original scale					
Arch E 36" x 48"					

POWERTECH (USA) INC.

Plate 3.6-9

Cross Section E - E'

Dewey-Burdock Project

PLOT DATE	14-Jun-2012	DATE	14-Jun-2012
DRAWN	Hetrick, Lichnovsky	PDF FILE	Plate 3.6-9_SectionE-E.pdf
CHECKED	J. Bonner, J. Mays	CAD FILE	p:\dewey-burdock\submittals\groundwater discharge permit\final\plates\sectione-e.dwg
COORD	NAD 27, South Dakota State Plane South (feet)		

WWC ENGINEERING
1849 Terra Avenue - Sheridan, WY 82801 - (307) 672-0761
Fax (307) 674-4265 - Email: infoshr@wwcengineering.com

July 3, 2012

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

Re: Additional Response to May 25, 2012 Preliminary Technical Comments
Dewey-Burdock Project Groundwater Discharge Plan Application

Dear Mr. Hicks:

On behalf of Powertech (USA) Inc., this letter is provided in response to the May 25, 2012 preliminary technical comments for the above referenced application for a Groundwater Discharge Plan (GDP). This letter includes responses not included in the June 18, 2012 response letter to two of the technical comments, a related typographical issue, and a general comment. For convenience, the applicable comments are provided below along with the responses. Application replacement pages are enclosed along with an index of changes (two hard copies and one electronic copy on CD).

Technical Comment 1: On Figure 3.6-4, the lithology and water levels depicted on the cross sections do not appear to correspond to the lithology and water levels described on the alluvial drill hole logs in Appendix 3.6-A or the features on the map on Figure 3.6-4. Please correct these discrepancies and submit larger depictions of the two cross sections to include geology/ hydrology data from the alluvial drill hole logs. If additional drill hole logs were used to construct these cross sections, please identify them on the cross sections and map, and include the logs with the application.

Response: Powertech (USA) has revised the Pass Creek alluvial cross sections, which were previously presented in Figure 3.6-4. The revised cross sections are provided on Plate 3.6-10. The lithology and water levels shown on the cross section match the alluvial drill hole logs presented in Appendix 3.6-A. When updating the cross sections, Powertech (USA) noticed that one of the alluvial water level measurements appears to have been recorded in error. This erroneous water level was not used to show the static water level elevation on the applicable cross section, nor was it used to generate the potentiometric contour map (Figure 3.7-8). This is noted on the cross section. A replacement log acknowledging the recording error is included with this response package.

Technical Comment 16: Several sections and figures in the application discuss collection areas, berms and catchment areas; however, the application is not very clear about these areas. Please elaborate and include discussions on the locations of collection areas, catchment areas, land application berms and catchment area berms; construction of the berms around both the catchment areas and land application areas (include a typical cross section construction design

that traverses the land application berms, land application area, catchment area, catchment area berms and collection area); and how water is to be conveyed to the collection and catchment areas. Please also include a discussion of berm elevation and design freeboard.

Additionally, as the SPAW model is a one-dimensional model that does not include flow routing or channel descriptors, please include a discussion and map indicating where in the collection or catchment areas, standing water likely is to occur, how much standing water may be anticipated during normal operations and during heavy precipitation events, the impacts this standing water would have on groundwater, and what threshold levels of runoff and/or standing water would trigger land application rates to be adjusted to mitigate and eliminate ponding or standing water.

Response: A conceptual design and operating plan for the catchment areas has been added to the GDP application. Following is a description of the conceptual design and operating plan. Prior to operation of the land application systems, Powertech (USA) will submit final designs of the catchment areas as indicated below.

Conceptual Catchment Area Design

Plates 5.4-1 and 5.4-2 present the conceptual designs of the Dewey and Burdock catchment areas, respectively. The final designs may vary from those shown on the plates but will include a minimum surface area of 35 acres at each of the Dewey and Burdock sites and sufficient capacity to contain the estimated 100-year, 24-hour runoff event from all center pivot areas and contributing drainage areas.

The conceptual designs include multiple catchment areas for each of the Dewey and Burdock sites. Earthen catchment berms typically will be constructed at the downgradient edges of the pivot areas or in common locations downgradient of multiple pivot areas. Catchment berms typically will be less than 6 feet high or will have an impounding capacity (excluding incised capacity) less than or equal to 15 acre-feet. Therefore, they are anticipated to be classified as "barriers" according to ARSD 74:02:08:01(7) and not require consideration of dam safety requirements in ARSD 74:02:08. Only one of the conceptual designs includes a capacity greater than 15 acre-feet and berm height greater than 6 feet (B-15 in the Burdock area). In this case the catchment area will be incised sufficiently such that the impounding capacity will be 15 acre-feet or less.

For each catchment area, the runoff volume resulting from the 100-year, 24-hour precipitation event was calculated. The 100-year, 24-hour general storm runoff was estimated using the Natural Resource Conservation Service triangular hydrograph method, a parametric method of estimating flood peaks and volumes from drainage area, relief, soil type, vegetative cover and stream length. The precipitation value (4.8 inches) for the 100-year, 24-hour storm event was obtained from the national depth-duration frequency map. This is the same value used for the flood analysis of Pass Creek and ephemeral tributaries within the project area described in Section 3.7.1.3 of the GDP application.

Summary tables are presented on each plate describing the individual and combined area and volume of the conceptual catchment areas and the estimated 100-year, 24-hour storm runoff volumes. In the conceptual design, the combined area is about 70 acres for each site, which is about twice the minimum area of 35 acres described in Section 5.4 of the GDP application. The combined capacity is 141 to 167 acre-feet, which is approximately 18 to 50% more than the total estimated 100-year, 24-hour runoff volume.

In most cases, the catchment areas will have excess capacity beyond the minimum required to contain the 100-year, 24-hour runoff event. The elevation corresponding to the excess capacity volume, where applicable, is designated on each area capacity table on Plates 5.4-1 and 5.4-2. This is termed "inactive capacity" on the plates and represents the normal operating level for each catchment area. As described below, a dewatering program will be initiated if the catchment areas fill above the normal operating level.

In a few cases, two or more catchment areas will be used to contain the 100-year, 24-hour storm runoff volume from multiple drainage areas. In these cases, overflow from upgradient catchment areas will be routed to a downgradient catchment area as indicated on the plates. The overflow will be conveyed in pipelines and/or ditches sized to convey the excess runoff at non-erosive velocities during the 100-year, 24-hour runoff event. In one or more cases berms with catchment ditches will be constructed at the edges of pivot areas to convey the runoff within the pivot areas to the catchment areas (i.e., the pivot area associated with Catchment D-13 in the Dewey land application area).

As requested, typical cross sections are provided on the plates traversing multiple pivot and catchment areas. The plates also depict the relationship between the conceptual catchment area designs and the general catchment area boundaries depicted on other figures and plates in this application (e.g., Figure 2.3-2 and Plates 3.6-5 through 3.6-10). The conceptual designs are within the general boundaries. The actual extents of the catchment areas also will be within or very close to the general catchment area boundaries depicted in the GDP application. The actual extents will be determined during final design as described below.

<u>Conceptual Catchment Area Operating Plan</u>
Powertech (USA) will operate the catchment areas to maintain adequate freeboard capacity for the estimated 100-year, 24-hour storm runoff. This will be accomplished by marking the elevation of the normal operating level in each catchment area, or, in the case of multiple catchment areas operated in series, marking the elevation of the normal operating level in the most downgradient catchment area. The normal operating level will be delineated with a clearly visible marker such as a post. Each catchment area will be routinely monitored, including after significant precipitation events.

The land application water will be applied at an agronomic rate to prevent runoff into the catchment areas except during significant precipitation or snowmelt events. If a catchment area fills above the normal operating level, a dewatering program will be initiated. The catchment area will be dewatered through pumping or gravity discharge. The excess water will be conveyed

to another catchment area with excess operating capacity, pumped to the storage ponds, or pumped to a land application pivot area (primary or standby area).

The conceptual catchment area design includes sufficient excess capacity such that dewatering would not be required frequently. This is demonstrated by the calculated 2-year, 24-hour runoff volumes listed on the summary tables on Plates 5.4-1 and 5.4-2. These runoff volume estimates are provided to illustrate how the catchment areas would be operated during a more frequent precipitation event. In each case, the total 2-year, 24-hour runoff volume is approximately equal to or less than the excess capacity, which is calculated as the total catchment capacity less the designated freeboard volume for the 100-year, 24-hour storm event. In the Dewey area, the conceptual catchment capacity is approximately 167 acre-feet and the 100-year, 24-hour runoff volume is approximately 111 acre-feet. The excess capacity is therefore about 56 acre-feet, or about 300% of the 2-year, 24-hour runoff volume of about 18 acre-feet. In the Burdock area, the excess capacity is about 22 acre-feet, which is approximately equal to the 2-year, 24-hour runoff volume of 23 acre-feet. This shows that the frequency at which the normal operating level would be exceeded for the combined catchment areas would typically be less than or equal to every 2 years. In this case the excess water would be pumped to a pivot area (likely a standby pivot area) or to the storage ponds. The final operating plan described below would include standard operating procedures to ensure that there would be adequate storage pond excess capacity or standby pivot areas to ensure that dewatering could be accomplished in a reasonable amount of time.

The calculation of 2-year, 24-hour runoff volumes for the catchment areas also demonstrates that the quantity of water evaporating or infiltrating in the catchment areas will be much smaller than the quantity of water applied to the land application areas. As described in Tables 5.1-1 and 5.2-1 in the GDP application, the design average annual application volume is 500 acre-feet for each land application system. By comparison, the calculated 2-year, 24-hour runoff volume for the catchment areas is about 18 to 23 acre-feet. This shows that the volume of runoff captured during a storm event that is predicted to occur every other year will only be about 4 to 5% of the design land application volume each year. This supports the conclusion that the catchment areas will have minimal potential groundwater impacts compared to the land application areas.

<u>Final Design and Operation and Maintenance Plan</u>
Prior to operating the land application systems, Powertech (USA) will provide the following information to DENR for review and approval:

1) Final catchment area designs, including hydrologic calculations for the 100-year, 24-hour runoff volumes, catchment area capacities and areas, normal operating levels, berm dimensions, overflow hydraulic designs, and dewatering systems;
2) As-constructed drawings showing the surveyed staged storage capacity, berm dimensions and elevations of the normal operating levels (which will be identified in the field by highly visible markers with the location shown on the as-constructed drawings);
3) Demonstration that water rights have been obtained for all catchment areas, if applicable;
4) Demonstration of catchment area compliance with Safety of Dams regulations in ARSD 74:02:08; and

5) An operation and maintenance (O&M) plan for the Dewey and Burdock sites that includes:
    a. Inspection procedures, including operating level monitoring frequency and berm inspection frequency;
    b. An operation plan describing the overflow and dewatering procedures; and
    c. A dewatering plan describing how each catchment area will be dewatered in the event that the water level exceeds the normal operating level.

Typographical Issue 2: On Figure 3.6-4, the cross sections show a feature with grey shading, but do not identify it. Please identify or otherwise label this feature. Please also identify the light green circles that are shown on the map, in the legend.

Response: As discussed in the response to Technical Comment 1, Figure 3.6-4 has been replaced by Plate 3.6-10, which includes a legend for all features.

General Comment: The Department agrees with the locations of the proposed interior and compliance point monitoring wells, however as the technical review continues and additional ground water information becomes available, the need for additional wells may be considered. Construction of the proposed wells should begin as soon as possible so that ambient sampling can be conducted in accordance with ARSD 74:54:02:18. Ambient sampling should also be conducted at the surface water sampling locations identified on Table 6.2-1.

Response: Powertech (USA) plans to drill the alluvial compliance wells during the week of July 9 and begin collecting samples during the month of July. Based on recent meetings with DENR staff, Powertech (USA) understands that the ambient sampling data for the compliance wells is the primary focus of this request for ambient monitoring, since compliance limits will be established based on the sample results. Powertech (USA) does not propose to begin the 12 months of stream sampling at this time due to the following considerations:

- As described in Section 4.1.1.1 of the GDP application, Powertech (USA) established stream sampling sites on Beaver Creek and Pass Creek and visited the sites monthly for 12 months in 2007-2008. Grab samples were collected from the Beaver Creek sites each month, when available, and passive samplers were installed on Pass Creek.
- While the ambient stream sampling results describe in Section 4.1.1.2 of the GDP application demonstrated significant seasonal variability (especially on Beaver Creek, where flow occurred throughout the year), there was little variation between upstream and downstream sampling locations during the same sampling event. This demonstrates that the temporal water quality variation likely is much greater than the spatial variation on the portions of Beaver Creek and Pass Creek near the project area. Therefore, Powetech (USA) expects similar ambient water quality at the proposed operational monitoring locations depicted on Figure 6.2-1 as the respective previous monitoring locations depicted on Figure 4.1-1 (i.e., the water quality at BVC11 is anticipated to be very similar to the water quality at BVC01 at any given point in time).

- Powertech (USA) has committed to collecting 12 months of ambient surface water data from the locations identified in Table 6.2-1 prior to operation of the Dewey-Burdock Project. The results will be provided to DENR prior to operation of the land application systems.

Please also note that Section 6.1.1.3 of the GDP application commits to sampling all interior wells a minimum of four times within a 6-month period prior to operation of the land application systems.

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

Sincerely,

Jack W. Fritz

Jack Fritz, P.E.
WWC Project Manager

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

Encl: Change Index
Replacement Pages

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Dewey-Burdock Project
Groundwater Discharge Plan
Revision Index

July 3, 2012 Response to May 25, 2012 Technical Comments

Volume	Page, Map or other Permit Entry to be Removed	Page, Map or other Permit Entry to be Added	Description of Change
1 & 2	p. viii, x, 75, 76 (Fig. 3.6-4), 3.6-A-10 (App. 3.6-A)	p. viii, x, 75, 76 (blank), Plate 3.6-10, 3.6-A-10 (App. 3.6-A)	Technical Comment 1 - Plate 3.6-10 is provided to replace Figure 3.6-4. Remove reference to Figure 3.6-4 and add reference to Plate 3.6-10. Replace DB11-3-ALLUV-2 borehole log to indicate water measurement is believed to have been recorded in error.
1 & 2	p. x	p. x, Plates 5.4-1, 5.4-2	Technical Comment 16 - Added Plates 5.4-1 and 5.4-2 depicting conceptual catchment area designs.
1	p. iii, 120a, 121, 164, 167	p. iii, 120a-120d, 121, 164, 167	Technical Comment 16 - Added conceptual catchment area design and operating plan along with commitment to provide final design prior to operation.
1 & 2	p. viii, x, 75, 76 (Fig. 3.6-4)	p. viii, x, 75, 76 (blank), Plate 3.6-10	Typographical Comment 2 - Plate 3.6-10 is provided to replace Figure 3.6-4. Remove reference to Figure 3.6-4 and add reference to Plate 3.6-10. The plate includes a legend for all features.

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Plate 3.6-9 Cross Section E-E'

Plate 3.6-10 Pass Creek Alluvium Cross Sections

Plate 5.4-1 Conceptual Catchment Area Design, Dewey Land Application Area

Plate 5.4-2 Conceptual Catchment Area Design, Burdock Land Application Area

marine shale with minor amounts of siltstone, fine grained sandstone, and a few thin beds of bentonite. Dark-gray to purple and black iron and manganese concretionary zones are common within the shale. When present the Newcastle Sandstone is stratigraphically located between the Skull Creek Shale and the Mowry Shale. Drilling has encountered no Newcastle Sandstone on the surface or in the subsurface within the Dewey-Burdock project area.

Belle Fourche Shale - The uppermost unit of the Graneros Group is the Belle Fourche Shale. This 300-foot unit consists of thin-bedded gray to black soft shale, containing black-reddish brown ironstone concretions, which are particularly abundant in the basal 20-30 feet. There is also bentonite production from the lower part of the Belle Fourche Shale.

Terrace Deposits - Along the sides of drainages are relatively flat terrace deposits representing floodplains and former levels of streams. The terraces are primarily overbank deposits of clay and silt with gravel beds. Gravel deposits consist of boulders and pebbles of chert, sandstone, and limestone.

Alluvium - The most recent sedimentary units are the Quaternary age alluvium deposits, which are present in the major drainages and their tributaries. The alluvium consists of silt, clay, sand and gravel. An isopach of the alluvium is presented as Plate 3.6-3. Cross sections of the Pass Creek alluvium are presented on Plate 3.6-10.

Powertech (USA) completed an alluvial geotechnical drilling program in May 2011 to further characterize the alluvium within the project area. Nineteen borings were drilled into the alluvium along Beaver Creek and Pass Creek, many of which were dry. Alluvial drilling logs indicating water levels (where present) are provided in Appendix 3.6-A. The alluvium in the Pass Creek drainage is up to 50 feet thick; in the Beaver Creek drainage, the alluvium is up to 30 feet thick. Only the bottom 0 to 15 feet of the alluvium typically contains gravel, and this is typically a mixture of silt, clay and sand with scattered gravel. The top of the alluvium contains a mixture of silt, clay and sand and may be better described as colluvium.

3.7 Hydrology

3.7.1 Surface Water

3.7.1.1 Regional Surface Water Hydrology

The project area is on the southwest flank of the Black Hills. The area includes two physiographic divisions that are characterized as the Black Hills and the Great Plains Divisions. The Black Hills Division generally consists of steep formations of metamorphosed and intensely

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a geonet, which will provide a physical separation and allow any fluid to flow between the two liners. A minimum grade of 2 percent will be maintained across the bottom of the pond toward a leak detection sump. Any potential leakage from the primary liner will be contained by the secondary liner and collected in the leak detection sump. The sump will be routinely monitored for the presence of fluid as described below. Should a leak occur, the pond will be removed from service and dewatered by transferring the contents to a spare pond.

Routine inspections for all ponds will be conducted in accordance with NRC license requirements as discussed in Section 10. In addition, routine inspections for ponds with leak detection systems will include daily checks for water accumulation in leak detection systems and monthly inspections of the functionality of leak detection systems.

5.4 Catchment Areas

Runoff from significant precipitation events or snowmelt on the land application areas will be conveyed to catchment areas within or adjacent to the pivot areas and allowed to evaporate or infiltrate. The minimum collection area will be 35 acres at each of the Dewey and Burdock sites, and the capacity will be sufficient to contain the estimated 100-year runoff event from each center pivot area. The application rate will be maintained at an agronomic rate that will prevent water from accumulating in the catchment areas during normal operation. The application rate will be adjusted as necessary including temporary shutdown if needed to prevent excessive ponding in the catchment areas. Following is a description of the conceptual catchment area design and operating plan. Prior to operation of the land application systems, Powertech (USA) will submit final designs of the catchment areas as indicated below.

Conceptual Catchment Area Design

Plates 5.4-1 and 5.4-2 present the conceptual designs of the Dewey and Burdock catchment areas, respectively. The final designs may vary from those shown on the plates but will include a minimum surface area of 35 acres at each of the Dewey and Burdock sites and sufficient capacity to contain the estimated 100-year, 24-hour runoff event from all center pivot areas and contributing drainage areas.

The conceptual designs include multiple catchment areas for each of the Dewey and Burdock sites. Earthen catchment berms typically will be constructed at the downgradient edges of the pivot areas or in common locations downgradient of multiple pivot areas. Catchment berms typically will be less than 6 feet high or will have an impounding capacity (excluding incised capacity) less than or equal to 15 acre-feet. Therefore, they are anticipated to be classified as

"barriers" according to ARSD 74:02:08:01(7) and not require consideration of dam safety requirements in ARSD 74:02:08. Only one of the conceptual designs includes a capacity greater than 15 acre-feet and berm height greater than 6 feet (B-15 in the Burdock area). In this case the catchment area will be incised sufficiently such that the impounding capacity will be 15 acre-feet or less.

For each catchment area, the runoff volume resulting from the 100-year, 24-hour precipitation event was calculated. The 100-year, 24-hour general storm runoff was estimated using the Natural Resource Conservation Service triangular hydrograph method, a parametric method of estimating flood peaks and volumes from drainage area, relief, soil type, vegetative cover and stream length. The precipitation value (4.8 inches) for the 100-year, 24-hour storm event was obtained from the national depth-duration frequency map. This is the same value used for the flood analysis of Pass Creek and ephemeral tributaries within the project area described in Section 3.7.1.3.

Summary tables are presented on each plate describing the individual and combined area and volume of the conceptual catchment areas and the estimated 100-year, 24-hour storm runoff volumes. In the conceptual design, the combined area is about 70 acres for each site, which is about twice the minimum area of 35 acres described in Section 5.4. The combined capacity is 141 to 167 acre-feet, which is approximately 18 to 50% more than the total estimated 100-year, 24-hour runoff volume.

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Typical cross sections are provided on the plates traversing multiple pivot and catchment areas. The plates also depict the relationship between the conceptual catchment area designs and the general catchment area boundaries depicted on other figures and plates in this application (e.g., Figure 2.3-2 and Plates 3.6-5 through 3.6-10). The conceptual designs are within the general boundaries. The actual extents of the catchment areas also will be within or very close to the general catchment area boundaries depicted in this application. The actual extents will be determined during final design as described below.

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be exceeded for the combined catchment areas would typically be less than or equal to every 2 years. In this case the excess water would be pumped to a pivot area (likely a standby pivot area) or to the storage ponds. The final operating plan described below will include standard operating procedures to ensure that there will be adequate storage pond excess capacity or standby pivot areas such that dewatering could be accomplished in a reasonable amount of time.

The calculation of 2-year, 24-hour runoff volumes for the catchment areas also demonstrates that the quantity of water evaporating or infiltrating in the catchment areas will be much smaller than the quantity of water applied to the land application areas. As described in Tables 5.1-1 and 5.2-1, the design average annual application volume is 500 acre-feet for each land application system. By comparison, the calculated 2-year, 24-hour runoff volume for the catchment areas is about 18 to 23 acre-feet. This shows that the volume of runoff captured during a storm event that is predicted to occur every other year will only be about 4 to 5% of the design land application volume each year. This supports the conclusion that the catchment areas will have minimal potential groundwater impacts compared to the land application areas.

Final Design and Operation and Maintenance Plan

Prior to operating the land application systems, Powertech (USA) will provide the following information to DENR for review and approval:

1) Final catchment area designs, including hydrologic calculations for the 100-year, 24-hour runoff volumes, catchment area capacities and areas, normal operating levels, berm dimensions, overflow hydraulic designs, and dewatering systems;
2) As-constructed drawings showing the surveyed staged storage capacity, berm dimensions and elevations of the normal operating levels (which will be identified in the field by highly visible markers with the location shown on the as-constructed drawings);
3) Demonstration that water rights have been obtained for all catchment areas, if applicable;
4) Demonstration of catchment area compliance with Safety of Dams regulations in ARSD 74:02:08; and
5) An operation and maintenance (O&M) plan for the Dewey and Burdock sites that includes:
    a. Inspection procedures, including operating level monitoring frequency and berm inspection frequency;
    b. An operation plan describing the overflow and dewatering procedures; and
    c. A dewatering plan describing how each catchment area will be dewatered in the event that the water level exceeds the normal operating level.

5.5 Irrigated Crops

Irrigated crops may include one or more of the following: native vegetation (primarily warm season perennial grasses, cool season perennial grasses, and perennial shrubs), alfalfa, or salt-tolerant wheatgrass.

5.6 Land Application System Operation

The center pivot irrigation systems will typically operate 24 hours per day during the normal frost-free season, which is approximately April through October. The land application systems will have variable operation schedules to allow for adjustments due to weather conditions and other site-specific conditions. The land application system design will allow for instantaneous shutdown of any one or more center pivots as needed. Temporary shutdowns would occur in the event of a piping leak, for maintenance activities, during significant precipitation events, due to excessive ponding in a catchment area, or due to cold temperature. The land application systems will not be used when water cannot infiltrate due to frozen ground. During times when land application will not be used, the treated liquid waste stream will be temporarily stored in ponds. As discussed in Section 5.7.4, the storage ponds will have significant surplus capacity. This will provide contingency to allow for a late spring startup or an early fall stoppage of operations. In addition, Section 5.3 describes how the central plant pond will provide additional capacity for blending of process water to keep the land application water quality relatively consistent.

The land application schedule will follow the project schedule shown in Figure 2.4-1. Land application will occur during production and restoration, the total duration of which is expected to be approximately 9.25 years. During the initial production period prior to restoration, which is expected to last approximately 1.5 to 2 years, the land application rate will be relatively low. During this phase the CPP liquid waste will be stored in the central plant pond and the land application solutions will consist almost entirely of production bleed. The average annual production bleed will be less than 100 gpm, or less than one-third the design average annual application rate of 310 gpm shown in Tables 5.1-1 and 5.2-1. The land application rate will be highest during concurrent production and restoration, which is expected to last approximately 6 years. The design application rates shown in Table 5.1-1 and 5.2-1 are based on this period of operation. The final project phase will be restoration without concurrent production. The land application rate during this relatively brief phase (approximately 0.25 year) will be slightly less

application areas following cessation of land application system operation. These model results demonstrate lack of potential to impact groundwater quality from the land application systems.

8.2 Surface Water

The two primary means of avoiding potential impacts to surface water quality are protection from flooding and containment of land application solutions. Specific mitigation measures are described below.

Flood Protection

The primary means of preventing impacts from flooding is siting the land application areas to avoid the floodplains of Pass Creek, Beaver Creek, and ephemeral tributaries. Figures 8.2-1 and 8.2-2 depict the location of the proposed land application facilities in relation to the modeled 100-year floodplains for Beaver Creek, Pass Creek, and ephemeral tributaries. These figures show that nearly all of the center pivots and catchment areas will be constructed to avoid potential flooding.

In cases where flood inundation areas cannot be avoided, Powertech (USA) will implement engineering controls to prevent impacts to the land application systems from flooding. These will include constructing diversion channels and berms. These engineering controls will be permitted through the DENR Minerals and Mining Program as part of the LSM permit. Other engineering controls used to minimize potential impacts to surface water quality will include stormwater best management practices (BMPs) that will be implemented as part of a construction NPDES permit that will be required through DENR. Example stormwater BMPs that may be used to minimize potential impacts to surface water quality from construction of the land application systems include silt fence, sediment logs, and straw bale check dams.

Containment of Land Application Solutions

Powertech (USA) will provide containment for all land application solutions by constructing catchment areas around each center pivot. As described in Section 5.4, runoff from significant precipitation events or snowmelt on the land application areas will be conveyed to catchment areas within or adjacent to the pivot areas and allowed to evaporate or infiltrate. Sufficient catchment area capacity will be provided to contain the runoff from the 100-year, 24-hour storm. Powertech (USA) will monitor the catchment areas daily to ensure that there is not excessive ponding and that adequate capacity is available for containment of rainfall/runoff from the 100-year, 24-hour storm. Powertech (USA) will adjust the land application rate or

dewater the catchment areas if the freeboard capacity limits are approached. The excess water will be conveyed to another catchment area with excess operating capacity, pumped to the storage ponds, or pumped to a land application pivot area.

8.3 Soil

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

Salinity and EC

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

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

Radionuclides

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

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

POWERTECH (USA) INC.

PowerTech (USA) Inc.

DRILLED WITH: AIR ☐ WATER ☐ HOLE NO. DBH-3-ALLUV-2

T.D. 33' LOCATION: 433708.096 1031228.363 State Plane, NAD27

BIT SIZE 4" FA

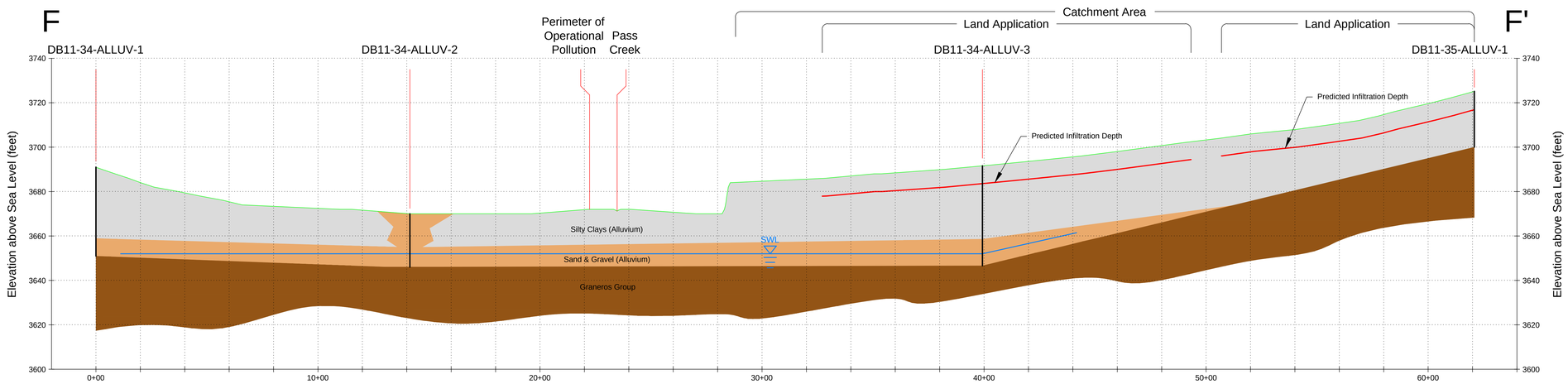
SAMPLE LOG BY LE LEASE: (PROJECT) Dewey Burdock

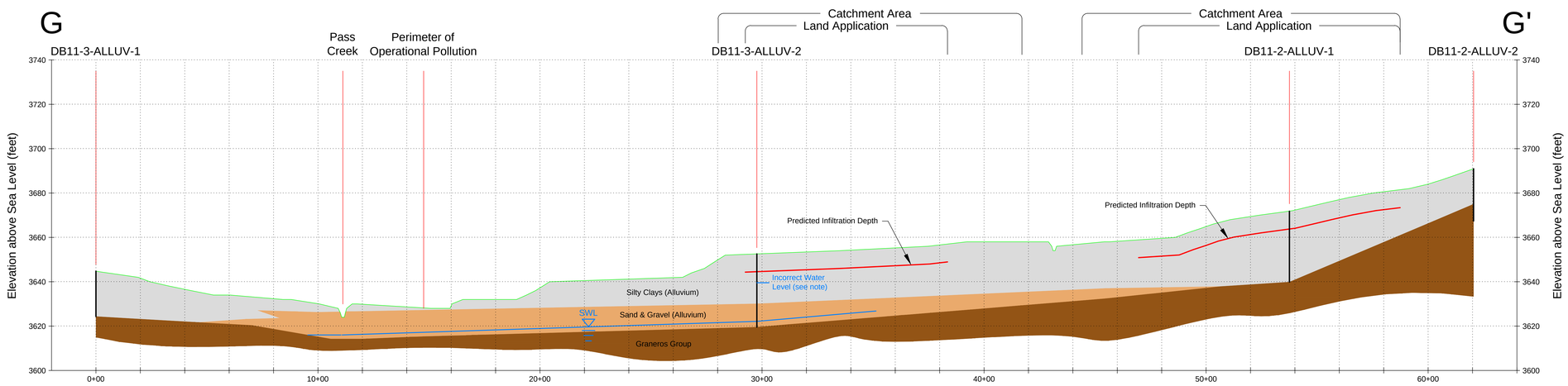
DATE 5/4/11 COUNTY Fall River STATE SD

DEPTH	LITHOLOGY	CARBON	PYRITE	OTHER Alteration	Alteration % Primary Oxidation	Alteration % Reduction	Alteration % Secondary Oxidation	SAMPLE DESCRIPTION (Amounts in Percent, %)
								0-22.5' silty, sandy CLAY, orangish brown, damp, sat roots
10				Water Level 13 ft. *				
20								22.5-33' silty GRAVELS, white/gray/pinks, wet, angular qtzites & cherts
30								TD @ 33' impeded GRAVELS - sharp contact.
40								* hole plugged w/ bentonite chips
50								* Note: Water level measurement believed to be in error.
60								
70								

L = Limonite (Lmn)
SOX Surf. Oxidation
Rd. Reduced
Rdt. Reduction
P = Pyrite (Pyr)
P_T = Pyrite Tarnish
POX = Primary Oxid.
BSOX = Base of Surf. Oxid.
2OX = Secondary Oxid.
Tn = Transition Zone
fld = Feldspar

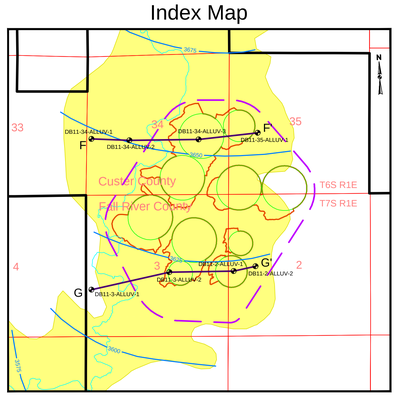
T = Trace
1 = Minor
2 = Moderate
3 = Abundant
C = Carbon
K = Kaolin
B = Bleached
Cht = Chert





NOTE: The static water level surface depicted on the cross sections and the potentiometric contours depicted on the index map are based on Figure 3.7-8, which was prepared using all water level measurements collected during the May 2011 alluvial drilling program except the water level recorded at DB11-3-ALLUV-2, which is believed to have been recorded in error. Potentiometric contour elevations are in feet above sea level.

Index Map



Cross Section Legend

- Silty Clays (Alluvium)
- Sand & Gravel (Alluvium)
- Graneros Group
- SWL — Static Water Level Elevation from Potentiometric Contour Map (see note)

Index Map Legend

- Project Boundary
- Land Application
- Alluvium
- Pass Creek
- 3625 — Potentiometric Contour (see note)
- Burdock POP Zone
- Catchment Areas

Horizontal Scale

Feet: 0 100 200 400 600 800

Meters: 0 100 200 400

Vertical Scale

Feet: 0 10 20 40 60 80

Meters: 0 50 100 200

CONSULTANT

REVISIONS

#	DRAWN	CHECKED	APPROVED	DATE

REF 874

CHECK SCALES

If this bar does not measure 1 inch this map is not at its original scale

ACAD 24" x 48"

POWERTECH (USA) INC.

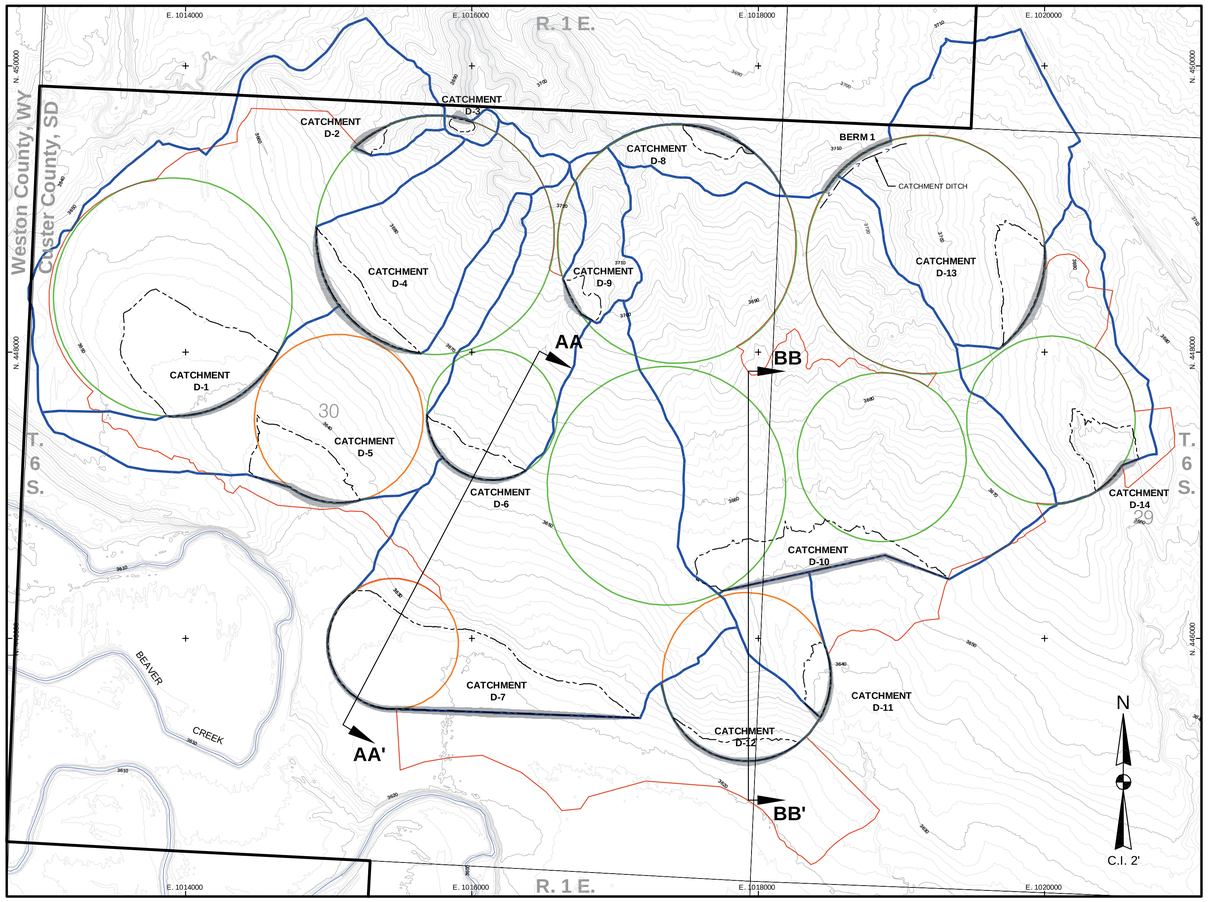
Plate 3.6-10

Pass Creek Alluvium Cross Sections

Dewey-Burdock Project

PLOT DATE	28-Jun-2012	DATE	19-Jun-2012
DRAWN	Hetrick, Lichnovsky	PDF FILE	Plate 3.6-10_SectionF-F.pdf
CHECKED	J. Bonner, J. Mays	CAD FILE	p:\dewey-burdock\submittals\groundwater discharge permit\finals\plates\sectionf-f.dwg

COORDS NAD 27, South Dakota State Plane South (feet)

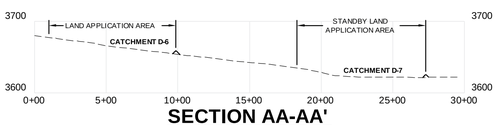


PLAN VIEW

Feet
0 250 500 1,000 1,500 2,000
0 125 250 500
Meters

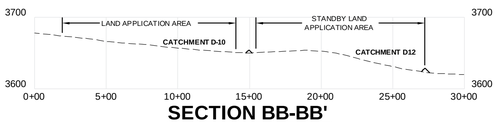
LEGEND

- PERMIT BOUNDARY
- PRIMARY LAND APPLICATION AREA
- STANDBY LAND APPLICATION AREA
- DRAINAGE BOUNDARY
- GENERAL CATCHMENT BOUNDARY
- MAXIMUM WATER LEVEL
- CATCHMENT BERM FOOTPRINT



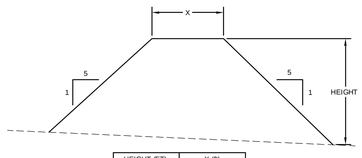
SECTION AA-AA'

SCALE: HORZ. 1" = 500', VERT. 1" = 100'



SECTION BB-BB'

SCALE: HORZ. 1" = 500', VERT. 1" = 100'



HEIGHT (FT)	X (ft)
≤6	5
6-8	8
8-10	10
>10	15

TYPICAL CATCHMENT BERM SECTION

NTS

CATCHMENT D-1 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3639.5	0.04			0.00	INACTIVE CAPACITY 3.09 ac-ft
		0.37	0.19		
3640.0	0.69			0.19	
		1.05	0.53		
3640.5	1.41			0.72	
		1.86	0.93		
3641.0	2.30			1.65	
		2.88	1.44		
3641.5	3.46			3.09	
		4.27	2.14		
3642.0	5.07			5.23	
		5.98	2.99		
3642.5	6.89			8.22	
		7.87	3.94		
3643.0	8.84			12.16	100yr FREEBOARD 20.30 ac-ft
		9.99	5.00		
3643.5	11.13			17.16	
		12.45	6.23		
3644.0	13.76			23.39	

CATCHMENT D-2 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3679.5	0.00			0.00	INACTIVE CAPACITY 0.09 ac-ft
		0.02	0.01		
3680.0	0.04			0.01	
		0.06	0.03		
3680.5	0.08			0.04	
		0.10	0.05		
3681.0	0.12			0.09	
		0.15	0.08		
3681.5	0.17			0.17	
		0.20	0.10		
3682.0	0.22			0.27	
		0.25	0.13		
3682.5	0.27			0.40	
		0.30	0.15		
3683.0	0.32			0.55	
		0.35	0.18		
3683.5	0.38			0.73	
		0.41	0.21		
3684.0	0.44			0.94	

CATCHMENT D-3 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3703.5	0.01			0.00	INACTIVE CAPACITY 0.03 ac-ft
		0.02	0.01		
3704.0	0.03			0.01	
		0.04	0.02		
3704.5	0.05			0.03	
		0.06	0.03		
3705.0	0.07			0.06	
		0.09	0.05		
3705.5	0.10			0.11	
		0.12	0.06		
3706.0	0.14			0.17	100yr FREEBOARD 0.56 ac-ft
		0.16	0.08		
3706.5	0.17			0.25	
		0.19	0.10		
3707.0	0.20			0.35	
		0.22	0.11		
3707.5	0.24			0.46	
		0.26	0.13		
3708.0	0.28			0.59	

CATCHMENT D-4 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3659.0	0.00			0.00	INACTIVE CAPACITY 1.32 ac-ft
		0.10	0.10		
3660.0	0.19			0.10	
		0.37	0.37		
3661.0	0.54			0.47	
		0.85	0.85		
3662.0	1.16			1.32	
		1.52	1.52		
3663.0	1.87			2.84	
		2.26	2.26		
3664.0	2.65			5.10	100yr FREEBOARD 6.84 ac-ft
		3.06	3.06		
3665.0	3.47			8.16	

CATCHMENT D-5 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3631.0	0.00			0.00	INACTIVE CAPACITY 2.32 ac-ft
		0.02	0.01		
3631.5	0.04			0.01	
		0.14	0.07		
3632.0	0.23			0.08	
		0.32	0.16		
3632.5	0.40			0.24	
		0.52	0.26		
3633.0	0.63			0.50	
		0.78	0.39		
3633.5	0.93			0.89	
		1.18	0.59		
3634.0	1.43			1.48	
		1.67	0.84		
3634.5	1.91			2.32	
		2.13	1.07		
3635.0	2.34			3.39	
		2.58	1.29		
3635.5	2.82			4.68	
		3.11	1.56		
3636.0	3.39			6.24	100yr FREEBOARD 10.65 ac-ft
		3.74	1.87		
3636.5	4.09			8.11	
		4.47	2.24		
3637.0	4.84			10.35	
		5.24	2.62		
3637.5	5.64			12.97	

CATCHMENT D-6 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3654.0	0.02			0.00	INACTIVE CAPACITY 0.02 ac-ft
		0.06	0.03		
3654.5	0.09			0.03	
		0.17	0.09		
3655.0	0.25			0.12	
		0.37	0.19		
3655.5	0.48			0.31	
		0.64	0.32		
3656.0	0.79			0.63	
		0.98	0.49		
3656.5	1.17			1.12	100yr FREEBOARD 4.93 ac-ft
		1.34	0.67		
3657.0	1.51			1.79	
		1.69	0.85		
3657.5	1.87			2.64	
		2.07	1.04		
3658.0	2.27			3.68	
		2.49	1.25		
3658.5	2.71			4.93	

CATCHMENT D-7 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3619.5	0.46			0.00	
		2.17	1.09		
3620.0	3.88			1.09	
		4.69	2.35		
3620.5	5.49			3.44	
		6.31	3.16		
3621.0	7.12			6.60	
		8.34	4.17		
3621.5	9.55			10.77	INACTIVE CAPACITY 50.30 ac-ft
		11.56	5.78		
3622.0	13.56			16.55	
		14.46	7.23		
3622.5	15.35			23.78	
		16.14	8.07		
3623.0	16.92			31.85	
		17.67	8.84		
3623.5	18.41			40.69	
		19.22	9.61		
3624.0	20.02			50.30	
		20.57	10.29		
3624.5	21.12			60.59	100yr FREEBOARD 21.09 ac-ft
		21.59	10.80		
3625.0	22.06			71.39	

CATCHMENT D-8 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3702.0	0.00			0.00	
		0.04	0.02		
3702.5	0.08			0.02	INACTIVE CAPACITY 0.75 ac-ft
		0.14	0.07		
3703.0	0.19			0.09	
		0.27	0.14		
3703.5	0.34			0.23	
		0.43	0.22		
3704.0	0.51			0.45	
		0.59	0.30		
3704.5	0.67			0.75	
		0.75	0.38		
3705.0	0.83			1.13	
		0.93	0.47		
3705.5	1.02			1.60	100yr FREEBOARD 1.42 ac-ft
		1.14	0.57		
3706.0	1.26			2.17	

CATCHMENT D-9 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3691.5	0.01			0.00	
		0.03	0.02		
3692.0	0.05			0.02	INACTIVE CAPACITY 0.44 ac-ft
		0.08	0.04		
3692.5	0.11			0.06	
		0.15	0.08		
3693.0	0.19			0.14	
		0.24	0.12		
3693.5	0.28			0.26	
		0.35	0.18		
3694.0	0.42			0.44	
		0.47	0.24		
3694.5	0.52			0.68	
		0.58	0.29		
3695.0	0.64			0.97	100yr FREEBOARD 1.33 ac-ft
		0.71	0.36		
3695.5	0.77			1.33	
		0.86	0.43		
3696.0	0.94			1.76	

CATCHMENT D-10 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3649.5	0.01			0.00	INACTIVE CAPACITY 0.05 ac-ft
		0.20	0.10		
3650.0	0.39			0.10	
		0.71	0.36		
3650.5	1.03			0.46	
		1.40	0.70		
3651.0	1.77			1.16	
		2.22	1.11		
3651.5	2.66			2.27	
		3.25	1.63		
3652.0	3.83			3.90	100yr FREEBOARD 16.39 ac-ft
		4.42	2.21		
3652.5	5.01			6.11	
		5.59	2.80		
3653.0	6.16			8.91	
		6.80	3.40		
3653.5	7.43			12.31	
		8.15	4.08		
3654.0	8.87			16.39	

CATCHMENT D-11 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3638.5	0.02			0.00	INACTIVE CAPACITY 0.05 ac-ft
		0.09	0.05		
3639.0	0.15			0.05	
		0.23	0.12		
3639.5	0.31			0.17	
		0.43	0.22		
3640.0	0.54			0.39	
		0.66	0.33		
3640.5	0.78			0.72	100yr FREEBOARD 2.44 ac-ft
		0.90	0.45		
3641.0	1.02			1.17	
		1.15	0.58		
3641.5	1.28			1.75	
		1.47	0.74		
3642.0	1.65			2.49	

CATCHMENT D-12 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3624.5	0.02			0.00	
		0.06	0.03		
3625.0	0.09			0.03	
		0.14	0.07		
3625.5	0.19			0.10	INACTIVE CAPACITY 0.52 ac-ft
		0.30	0.15		
3626.0	0.40			0.25	
		0.54	0.27		
3626.5	0.68			0.52	
		0.81	0.41		
3627.0	0.95			0.93	
		1.11	0.56		
3627.5	1.26			1.49	
		1.44	0.72		100yr FREEBOARD 2.60 ac-ft
3628.0	1.61			2.21	
		1.81	0.91		
3628.5	2.01			3.12	

CATCHMENT D-13 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3681.5	0.03			0.00	
		0.13	0.07		
3682.0	0.23			0.07	INACTIVE CAPACITY 0.51 ac-ft
		0.33	0.17		
3682.5	0.43			0.24	
		0.53	0.27		
3683.0	0.63			0.51	
		0.75	0.38		
3683.5	0.86			0.89	
		0.99	0.50		
3684.0	1.12			1.39	
		1.31	0.66		
3684.5	1.49			2.05	
		1.68	0.84		
3685.0	1.87			2.89	100yr FREEBOARD 10.10 ac-ft
		2.09	1.05		
3685.5	2.31			3.94	
		2.56	1.28		
3686.0	2.80			5.22	
		3.07	1.54		
3686.5	3.33			6.76	
		3.58	1.79		
3687.0	3.83			8.55	
		4.11	2.06		
3687.5	4.38			10.61	

CATCHMENT D-14 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3666.0	0.21			0.00	
		0.30	0.15		
3666.5	0.39			0.15	INACTIVE CAPACITY 1.24 ac-ft
		0.49	0.25		
3667.0	0.58			0.40	
		0.69	0.35		
3667.5	0.79			0.75	
		0.97	0.49		
3668.0	1.14			1.24	
		1.29	0.65		
3668.5	1.43			1.89	
		1.58	0.79		
3669.0	1.72			2.68	
		1.88	0.94		
3669.5	2.03			3.62	100yr FREEBOARD 6.40 ac-ft
		2.22	1.11		
3670.0	2.40			4.73	
		2.66	1.33		
3670.5	2.91			6.06	
		3.15	1.58		
3671.0	3.39			7.64	

NOTES:

1. INACTIVE CAPACITY IS THE AVAILABLE STORAGE CAPACITY FOR EACH CATCHMENT AREA ALLOWING ADEQUATE FREEBOARD CAPACITY FOR THE 100-YEAR, 24-HOUR STORM RUNOFF.
2. THE GENERAL CATCHMENT BOUNDARY THAT IS SHOWN IS THE SAME AS SHOWN ON OTHER FIGURES IN THIS APPLICATION. THE ACTUAL BOUNDARY WILL VARY DEPENDING UPON THE FINAL DESIGN OF THE CATCHMENT AREAS. THE CONCEPTUAL CATCHMENT AREA DESIGN SHOWN ON THIS PLATE IS WITHIN THE GENERAL CATCHMENT BOUNDARY.

Dewey Land Application Catchment Summary

Catchment Designation	Drainage Area (acres)	Drainage Area (mi^2)	2-Year Runoff Volume (acre-ft)	100-Year Runoff Volume (acre-ft)	Catchment Area (acres)	Catchment Capacity (acre-ft)	Catchment Height (ft)	2-Year Depth (ft)
D-1	99.41	0.16	3.04	19.53	13.76	23.39	5.0	2.0
D-2	2.05	0.00	0.33	0.82	0.44	0.94	7.3	3.0
D-3	1.38	0.00	0.22	0.55	0.28	0.59	9.5	3.0
D-4	30.36	0.05	0.95	6.10	3.47	8.16	9.0	3.0
D-5	50.18	0.08	1.52	9.76	5.64	12.97	7.5	3.5
D-6	29.01	0.05	0.95	6.10	2.71	4.93	5.6	2.5
D-7	103.98	0.16	3.04	19.53	22.06	71.39	5.8	1.0
D-8	8.17	0.01	0.19	1.22	1.26	2.17	5.4	1.5
D-9	9.28	0.01	0.19	1.22	0.94	1.76	8.0	2.0
D-10	135.41	0.21	4.00	25.63	8.87	16.39	5.7	3.0
D-11	9.91	0.02	0.38	2.44	1.65	2.49	4.8	1.5
D-12	13.84	0.02	0.38	2.44	2.01	3.12	6.0	2.0
D-13	51.60	0.08	1.52	9.76	4.38	10.61	7.5	3.0
D-14	32.45	0.05	0.95	6.10	3.39	7.64	6.3	2.0
		Total:	**17.66**	**111.20**	**70.86**	**166.55**		

Notes:
1. Overflow from Catchment D-6 will be routed to Catchment D-5.
2. Overflow from Catchment D-10 will be routed to Catchment D-7.

CONSULTANT

REVISIONS

#	DRAWN	CHECKED	APPROVED	DATE

REF

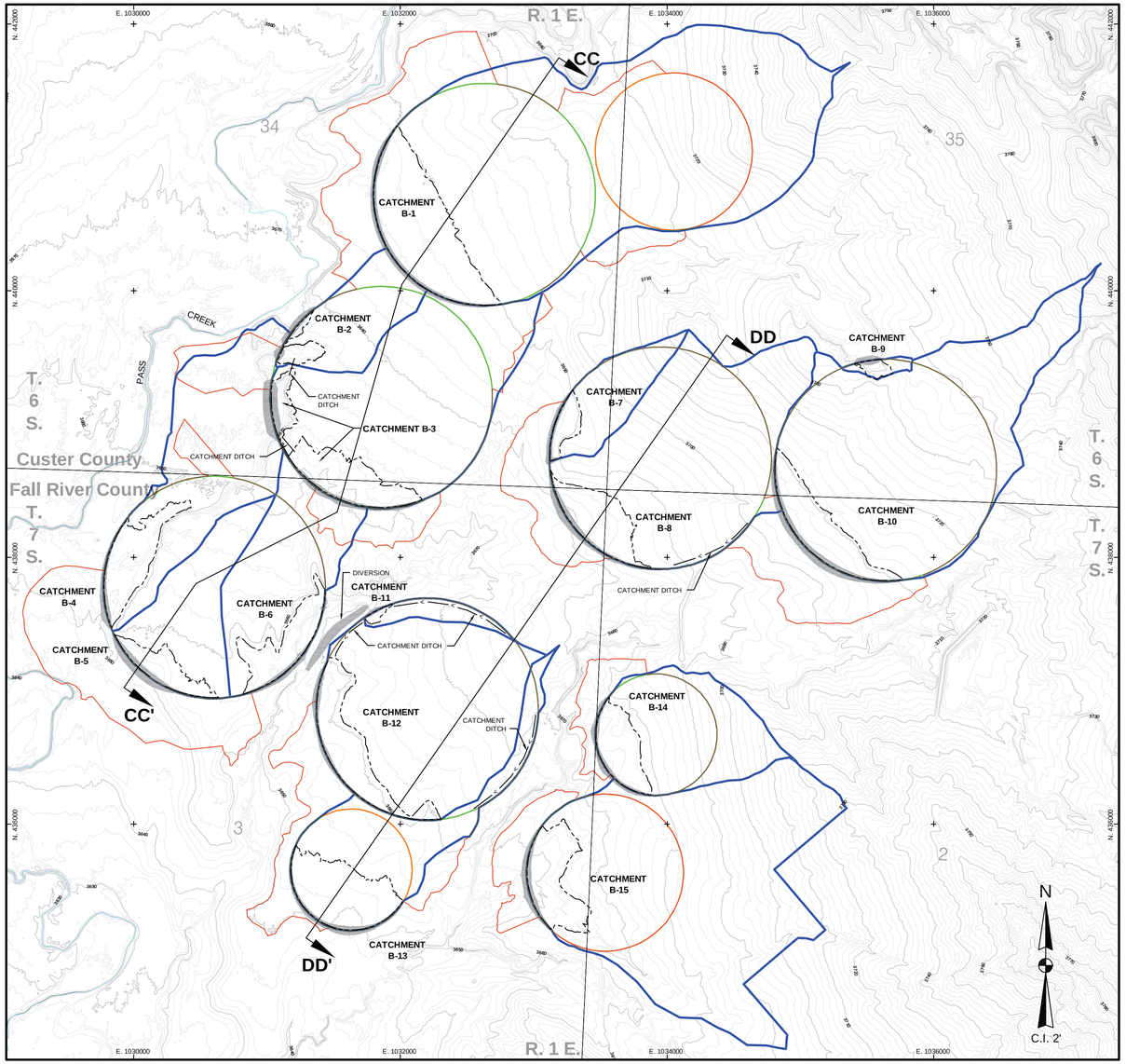
PLOT DATE 3 July 2012 | DATE 3 July 2012
DRAWN DCJ | PDF FILE
CHECKED DEB | CAD FILE K:\Powertech\12091\DWGS\CATCHMENT_PONDS.dwg
COORDS NAD 27, South Dakota State Plane South (feet)

POWERTECH (USA) INC.

Plate 5.4-1

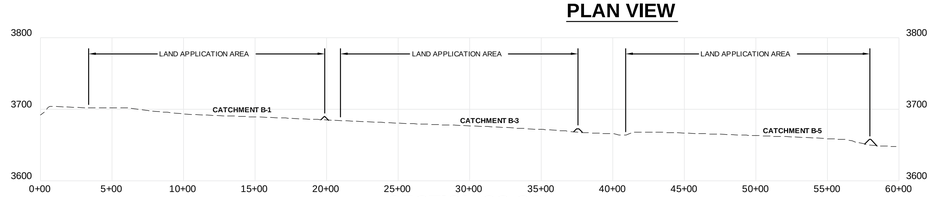
Conceptual Catchment Area Design
Dewey Land Application Area

Dewey-Burdock Project



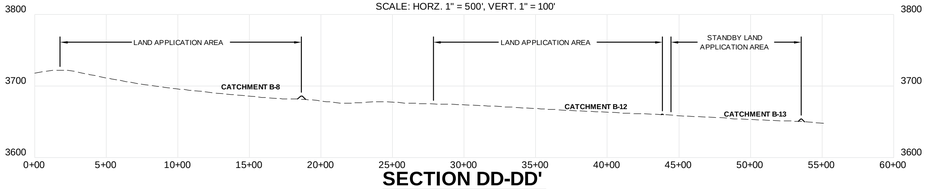
PLAN VIEW

Feet
0 250 500 1,000 1,500 2,000
0 125 250 500
Meters



SECTION CC-CC'

SCALE: HORZ. 1" = 500', VERT. 1" = 100'



SECTION DD-DD'

SCALE: HORZ. 1" = 500', VERT. 1" = 100'

NOTES:

1. INACTIVE CAPACITY IS THE AVAILABLE STORAGE CAPACITY FOR EACH CATCHMENT AREA ALLOWING ADEQUATE FREEBOARD CAPACITY FOR THE 100-YEAR, 24-HOUR STORM RUNOFF.
2. THE GENERAL CATCHMENT BOUNDARY THAT IS SHOWN IS THE SAME AS SHOWN ON OTHER FIGURES IN THIS APPLICATION. THE ACTUAL BOUNDARY WILL VARY DEPENDING UPON THE FINAL DESIGN OF THE CATCHMENT AREAS. THE CONCEPTUAL CATCHMENT AREA DESIGN SHOWN ON THIS PLATE IS WITHIN THE GENERAL CATCHMENT BOUNDARY.

CATCHMENT B-1 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3686.0	0.46			0.00	INACTIVE CAPACITY 1.82 ac-ft
		1.13	0.57		
3686.5	1.80			0.57	
		2.49	1.25		
3687.0	3.17			1.82	
		3.91	1.96		
3687.5	4.65			3.78	
		5.40	2.70		
3688.0	6.15			6.48	
		7.12	3.56		
3688.5	8.09			10.04	
		8.93	4.47		
3689.0	9.78			14.51	
		10.64	5.32		
3689.5	11.50			19.83	
		12.37	6.19		
3690.0	13.24			26.02	100yr FREEBOARD 24.20 ac-ft

CATCHMENT B-2 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3670.5	0.01			0.00	INACTIVE CAPACITY 0.00 ac-ft
		0.03	0.02		
3671.0	0.04			0.02	
		0.06	0.03		
3671.5	0.08			0.05	
		0.11	0.06		
3672.0	0.14			0.11	
		0.18	0.09		
3672.5	0.21			0.20	
		0.25	0.13		
3673.0	0.29			0.33	
		0.38	0.19		
3673.5	0.47			0.52	
		0.48	0.24		
3674.0	0.48			0.76	
		0.66	0.33		
3674.5	0.83			1.09	
		0.92	0.46		
3675.0	1.01			1.55	
		1.11	0.56		
3675.5	1.21			2.11	100yr FREEBOARD 2.11 ac-ft

CATCHMENT B-3 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3664.0	0.16			0.00	
		0.20	0.10		
3664.5	0.23			0.10	
		0.25	0.13		
3665.0	0.27			0.23	
		0.30	0.15		
3665.5	0.32			0.38	
		0.35	0.18		
3666.0	0.37			0.56	
		0.41	0.21		
3666.5	0.44			0.77	
		0.47	0.24		
3667.0	0.49			1.01	
		0.52	0.26		
3667.5	0.55			1.27	
		0.58	0.29		
3668.0	0.61			1.56	
		0.64	0.32		
3668.5	0.67			1.88	
		0.72	0.36		
3669.0	0.76			2.24	
		0.85	0.43		
3669.5	0.94			2.67	
		1.19	0.60		
3670.0	1.44			3.27	
		1.72	0.86		
3670.5	1.99			4.13	
		2.27	1.14		
3671.0	2.54			5.27	
		2.87	1.44		
3671.5	3.20			6.71	
		3.66	1.83		
3672.0	4.12			8.54	
		4.91	2.46		
3672.5	5.70			11.00	
		6.32	3.16		
3673.0	6.93			14.16	INACTIVE CAPACITY 4.13 ac-ft; 100yr FREEBOARD 10.03 ac-ft

CATCHMENT B-4 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3653.5	0.01			0.00	
		0.11	0.06		
3654.0	0.20			0.06	
		0.32	0.16		
3654.5	0.44			0.22	INACTIVE CAPACITY 0.90 ac-ft
		0.55	0.28		
3655.0	0.65			0.50	
		0.80	0.40		
3655.5	0.94			0.90	
		1.28	0.64		
3656.0	1.61			1.54	
		2.25	1.13		
3656.5	2.88			2.67	
		3.21	1.61		
3657.0	3.54			4.28	
		3.90	1.95		
3657.5	4.25			6.23	
		4.62	2.31		
3658.0	4.99			8.54	100yr FREEBOARD 7.64 ac-ft

CATCHMENT B-5 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3652.0	0.05			0.00	
		0.11	0.06		
3652.5	0.16			0.06	
		0.22	0.11		
3653.0	0.28			0.17	
		0.35	0.18		
3653.5	0.41			0.35	
		0.49	0.25		
3654.0	0.56			0.60	
		0.63	0.32		
3654.5	0.69			0.92	
		0.77	0.39		
3655.0	0.84			1.31	
		0.92	0.46		
3655.5	0.99			1.77	
		1.08	0.54		
3656.0	1.16			2.31	
		1.29	0.65		
3656.5	1.41			2.96	
		1.56	0.78		
3657.0	1.70			3.74	
		1.91	0.95		
3657.5	2.11			4.69	
		2.25	1.13		
3658.0	2.39			5.82	INACTIVE CAPACITY 1.31 ac-ft; 100yr FREEBOARD 4.51 ac-ft

CATCHMENT B-6 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3652.5	0.02			0.00	
		0.03	0.02		
3653.0	0.04			0.02	
		0.05	0.03		
3653.5	0.05			0.05	
		0.10	0.05		
3654.0	0.14			0.10	
		0.41	0.21		
3654.5	0.68			0.31	
		0.89	0.45		
3655.0	1.10			0.76	
		1.33	0.67		
3655.5	1.55			1.43	
		1.96	0.98		
3656.0	2.36			2.41	
		2.63	1.32		
3656.5	2.89			3.73	
		3.11	1.56		
3657.0	3.33			5.29	
		3.58	1.79		
3657.5	3.82			7.08	
		4.11	2.06		
3658.0	4.39			9.14	INACTIVE CAPACITY 2.41 ac-ft; 100yr FREEBOARD 6.73 ac-ft

CATCHMENT B-7 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3687.5	0.03			0.00	
		0.13	0.07		
3688.0	0.22			0.07	
		0.33	0.17		
3688.5	0.43			0.24	
		0.55	0.28		
3689.0	0.66			0.52	
		0.78	0.39		
3689.5	0.90			0.91	
		1.03	0.52		
3690.0	1.15			1.43	
		1.31	0.66		
3690.5	1.46			2.09	INACTIVE CAPACITY 0.52 ac-ft; 100yr FREEBOARD 1.57 ac-ft

CATCHMENT B-8 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3679.5	0.00			0.00	
		0.04	0.02		
3680.0	0.08			0.02	
		0.14	0.07		
3680.5	0.20			0.09	
		0.29	0.15		
3681.0	0.37			0.24	
		0.49	0.25		
3681.5	0.60			0.49	
		0.76	0.38		
3682.0	0.92			0.87	
		1.11	0.56		
3682.5	1.29			1.43	
		1.48	0.74		
3683.0	1.66			2.17	
		1.88	0.94		
3683.5	2.09			3.11	
		2.39	1.20		
3684.0	2.68			4.31	
		2.97	1.49		
3684.5	3.26			5.80	
		3.52	1.76		
3685.0	3.77			7.56	
		4.04	2.02		
3685.5	4.31			9.58	
		4.63	2.32		
3686.0	4.94			11.90	INACTIVE CAPACITY 0.24 ac-ft; 100yr FREEBOARD 11.66 ac-ft

CATCHMENT B-9 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3726.5	0.01			0.00	
		0.02	0.01		
3727.0	0.03			0.01	
		0.05	0.03		
3727.5	0.06			0.04	
		0.08	0.04		
3728.0	0.10			0.08	
		0.12	0.06		
3728.5	0.13			0.14	
		0.15	0.08		
3729.0	0.16			0.22	
		0.18	0.09		
3729.5	0.20			0.31	
		0.22	0.11		
3730.0	0.23			0.42	
		0.27	0.14		
3730.5	0.31			0.56	
		0.35	0.18		
3731.0	0.38			0.74	
		0.43	0.22		
3731.5	0.47			0.96	
		0.52	0.26		
3732.0	0.56			1.22	INACTIVE CAPACITY 0.74 ac-ft; 100yr FREEBOARD 0.48 ac-ft

CATCHMENT B-10 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3705.0	0.08			0.00	
		0.20	0.10		
3705.5	0.31			0.10	
		0.50	0.25		
3706.0	0.69			0.35	
		0.92	0.46		
3706.5	1.15			0.81	
		1.38	0.69		
3707.0	1.60			1.50	
		1.86	0.93		
3707.5	2.11			2.43	
		2.38	1.19		
3708.0	2.64			3.62	
		2.97	1.49		
3708.5	3.30			5.11	
		3.61	1.81		
3709.0	3.92			6.92	
		4.25	2.13		
3709.5	4.57			9.05	
		4.92	2.46		
3710.0	5.27			11.51	
		5.69	2.85		
3710.5	6.10			14.36	
		6.18	0.62		
3710.6	6.26			14.98	INACTIVE CAPACITY 0.30 ac-ft; 100yr FREEBOARD 14.63 ac-ft

CATCHMENT B-11 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3661.5	0.00			0.00	
		0.02	0.01		
3662.0	0.03			0.01	
		0.05	0.03		
3662.5	0.06			0.04	
		0.09	0.05		
3663.0	0.11			0.09	
		0.14	0.07		
3663.5	0.16			0.16	
		0.21	0.11		
3664.0	0.25			0.27	INACTIVE CAPACITY 0.00 ac-ft; 100yr FREEBOARD 0.27 ac-ft

CATCHMENT B-12 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3656.5	0.04			0.00	
		0.10	0.05		
3657.0	0.16			0.05	
		0.10	0.05		
3657.5	0.04			0.10	
		0.02	0.01		
3658.0	0.00			0.11	
		0.74	0.37		
3658.5	1.47			0.48	
		1.91	0.95		
3659.0	2.35			1.43	
		2.87	1.44		
3659.5	3.38			2.87	
		3.93	1.97		
3660.0	4.47			4.84	
		5.63	2.82		
3660.5	6.78			7.66	INACTIVE CAPACITY 0.00 ac-ft; 100yr FREEBOARD 7.66 ac-ft

CATCHMENT B-13 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3648.5	0.00			0.00	
		0.04	0.02		
3649.0	0.08			0.02	
		0.17	0.09		
3649.5	0.25			0.11	
		0.40	0.20		
3650.0	0.54			0.31	
		0.74	0.37		
3650.5	0.94			0.68	
		1.21	0.61		
3651.0	1.47			1.29	
		1.80	0.90		
3651.5	2.13			2.19	
		2.57	1.29		
3652.0	3.00			3.48	
		3.66	1.83		
3652.5	4.32			5.31	
		4.82	2.41		
3653.0	5.31			7.72	
		5.79	2.90		
3653.5	6.27			10.62	
		6.82	3.41		
3654.0	7.36			14.03	INACTIVE CAPACITY 7.72 ac-ft; 100yr FREEBOARD 6.31 ac-ft

CATCHMENT B-14 AREA CAPACITY TABLE

ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3674.0	0.05			0.00	
		0.08	0.04		
3674.5	0.11			0.04	
		0.19	0.10		
3675.0	0.26			0.14	
		0.28	0.14		
3675.5	0.29			0.28	
		0.59	0.30		
3676.0	0.89			0.58	
		1.23	0.62		
3676.5	1.56			1.20	
		1.79	0.90		
3677.0	2.02			2.10	
		2.26	1.13		
3677.5	2.49			3.23	
		2.80	1.40		
3678.0	3.10			4.63	
		3.52	1.76		
3678.5	3.93			6.39	INACTIVE CAPACITY 0.58 ac-ft; 100yr FREEBOARD 5.81 ac-ft

CATCHMENT B-15 AREA CAPACITY TABLE

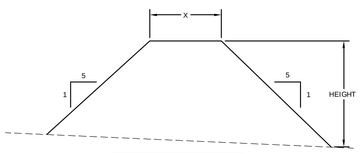
ELEVATION (ft)	AREA (ac)	AVG. AREA (ac)	CAPACITY (ac-ft) INCR.	CAPACITY (ac-ft) ACCUM.	
3655.5	0.50			0.00	
		0.53	0.27		
3656.0	0.55			0.27	
		0.58	0.29		
3656.5	0.61			0.56	
		0.64	0.32		
3657.0	0.67			0.88	
		0.70	0.35		
3657.5	0.73			1.23	
		0.76	0.38		
3658.0	0.79			1.61	
		0.83	0.42		
3658.5	0.86			2.03	
		0.89	0.45		
3659.0	0.92			2.48	
		0.96	0.48		
3659.5	0.99			2.96	
		1.03	0.52		
3660.0	1.06			3.48	
		1.16	0.58		
3660.5	1.26			4.06	
		1.39	0.70		
3661.0	1.52			4.76	
		1.71	0.86		
3661.5	1.89			5.62	
		2.12	1.06		
3662.0	2.34			6.68	
		2.63	1.32		
3662.5	2.92			8.00	
		3.19	1.60		
3663.0	3.45			9.60	
		3.74	1.87		
3663.5	4.02			11.47	
		4.36	2.18		
3664.0	4.70			13.65	
		5.06	2.53		
3664.5	5.41			16.18	INACTIVE CAPACITY 0.00 ac-ft; 100yr FREEBOARD 16.18 ac-ft

Burdock Land Application Catchment Summary

Catchment Designation	Drainage Area (acres)	Drainage Area (mi^2)	2-Year Runoff Volume (acre-ft)	100-Year Runoff Volume (acre-ft)	Catchment Area (acres)	Catchment Capacity (acre-ft)	Catchment Height (ft)	2-Year Depth (ft)
B-1	107.88	0.17	4.47	23.85	13.24	26.02	5.1	2.0
B-2	12.24	0.02	0.53	2.81	1.21	2.11	7.6	3.0
B-3	45.91	0.07	1.84	9.82	6.93	14.16	11.0	4.5
B-4	33.24	0.05	1.32	7.01	4.99	8.54	8.0	2.5
B-5	17.38	0.03	0.79	4.21	2.39	5.82	8.9	2.5
B-6	24.15	0.04	1.05	5.61	4.39	9.14	5.1	3.0
B-7	9.58	0.01	0.28	1.45	1.46	2.09	5.5	1.5
B-8	48.08	0.08	2.27	11.60	4.94	11.90	8.6	4.0
B-9	1.16	0.00	0.19	0.46	0.56	1.22	6.0	2.5
B-10	64.09	0.10	2.84	14.50	6.26	14.98	8.3	3.0
B-11	3.15	0.00	0.51	1.26	0.25	0.27	4.0	2.5
B-12	44.24	0.07	1.45	8.85	6.78	7.66	6.0	2.5
B-13	23.15	0.04	1.14	5.80	7.36	14.03	6.2	2.5
B-14	22.41	0.04	1.14	5.80	3.93	6.39	6.5	2.5
B-15	70.46	0.11	3.12	15.95	5.41	16.18	8.6	4.5
			Total:	**22.94**	**118.98**	**70.10**	**140.51**	

Notes:

1. Overflow from Catchment B-2 will be routed to Catchment B-3.
2. Overflow from Catchment B-11 will be routed to Catchment B-12.
3. Overflow from Catchment B-12 will be routed to Catchment B-13.



HEIGHT (FT)	X (ft)
≤6	5
6-8	8
8-10	10
>10	15

TYPICAL CATCHMENT BERM SECTION

NTS

LEGEND

- PRIMARY LAND APPLICATION AREA
- STANDBY LAND APPLICATION AREA
- DRAINAGE BOUNDARY
- GENERAL CATCHMENT BOUNDARY
- MAXIMUM WATER LEVEL
- CATCHMENT BERM FOOTPRINT

CONSULTANT

REF

REVISIONS

#	DRAWN	CHECKED	APPROVED	DATE

PLOT DATE 3 July 2012 | DATE 3 July 2012
DRAWN DCJ | PDF FILE
CHECKED DEB | CAD FILE K:\Powertech\12091\DWGS\CATCHMENT_PONDS.dwg

POWERTECH (USA) INC.

Plate 5.4-2

Conceptual Catchment Area Design
Burdock Land Application Area

Dewey-Burdock Project

COORDS NAD 27, South Dakota State Plane South (feet)

WWC ENGINEERING
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August 10, 2012

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

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

Dear Mr. Hicks:

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

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

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

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

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

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

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

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

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

Powertech (USA) will record daily precipitation totals and use this information along with the daily catchment area monitoring results to evaluate whether the catchment areas accumulate water during normal operations (i.e., dry conditions). If water accumulates in the catchment areas during dry conditions, Powertech (USA) will implement a dewatering program. The accumulated water will be conveyed to the storage ponds or pumped to a land application pivot area (primary or standby area). In the annual report following each land application cycle, Powertech (USA) will provide the results of daily catchment area monitoring and a description of any dewatering activities.

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

Sincerely,

Jack W. Fritz

Jack Fritz, P.E.
WWC Project Manager

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

Encl: Change Index
Replacement Pages

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Dewey-Burdock Project
Groundwater Discharge Plan
Revision Index

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

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

Table 6.1-3: Water Quality Parameter List

Test Analyte/Parameter	Units	Analytical Method
Physical Properties		
pH ≠	pH units	A4500-H B
Total Dissolved Solids (TDS) +	mg/L	A2540 C
Conductivity	µmhos/cm	A2510 B
Common Elements and Ions		
Alkalinity (as $CaCO_3$)	mg/L	A2320 B
Bicarbonate Alkalinity (as $CaCO_3$)	mg/L	A2320 B (as HCO_3)
Calcium	mg/L	E200.7
Carbonate Alkalinity (as $CaCO_3$)	mg/L	A2320 B
Chloride, Cl	mg/L	A4500-Cl B; E300.0
Magnesium, Mg	mg/L	E200.7
Nitrate, NO_3^- (as Nitrogen)	mg/L	E300.0
Potassium, K	mg/L	E200.7
Sodium, Na	mg/L	E200.7
Sulfate, SO_4	mg/L	A4500-SO4 E; E300.0
Trace and Minor Elements[1]		
Arsenic, As	mg/L	E200.8
Barium, Ba	mg/L	E200.8
Boron, B	mg/L	E200.7
Cadmium, Cd	mg/L	E200.8
Chromium, Cr	mg/L	E200.8
Copper, Cu	mg/L	E200.8
Fluoride, F	mg/L	E300.0
Iron, Fe	mg/L	E200.7
Lead, Pb	mg/L	E200.8
Manganese, Mn	mg/L	E200.8
Mercury, Hg	mg/L	E200.8
Molybdenum, Mo	mg/L	E200.8
Nickel, Ni	mg/L	E200.8
Selenium, Se	mg/L	E200.8, A3114 B
Silver, Ag	mg/L	E200.8
Uranium, U	mg/L	E200.7, E200.8
Vanadium, V	mg/L	E200.7, E200.8
Zinc, Zn	mg/L	E200.8
Radiological Parameters[1,2]		
Gross Alpha††	pCi/L	E900.0
Gross Beta	pCi/L	E900.0
Radium, Ra-226	pCi/L	E903.0

≠ Field and laboratory
+ Laboratory only
††Excluding radon, radium, and uranium
[1] For alluvial compliance and interior well sampling, the concentrations of trace and minor elements and radiological parameters will be the dissolved portion, except mercury, which will be the total, unfiltered concentration in accordance with ARSD 74:54:01:04.
[2] The parameter list for alluvial compliance and interior wells also will include radon-222 and radium-228.

6.4 Soil

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

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

Table 6.4-1: Soil Sampling Parameters

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

6.5 Vegetation

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

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

8.3 Soil

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

Salinity and EC

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

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

Radionuclides

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

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

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

11.0 REPORTING

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

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

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

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

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

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

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October 18, 2012

Matt Hicks
Senior Hydrologist
Groundwater Quality Program
South Dakota Department of Environment & Natural Resources
523 East Capitol Avenue
Joe Foss Building
Pierre, SD 57501-3181

Re: Response to September 19 Technical Comment
Dewey-Burdock Project Groundwater Discharge Plan Application

Dear Mr. Hicks:

On behalf of Powertech (USA) Inc. (Powertech), this letter is provided in response to a technical comment received verbally on September 19, 2012 for the above referenced application for a Groundwater Discharge Plan (GDP). For convenience, the comment is provided below along with the response.

Technical Comment: Address whether prairie dog burrows have the potential to provide a pathway for land application effluent to reach groundwater or to transport land application solutions deeper into the soil column.

Response: Powertech has evaluated the potential for prairie dog burrows to impact groundwater or transport land application solutions deeper into the soil column and has concluded that potential impacts are limited to catchment areas. Following is a description of the extents of prairie dog colonies within the proposed land application and catchment areas, an assessment of potential impacts, and a description of monitoring and mitigation measures that will be implemented to address potential impacts.

<u>Extent of Prairie Dog Colonies within Proposed Land Application Areas</u>
No prairie dog colonies are known to exist within the proposed Burdock land application or catchment areas. Figure 1 (enclosed) depicts the approximate extents of prairie dog colonies within the vicinity of the proposed Dewey land application and catchment areas. The approximate extents are based on high-resolution aerial imagery photographed in 2008 as part of the topographic survey of the project area and wildlife surveys conducted in 2007 and 2008. This figure shows that approximately 50% of the proposed Dewey land application and catchment areas coincide with prairie dog colonies.

Powertech assessed the density of burrow entrances within prairie dog colonies using the 2008 aerial imagery. Using ArcGIS, 1-acre squares were drawn at 12 randomly selected locations within the prairie dog colonies, and the density was determined by counting the number of

burrow entrances within each square. The density was found to range from 4 to 20 burrow entrances per acre, averaging approximately 10 burrow entrances per acre. The Montana Field Guide for the Black-Tailed Prairie Dog (Montana, 2012) indicates that burrow density varies substantially, with a typical range of 20 to 50 burrow entrances per acre. The average density in the project area is lower than this typical range.

According to Hoogland (1995), the average burrow entrance diameter is 4 to 12 inches. Verdolin et al. (2008) show that the maximum burrow depth for the black-tailed prairie dog ranged from about 1.5 to 2.3 meters (4.9 to 7.5 feet) in three previous studies.

Potential Impacts from Prairie Dog Colonies

Powertech evaluated whether the prairie dog burrows will have the potential to transport land application effluent into groundwater or deeper in the soil column. This evaluation included potential impacts in the land application areas and in the catchment areas. The results of the evaluation are described below.

Potential impacts within land application areas generally will be limited to direct capture of the effluent from the sprinklers in the burrow entrances, since the burrow entrances typically are not located in drainages prone to surface runoff. An estimate of the quantity of land application effluent captured by the burrow entrances was calculated as follows. Conservatively assuming a burrow entrance density of 20 entrances per acre (the highest value in the 12 site-specific measurements described previously) and an average diameter of 12 inches (the upper range of the typical values described previously), the total burrow entrance area per acre of prairie dog colony is up to 16 square feet. Multiplying this by 315 acres (the primary pivot area in Table 5.1-1 of the GDP application) times 50% (the proportion of land application area coinciding with prairie dog colonies) yields a total estimated burrow entrance area of up to 2,500 square feet. This is equal to approximately 0.018% of the 315-acre primary pivot area.

The peak design application rate is 653 gpm (Table 5.1-1 of the GDP application). Multiplying this rate by the percentage of the area occupied by burrow entrances (0.018%) yields an estimate of approximately 0.12 gpm of land application effluent entering all of the burrow entrances during the peak land application season. Since this would be distributed over thousands of burrow entrances, Powertech concludes that the potential to transport land application effluent into groundwater or deeper into the soil column will be negligible. It is anticipated that this small amount of water may cause a slight increase in moisture around the burrow entrance, but it will be insufficient to accumulate in the burrows or impact groundwater. The potential impacts are anticipated to decrease during land application system operation, since the prairie dogs likely will relocate from the irrigated fields due to the temporary change in habitat resulting from irrigation. Some of the burrow entrances are anticipated to collapse and fill in due to lack of maintenance.

In the catchment areas, the prairie dog burrows could result in increased potential to impact groundwater if the entrances coincide with ponded water and if the burrows overlie alluvial groundwater. The potential impacts to groundwater quality will be limited by the following factors:

- Quality of ponded water: As described in the GDP application, Powertech will operate the land application solutions to prevent water from accumulating in the catchment areas during normal operations (i.e., dry conditions). If land application effluent accumulates in the catchment areas, Powertech will implement a dewatering program. Therefore, water in the catchment areas primarily will consist of runoff and snowmelt, the quality of which generally will be higher than that of the alluvial groundwater.
- Quantity of ponded water: As described in the GDP application, Powertech will maintain adequate freeboard volume in the catchment areas for the 100-year, 24-hour storm event. Powertech will adjust the land application rate or pump water from the catchment areas if the freeboard capacity limits are approached. Maintaining freeboard for the 100-year, 24-hour storm event will limit the areal extents of ponded water in the catchment areas.
- Burrow depth: Based on ambient monitoring from July through October 2012, the average depth to water in the Dewey alluvial compliance wells ranged from about 11 to 20 feet and averaged approximately 16.5 feet. By comparison, the maximum burrow depth from previous studies ranges from approximately 4.9 to 7.5 feet. Therefore, even where a burrow entrance within a catchment area could be submerged, it would not provide a direct conduit to groundwater.

To further limit potential impacts, Powertech commits to evaluating prairie dog burrow entrances during final catchment area design and determining whether the potential exists to provide a pathway to groundwater. The evaluation will consist of mapping burrow entrances within each catchment area, evaluating the likelihood that one or more burrow entrances will be submerged, and evaluating the proximity to groundwater. If the potential exists to impact groundwater, Powertech will mitigate specific burrow entrances during the construction of the catchment areas. Typically grading within the catchment areas is anticipated to be sufficient to plug the entrances. If needed, additional measures may be used such as plugging the burrow with bentonite slurry.

Potential impacts to groundwater will be monitored using the various monitoring systems described in the GDP application. These include suction lysimeters beneath each land application pivot area and catchment area to monitor potential impacts to vadose-zone groundwater quality, interior wells to detect potential changes in alluvial water quality within the POP zone, and compliance wells to assess compliance with the permitted allowable limits at the edge of the POP zone.

References

Hoogland, J.L., 1995, *The Black-Tailed Prairie Dog: Social Life of a Burrowing Mammal*, The University of Chicago Press.

Montana, 2012, Montana Field Guide for the Black-tailed Prairie Dog - *Cynomys ludovicianus*. Available from the Internet as of September 2012: http://fieldguide.mt.gov/detail_AMAFB06010.aspx.

Verdolin, J.L., K. Lewis and C.N. Slobodchikoff, 2008, Morphology of Burrow Systems: A Comparison of Gunnison's (*Cynomys gunnisoni*), White-Tailed (*C. leucurus*), Black-Tailed (*C. ludovicianus*), and Utah (*C. parvidens*) Prairie Dogs, The Southwestern Naturalist 53(2):201-207, June 2008.

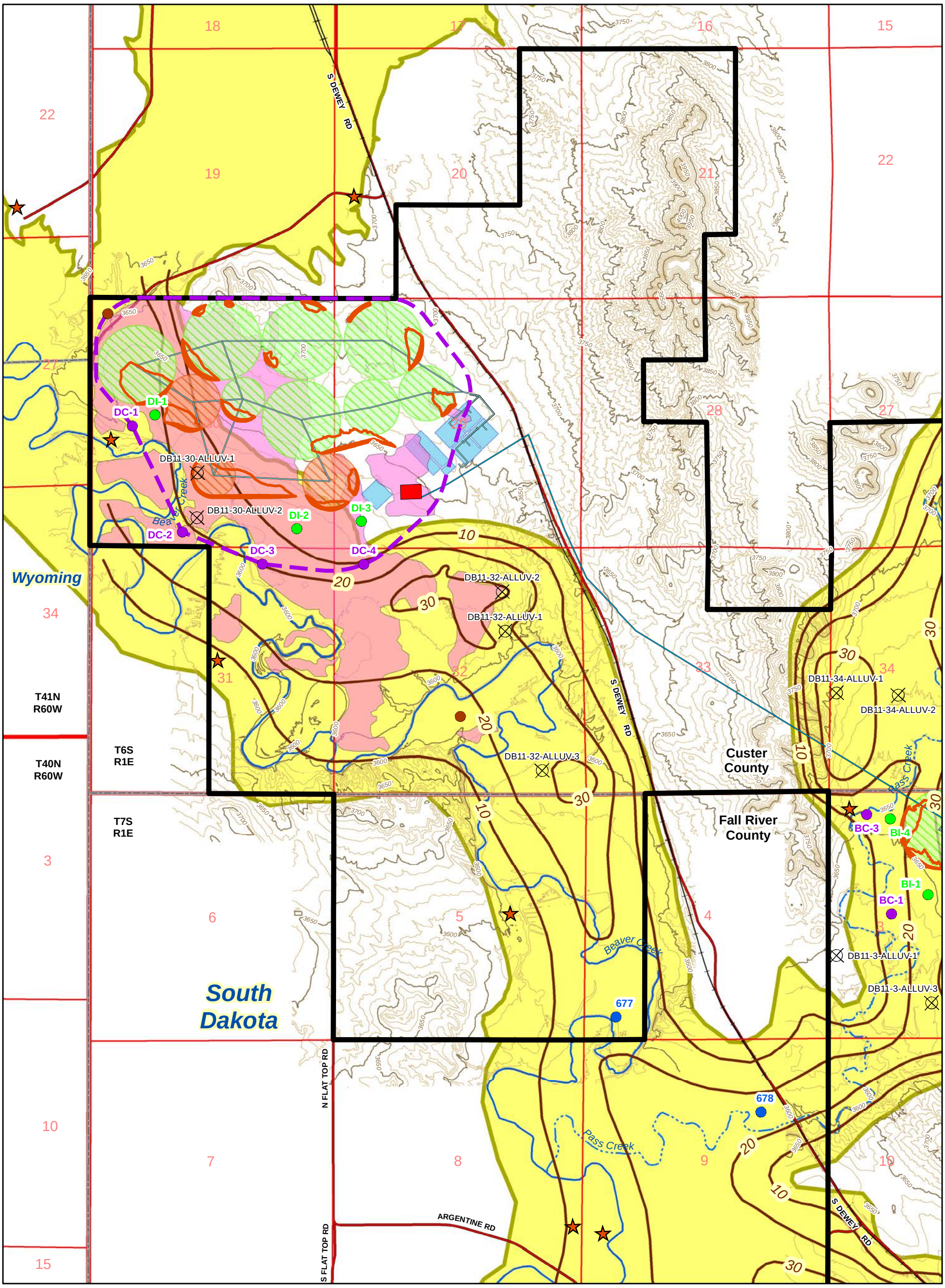
Please direct any questions regarding this comment response to Richard Blubaugh at (303) 790-7528 or Jack Fritz at (307) 672-0761.

Sincerely,

Jack Fritz, P.E.
WWC Project Manager

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

Encl: Figure 1: Approximate Extents of Prairie Dog Colonies
K:\Powertech\12091\Corres\GDP Technical Review Responses_2012-10-18.docx



Legend

- Residences
- Project Boundary
- Dewey POP Zone
- Catchment Areas (Preliminary Design)
- Pipelines
- BNSF Railroad
- County Roads
- Mapped Alluvium
- Processing Plants
- Ephemeral Streams
- Perennial Streams
- Land Application
- Standby Land Application
- Structure Contour Line
- Ponds
- Geotechnical Hole
- Existing Alluvial Well
- Proposed Compliance Well
- Proposed Interior Well
- Proposed Other Alluvial Monitor Well
- Approximate Extent of Prairie Dog Colonies

Feet: 0, 1,000, 2,000, 4,000
Meters: 0, 500, 1,000

N

Figure 1

Approximate Extents of Prairie Dog Colonies

Dewey-Burdock Project

DRAWN BY	S. Hetrick
DATE	17-Oct-2012
FILENAME	PrairieDogAlluvial2.mxd

POWERTECH (USA) INC.

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November 21, 2012

Mr. Matt Hicks
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Re: Response to August 7 Technical Comment
Dewey-Burdock Project Groundwater Discharge Plan Application

Dear Mr. Hicks:

On behalf of Powertech (USA) Inc. (Powertech), this letter is provided in response to a technical comment received by email on August 7, 2012 for the above-referenced Groundwater Discharge Plan (GDP) application. For convenience, the comment is provided below along with the response. Application replacement pages are enclosed along with an index of changes (two hard copies and one electronic copy on CD).

Technical Comment: I also have a question regarding the static water levels listed for DB11-34-ALLUV-3 and DB11-3-ALLUV-2 on Plate 3.6-10. The log for DB11-34-ALLUV-3 indicates it is a dry hole and Powertech has stated they believe the original SWL listed on the log for DB11-3-ALLUV-2 is in error. Are the SWL on Plate 3.6-10 for these two wells inferred, or were the SWL determined from additional sources not indicated on Plate 3.6-10 or well logs?

Response: The static water levels depicted on Plate 3.6-10 were based on Figure 3.7-8 (Potentiometric Contour Map, Pass Creek and Beaver Creek Alluvium), which was prepared using water level measurements from alluvial wells collected prior to June 2011. The static water levels from uncased geotechnical drill holes including DB11-34-ALLUV-3 and DB11-3-ALLUV-2 were not used to prepare Figure 3.7-8. In response to this technical comment, Powertech updated Figure 3.7-8 and Plate 3.6-10 using 2012 water level measurements, including those collected from the GDP alluvial compliance wells installed in July 2012. The alluvial compliance well data indicated a significant difference between the static water levels and water quality at compliance well BC-2 compared to well 708, which is approximately 219 feet southwest of BC-2 and outside of the proposed perimeter of operational pollution (POP) zone. During October and November 2012, work was conducted to address the discrepancy in static water level and water quality between these two wells. This work included installing and sampling six additional alluvial wells near BC-2 and revising Plate 3.6-10 and Figure 3.7-8. This comment response describes how the recent work confirms the observed water level and water quality variation between BC-2 and 708. The differences are attributed to significant

heterogeneity of the alluvial material. The results of this investigation support the use of BC-2 as a compliance well for the proposed Burdock land application system.

Water Level and Water Quality Comparison between BC-2 and 708

Table 1 summarizes July through November 2012 static water level measurements at BC-2 and 708. The horizontal distance between BC-2 and 708 is 219.22 feet, and the average difference in static water elevation is 15.61 feet. The calculated gradient in the static water elevation is therefore 7.1% between BC-2 and 708. In contrast, the typical alluvial potentiometric surface gradient along Pass Creek is 0.6%. This typical gradient was calculated using the November 2012 static water elevations from wells 678 and 679 (presented in the revised Figure 3.7-8) and an approximate distance between these wells normal to the potentiometric contours of 3.1 miles.

Table 1. BC-2 and 708 Static Water Level Measurements

Parameter	**Hydro ID**	
	BC-2	**708**
Northing[1]	434,253.95	434,084.74
Easting[1]	1,030,548.07	1,030,408.69
TOC Elevation[1]	3,636.33	3,634.37
Ground surface elevation	3,633.90	3,631.26
Horizontal separation (feet)	**219.22**	
Vertical separation based on ground surface elevation (feet)	**2.64**	
July 2012 static water elevation (feet AMSL[2])	3,630.42	3,615.18
August 2012 static water elevation (feet AMSL)	3,630.04	3,614.81
September 2012 static water elevation (feet AMSL)	3,629.86	3,614.53
October 2012 static water elevation (feet AMSL)	3,630.10	3,614.35
November 2012 static water elevation (feet AMSL)	3,630.73	3,614.24
Average static water elevation (feet AMSL)	3,630.23	3,614.62
Average difference in static water elevation (feet)	**15.61**	

[1] Surveyed top of casing (TOC); coordinate system is SD State Plane NAD 27 (feet); vertical datum is NGVD 29.
[2] AMSL - above mean sea level.

In addition to the difference in static water elevation between BC-2 and 708, there also is a notable difference in water quality. The water quality variation is summarized in Table 2, which compares the average water quality at BC-2 with 708 for July through September 2012. Attachment A includes a summary table of individual sample results from BC-2 and 708. Laboratory analytical results from BC-2 have been provided to DENR previously (refer to 9/6/2012, 10/22/2012, and 10/26/2012 email submittals from Lisa Scheinost, Powertech). Laboratory analytical results from 708 are included in Attachment A.

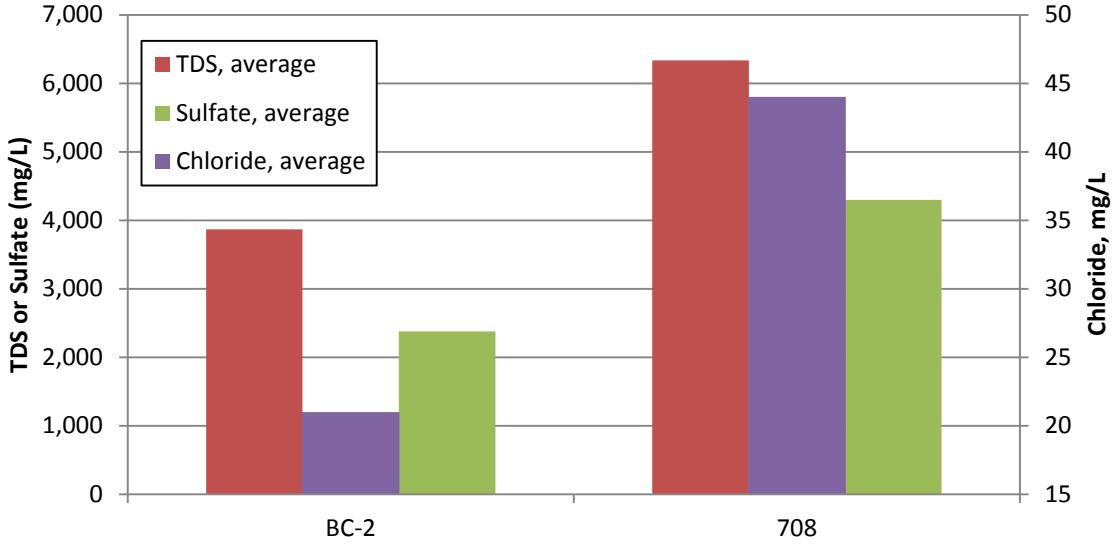
Table 2 shows that the total dissolved solids (TDS) concentration in 708 is nearly twice that of BC-2. Most major ion concentrations are higher in 708 than BC-2. The sodium and chloride concentrations in 708 are more than double those of BC-2. Calcium was the only major ion with a lower concentration in 708 compared to BC-2. Figure 1 illustrates the difference in average water quality for TDS, sulfate and chloride.

Table 2. BC-2 and 708 Average Water Quality[1]

Parameter	Hydro ID		RPD[2]
	BC-2	708	
Total dissolved solids (mg/L)	3,867	6,333	48%
Major cations			
Calcium (mg/L)	527	427	21%
Magnesium (mg/L)	213	509	82%
Sodium (mg/L)	271	704	89%
Major anions			
Bicarbonate (mg/L)	283	361	24%
Carbonate (mg/L)	<5	<5	0%
Chloride (mg/L)	21	44	71%
Sulfate (mg/L)	2,380	4,297	57%

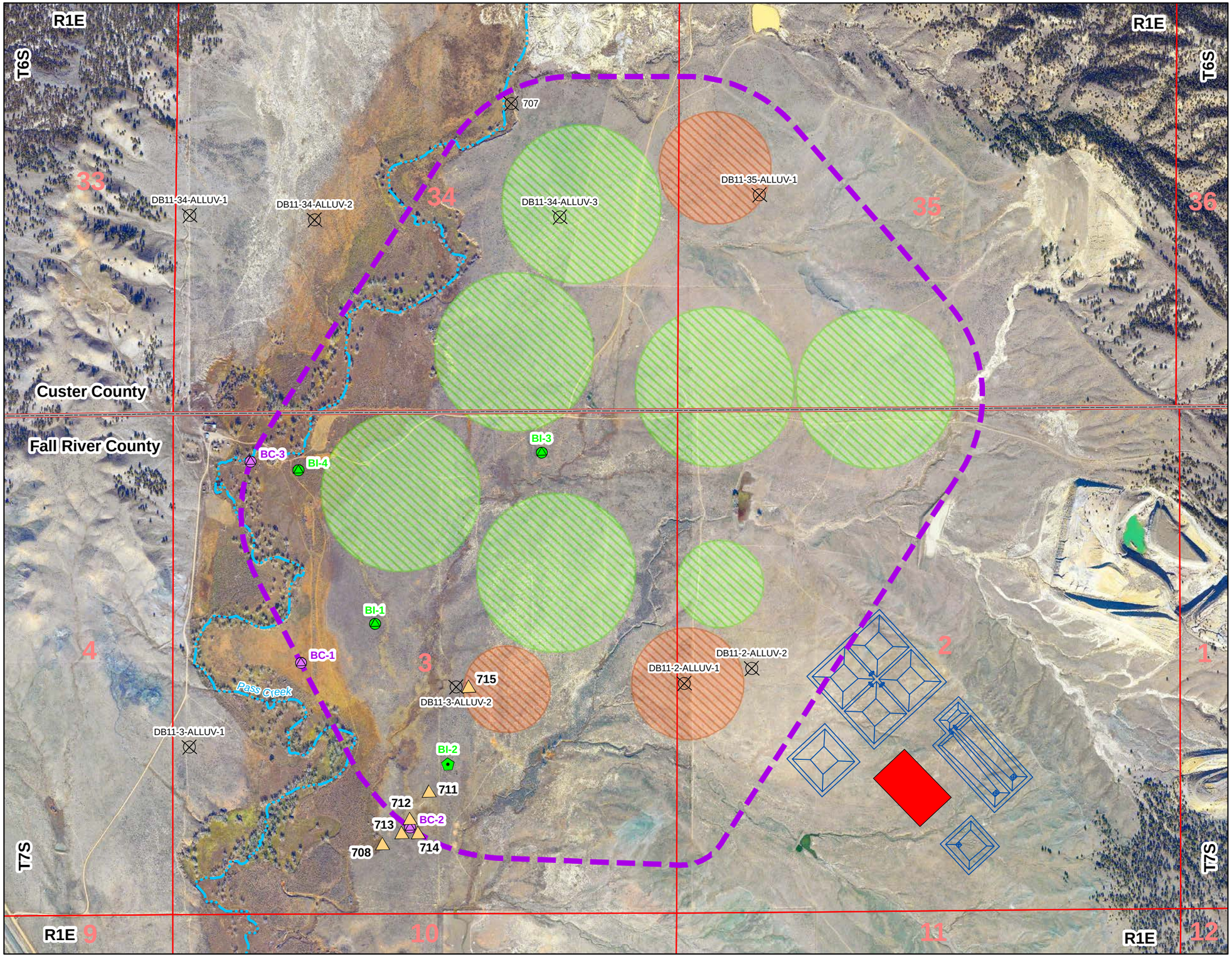
[1] Average July through September 2012 water quality.
[2] RPD - relative percent difference; calculated as the absolute difference divided by the average.

Figure 1. Comparison between BC-2 and 708 Water Quality



October and November 2012 Alluvial Characterization Activities

Additional characterization of the alluvial groundwater level and water quality in the vicinity of BC-2 and 708 was performed in October and November 2012. This work was conducted to assess the discrepancy in static water elevations and water quality previously observed at BC-2 and 708. Six additional alluvial wells were completed in October, the locations of which are depicted on Figure 2. The six wells included three wells offset approximately 100 feet from BC-2 in a triangular fashion, one well installed at approximately the same location as geotechnical hole DB11-3-ALLUV-2, interior well BI-2, and one well installed approximately halfway between BI-2 and BC-2. Attachment B includes a well completion report for the additional alluvial wells. Following is a brief summary of the characterization activities and results.



Legend

- Burdock POP Zone
- Ephemeral Streams
- Alluvial Well
- Alluvial Compliance Well
- Alluvial Interior Well (Proposed)
- Alluvial Interior Well (Existing)
- Central Processing Plant
- Ponds
- Land Application
- Standby Land Application
- Geotechnical Hole

Feet
0 500 1,000 2,000
0 200 400 600
Meters
N

Figure 2

Additional Drilling
near BC-2

Dewey-Burdock Project

DRAWN BY	S. Hetrick
DATE	16-Nov-2012
FILENAME	BC2WellOverallPOP.mxd

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The six new alluvial wells were drilled on October 29-31, 2012 using a geotechnical drilling rig with a hollow-stem auger. Each well was drilled 1 to 2 feet into the Graneros Shale bedrock and screened in the sand, gravel and clay alluvial material above the Graneros. The wells were developed on November 1-2, 2012 using disposable bailers and a peristaltic pump. Static water levels were measured on November 5, 2012 after the wells had stabilized. Water samples were collected on November 6, 2012 after evacuating at least three casing volumes and verifying that field water quality parameters had stabilized. Samples were analyzed for pH, TDS, electrical conductivity, and major ions. Table 3 presents the surveyed coordinates and November 5 depths to water and static water elevations for the six new wells (711 through 715 and BI-2), BC-2 and 708.

Table 3. Additional Alluvial Well Information

Hydro ID	Northing[1]	Easting[1]	TOC Elevation[1] (feet AMSL)	Ground Elevation (feet AMSL)	Depth to Water below TOC[2] (feet)	Static Water Elevation (feet AMSL)
711	434,621.05	1,030,766.04	3,646.09	3,642.99	15.17	3,630.92
712	434,347.43	1,030,551.63	3,636.90	3,633.47	6.54	3630.36
713	434,202.54	1,030,459.68	3,634.86	3,632.22	20.58	3,614.28
714	434,192.58	1,030,635.29	3,641.61	3,638.78	8.50	3633.11
715	435,702.30	1,031,225.61	3,655.88	3,653.11	16.16	3,639.72
BI-2	434,898.92	1,030,980.14	3,650.73	3,647.86	15.13	3,635.60
BC-2	434,253.95	1,030,548.07	3,636.33	3,633.90	5.60	3,630.73
708	434,084.74	1,030,408.69	3,634.37	3,631.26	20.13	3,614.24

[1] Surveyed top of casing (TOC); coordinate system is SD State Plane NAD 27 (feet); vertical datum is NGVD 29.
[2] Water level measurements performed November 5, 2012.

The static water elevations are depicted on revised Figure 3.7-8 (attached). Revised Plate 3.6-10 (attached) includes new Cross Section H-H' drawn through 708 and most of the new alluvial wells. Cross Section H-H' shows a significant thinning of the gravel alluvium at BC-2. This is highlighted by differentiating the gravel from the overlying sand in Cross Section H-H'. Because the lithology descriptions from the previous geotechnical drilling program did not make this distinction, Cross Sections F-F' and G-G' depict a single sand/gravel alluvial unit.

Cross Section H-H' on Plate 3.6-10 shows that the static water elevation at 713, which is approximately halfway between BC-2 and 708, is essentially the same as that at 708. The new wells installed upgradient of BC-2 support the observed static water elevation at BC-2. Generally there is a gradual drop in the static water elevation from 715 to BC-2. The gradient between 715 and BC-2 is 0.6%, which is the same as the typical gradient in the Pass Creek alluvium within the project area.

The installation of well 713, located approximately 100 feet southwest and downgradient of BC-2 and approximately 130 feet northeast of 708, confirms that the static water elevation in the area encompassing 708 and 713 is approximately 16 to 19 feet lower than the static water elevation around BC-2. The installation of additional wells upgradient of BC-2 confirms that the static

water elevations upgradient of BC-2 are consistent with the typical gradient observed along the entire Pass Creek alluvial system within the project area. Further, the data from the six new alluvial wells independently verify past observations from BC-2 and 708. These observations suggest that a lower permeability aquifer material exists somewhere between 713 and BC-2. This abrupt change in permeability manifests itself as a hydraulic barrier. This phenomenon is supported by Cross Section H-H' on Plate 3.6-10, which shows that the basal aquifer materials vary significantly immediately overlying the Graneros Shale. In addition, it is possible the difference in static water elevation is exacerbated by higher-permeability materials downgradient of 708. Water quality differences also provide evidence of a hydraulic barrier, as described below.

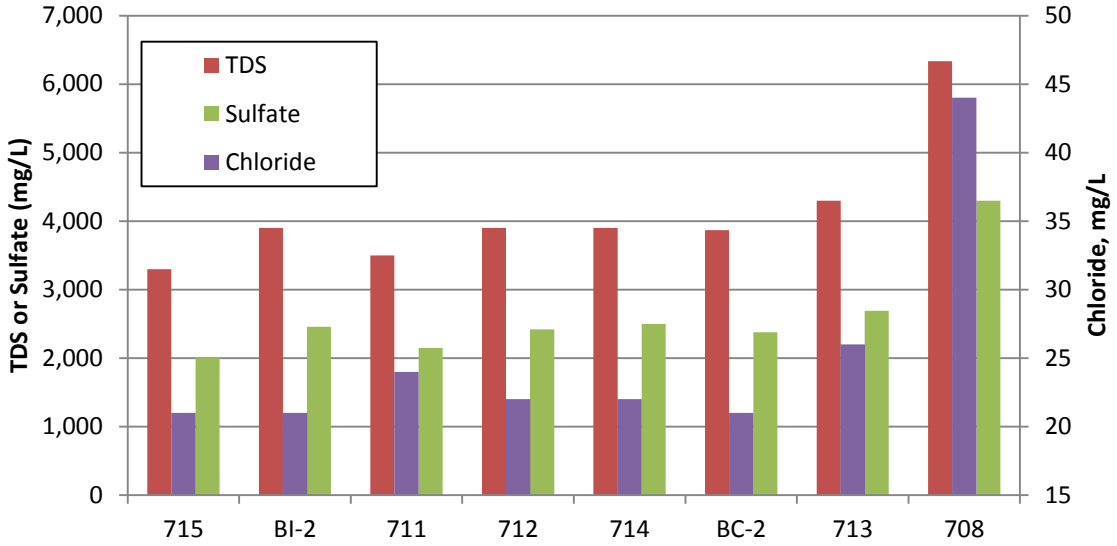
Table 4 and Figure 3 compare the water quality in the wells near BC-2. Figure 3 depicts the concentrations of TDS, sulfate and chloride in the various wells. The wells in Figure 3 are ordered from upgradient (715) to downgradient (708). The water quality is similar in BC-2 to wells upgradient (northeast) of BC-2. The concentrations of TDS, sulfate and chloride increase slightly from BC-2 to 713 then increase significantly from 713 to 708. Notably, the calcium concentration decreases from BC-2 to 713 and from 713 to 708. The wells including and upgradient of BC-2 consistently display lower dissolved solids concentrations, indicating different matrix geochemistry, solubility, and residence time as compared to well 708. Downgradient of BC-2, the dissolved solids concentrations increase markedly, suggesting longer residence times and limited flushing. These results support the conclusion that there is a hydrologic barrier between BC-2 and 708, likely caused by heterogeneity of the basal alluvial material. Attachment A includes laboratory results from November samples from wells 711 through 715 and BI-2. Note that this laboratory report also includes the results of a sample collected from Dewey compliance well DC-3. Those results are unrelated to the investigation around BC-2. Laboratory reports for samples collected from 708 during July through November are included in Attachment A.

Table 4. Water Quality in Additional Alluvial Wells[1]

Hydro ID	TDS (mg/L)	Calcium (mg/l)	Magnesium (mg/L)	Sodium (mg/L)	Bicarbonate (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
711	3,500	497	154	260	275	24	2,150
712	3,900	508	216	294	283	22	2,420
713	4,300	472	274	363	312	26	2,690
714	3,900	491	232	275	280	22	2,500
715	3,300	507	158	166	266	21	2,010
BI-2	3,900	481	246	255	285	21	2,460
BC-2	3,867	527	213	271	283	21	2,380
708	6,333	427	509	704	361	44	4,297

[1] Avg. July-September 2012 concentrations shown for BC-2 and 708; November concentrations shown for all other wells.

Figure 3. Water Quality Comparison in Wells near BC-2



Note: Avg. July-September 2012 concentrations shown for BC-2 and 708; November concentrations shown for all other wells

Static Water Elevation in the Burdock Land Application Area

The results of the recent work confirm the initial depth to water measured at DB11-3-ALLUV-2. Powertech noted in the July 3, 2012 technical comment response that the initial measurement, which was made in an open borehole, was suspected of being made in error. The recent measurement of static water elevation in well 715 confirms that the depth to water is approximately 13 feet below ground surface at this location. The DB11-3-ALLUV-2 borehole log in Appendix 3.6-A has been revised to remove the note that the water level measurement was believed to be in error. In addition, the minimum anticipated depth to groundwater described in Section 8.1.1 of the GDP application has been revised from 25 to 13 feet.

Potential Impacts on the Effectiveness of BC-2 as an Alluvial Compliance Well

The potentiometric surface depicted in Figure 3.7-8 and Cross Section H-H' in Plate 3.6-10 demonstrates that there is a downward hydraulic gradient between the proposed land application areas and BC-2. The results of the recent alluvial characterization work show that BC-2 is upgradient of the postulated lower permeability hydraulic barrier, which is believed to be the cause of the significant difference in static water elevation and water quality between BC-2 and 708. These findings support the conclusion that BC-2 can be used as an effective compliance well to detect potential changes in the alluvial groundwater system from the proposed land application systems.

Please direct any questions regarding this comment response to Richard Blubaugh at (303) 790-7528 or Jack Fritz at (307) 672-0761.

Sincerely,

Jack Fritz, P.E.
WWC Project Manager

cc: Richard Blubaugh
Mark Hollenbeck
John Mays
Mike Cepak, DENR Minerals & Mining Program*
Ronald Burrows, U.S. NRC*
Valois Shea, U.S. EPA, Region 8*
Marian Atkins, BLM*
Max Main, Bennett, Main & Gubbrud, P.C.

*Enclosures provided on CD only

Encl: Change Index and Replacement Pages
Attachment A: Additional Alluvial Characterization Water Quality
Attachment B: Additional Alluvial Characterization Well Completion Report
K:\Powertech\12091\Corres\GDP Technical Review Responses_2012-11-21.docx

Dewey-Burdock Project
Groundwater Discharge Plan
Revision Index

November 21, 2012 Response to August 7, 2012 Technical Comment

Volume	Page, Map or other Permit Entry to be Removed	Page, Map or other Permit Entry to be Added	Description of Change
1	p. 89	p. 89	Updated discussion on alluvial potentiometric contour map.
1	p. 91 (Fig. 3.7-8)	p. 91 (Fig. 3.7-8)	Updated alluvial potentiometric contour map to include November 2012 water level measurements, including those from alluvial compliance wells and additional wells near BC-2.
1	p. 152	p. 152	Corrected reference to Plate 3.6-10; updated minimum observed depth to groundwater in the Burdock land application area from 25 to 13 feet based on the November 2012 static water level measurement from well 715.
1	3.6-A-10 (App. 3.6-A)	3.6-A-10 (App. 3.6-A)	Replaced DB11-3-ALLUV-2 borehole log to remove previous note indicating water measurement was suspected of being made in error.
2	Plate 3.6-10	Plate 3.6-10	Added new Cross Section H-H' and updated Cross Sections F-F' and G-G' to reflect revised potentiometric contours based on November 2012 water level measurements.

falls on the land surface and by infiltration of surface runoff, primarily in the Pass Creek and Bennett Canyon drainages north and east of the project area, respectively.

Within the project area, the Fall River dips gently to the southwest at 2 to 6 degrees away from its outcrop areas. As a result, groundwater flow generally occurs from the northeast to the southwest toward the Powder River Basin.

A potentiometric contour map for the Fall River Formation is shown on Figure 3.7-7. This map is based on representative water level measurements taken over a 5-day period from April 25 through April 29, 2011. The potentiometric contour map for the Fall River Formation shows a relatively uniform hydraulic gradient across the project area, with the potentiometric levels decreasing to the southwest.

A shallow, perched groundwater system exists within some of the alluvium associated with Beaver Creek, Pass Creek, and Bennett Canyon on the eastern edge of the project area. These alluvial systems are perched above the top of the Graneros Group on the portions of the project area where land application of water is proposed. Groundwater flow within the alluvium is controlled by the configuration of the drainage channel on the top of bedrock and in most situations is generally parallel to surface drainage patterns. In the case of Bennett Canyon, the alluvium directly overlies the Chilson Member of the Lakota Formation. As such, the alluvial groundwater is a potential source of recharge to the underlying Chilson. The closest land application area, Burdock, is over 4,000 feet west of Bennett Canyon and will have no influence on Bennett Canyon alluvium or the Chilson Member.

A potentiometric surface contour map for the Pass Creek and Beaver Creek alluvium is shown on Figure 3.7-8. An isopach map for the alluvium is shown on Plate 3.6-4. The potentiometric surfaces within the alluvium show typical down-valley gradients paralleling the surface topography. The potentiometric surface in Figure 3.7-8 is based on water level measurements taken on November 5, 2012. The significant drop in the static water elevation between alluvial compliance well BC-2 and alluvial wells 708 and 713 is believed to be attributed to significant heterogeneity of the basal alluvial gravel material in this vicinity. This conclusion is supported by significant differences in water quality between wells BC-2 and 708.

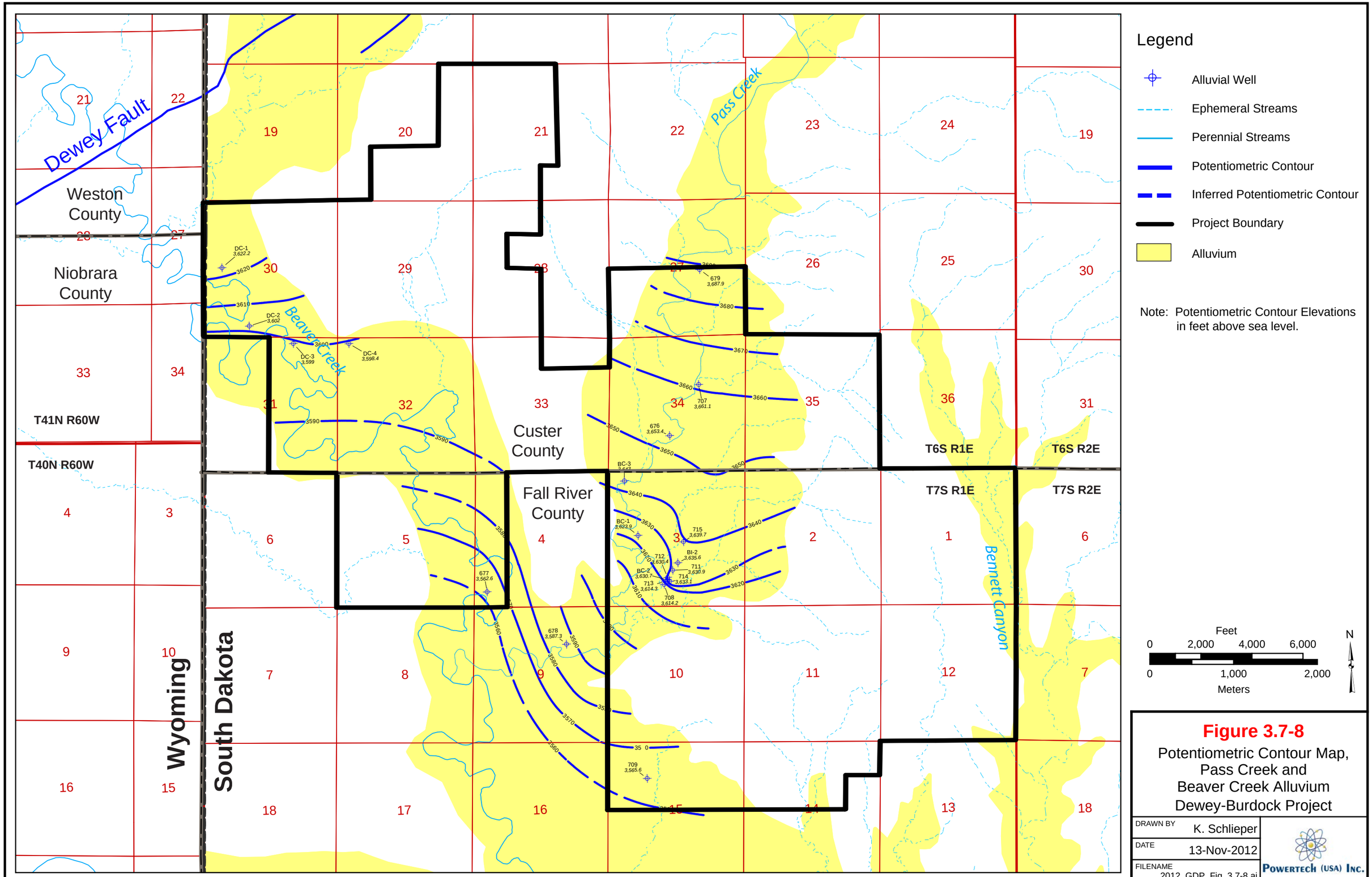


Figure 3.7-8

Potentiometric Contour Map, Pass Creek and Beaver Creek Alluvium Dewey-Burdock Project

DRAWN BY	K. Schlieper
DATE	13-Nov-2012
FILENAME	2012_GDP_Fig_3.7-8.ai

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8.0 MITIGATION OF POTENTIAL IMPACTS

The following sections describe the mitigation measures that will be used to minimize the potential impacts to groundwater, surface water, soil, vegetation, livestock and wildlife.

8.1 Groundwater

8.1.1 Alluvial Groundwater

Mitigation measures used to protect alluvial groundwater quality are described below and include:

- Siting the land application areas at locations where natural conditions make it highly unlikely that the land application water will reach the alluvium,
- Plugging and abandoning existing wells within the land application areas,
- Design and construct well fields and land application systems to avoid any potential conflicts and minimize potential risks,
- Applying the water at agronomic rates,
- Treating the land application water to remove radionuclides,
- Providing sufficient pond storage capacity to stabilize the water quality over long periods of time,
- Implementing an extensive monitoring program, and
- Implementing a contingency plan to address increasing trends in groundwater quality constituents within the POP zones in order to avoid potential impacts to groundwater outside of the POP zones.

<u>Natural Conditions</u>

Potential impacts to alluvial groundwater will be minimized by natural conditions that make it highly unlikely that the land application water will reach the alluvial groundwater. Plate 3.6-10 depicts shallow geologic cross sections drawn through the Burdock land application area. The figure shows that the depth to the top of the alluvial gravel ranges from about 12 to 33 feet and is typically 15 to 25 feet. The depth to alluvial groundwater, where encountered, is typically 13 to 35 feet. By comparison, the SPAW model simulations predict that the land application water will not percolate deeper than 8 feet.

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PowerTech (USA) Inc.

DRILLED WITH: AIR ☐ WATER ☐ HOLE NO. DBH-3-ALLUV-2

T.D. 33' LOCATION: 433708.096 1031228.363 State Plane, NAD27

BIT SIZE 4" FA

SAMPLE LOG BY LE LEASE: (PROJECT) Dewey Burdock

DATE 5/4/11 COUNTY Fall River STATE SD

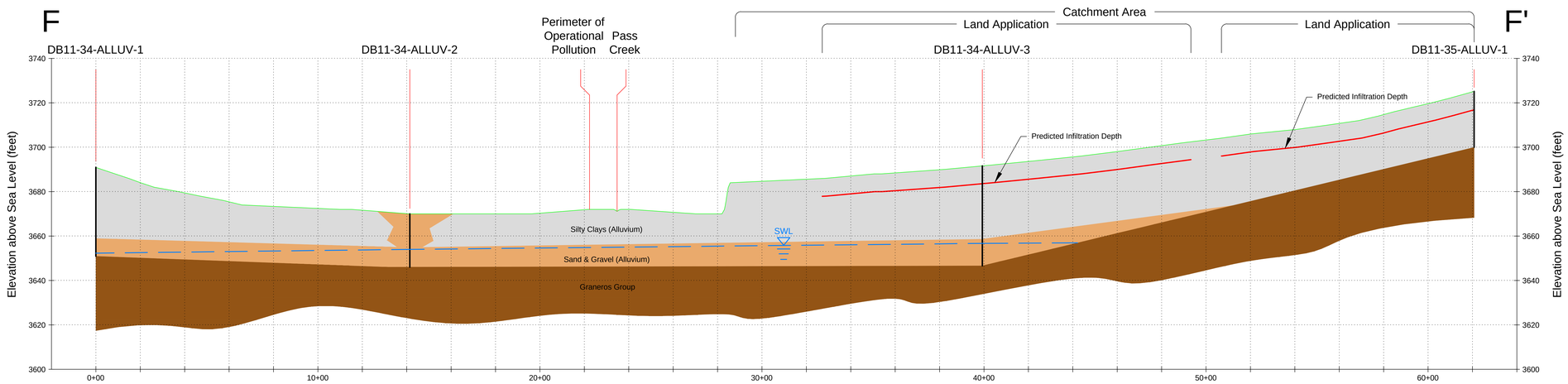
DEPTH	LITHOLOGY	CARBON	PYRITE	OTHER Alteration	Alteration % Primary Oxidation	Reduction	Secondary Oxidation	SAMPLE DESCRIPTION (Amounts in Percent, %)
								0-22.5' silty, sandy CLAY, orangish brown, damp, sat roots
10				Water Level 13 ft.				
20								22.5-33' silty GRAVELS, white/gray/pinks, wet, angular qtzites & cherts
30								TD @ 33' impeded GRAVELS - sharp contact.
40								x hole plugged w/ bentonite chips
50								
60								
70								

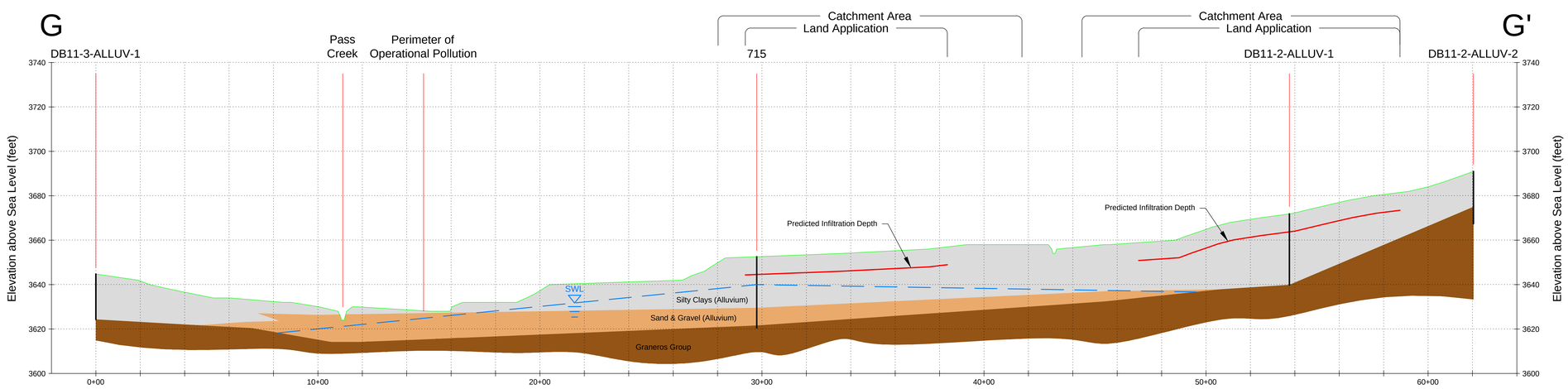
L = Limonite (Lmn)
SOX Surf. Oxidation
Rd. Reduced
Rdt. Reduction
P = Pyrite (Pyr)
P_T = Pyrite Tarnish

POX = Primary Oxid.
BSOX = Base of Surf. Oxid.
2OX = Secondary Oxid.
Tn = Transition Zone
fld = Feldspar

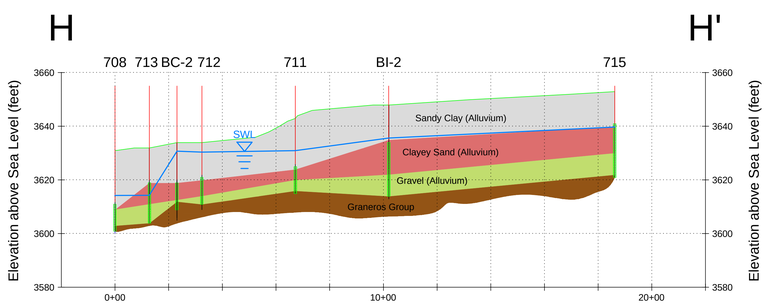
T = Trace
1 = Minor
2 = Moderate
3 = Abundant

C = Carbon
K = Kaolin
B = Bleached
Cht = Chert

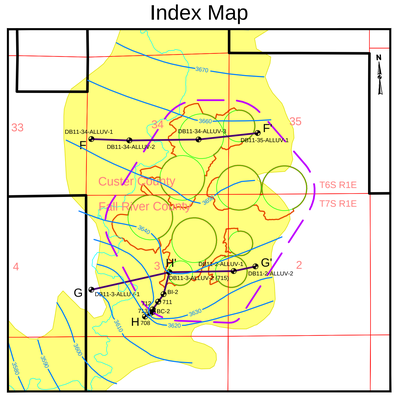




NOTE: The static water level surface depicted on the cross sections and the potentiometric contours depicted on the index map are based on Figure 3.7-8, which was prepared using November 2012 water level measurements. Potentiometric contour elevations are in feet above sea level.



Index Map



Cross Section Legend

- Silty Clays and Sandy Clays (Alluvium)
- Gravel (Alluvium)
- Clayey Sand (Alluvium)
- Sand & Gravel (Alluvium)
- Graneros Group
- Static Water Level Elevation from Potentiometric Contour Map (see note)
- Well Screen

Index Map Legend

- Project Boundary
- Land Application
- Alluvium
- Pass Creek
- Potentiometric Contour (see note)
- Burdock POP Zone
- Catchment Areas

Horizontal Scale

Feet: 0 100 200 400 600 800

Meters: 0 50 100 200

Vertical Scale

Feet: 0 10 20 40 60 80

Meters: 0 5 10 20

CONSULTANT	REVISIONS #	DRAWN	CHECKED	APPROVED	DATE
REF 948					
CHECK SCALES: If this bar does not measure 1 inch this map is not at its original scale					
ACAD 6	24" x 36"				

POWERTECH (USA) INC.

Plate 3.6-10

Pass Creek Alluvium Cross Sections

Dewey-Burdock Project

PLOT DATE	21-Nov-2012	DATE	21-Nov-2012
DRAWN	Hetrick, Lichnovsky	DWF FILE	Plate 3.6-10_SectionF-F.pdf
CHECKED	J. Bonner, J. Mays	CAD FILE	p:\dewey-burdock\submittals\groundwater discharge permit\finals\plates\section f-f.dwg
COORD'S	NAD 27, South Dakota State Plane South (feet)		

POWERTECH (USA) INC.

ATTACHMENT A

Additional Alluvial Characterization Water Quality

Powertech (USA) Inc.

Powertech (USA) Inc. Dewey-Burdock Project Alluvial Characterization Sampling Results		Well 708	Well 708	Well 708	Well 708	Well 708	Well 711	Well 712	Well 713	Well 714	Well 715	Well BI-2	Well BC-2	Well BC-2	Well BC-2	Human Health Standards ARSD 74:54:01:04
Sample Collection Date		7/23/2012	8/20/2012	9/10/2012	10/3/2012	11/5/2012	11/6/2012	11/6/2012	11/6/2012	11/6/2012	11/6/2012	11/6/2012	7/23/2012	8/20/2012	9/10/2012	
Physical Properties																
Lab pH	s.u.	7.22	7.29	7.28	7.21	7.27	7.25	7.17	7.18	7.13	7.29	7.26	7.07	7.11	7.22	6.5 - 8.5
Total Dissolved Solids	mg/L	6200	6300	6500	7000	6600	3500	3900	4300	3900	3300	3900	3800	3900	3900	1000
Lab Conductivity	umhos/cm	5920	6300	6250	6300	5200	3450	3740	4190	3800	3270	3800	3430	3860	3850	
Common Elements and Ions																
Alkalinity, Total as $CaCO_3$	mg/L	288	298	302	298	306	226	232	256	230	218	234	230	234	234	
Bicarbonate as HCO_3	mg/L	351	363	368	363	373	275	283	312	280	266	285	280	285	285	
Calcium, Ca	mg/L	440	414	426	442	415	497	508	472	491	507	481	544	516	521	
Carbonate as CO_3	mg/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	
Chloride, Cl	mg/L	42	44	46	47	45	24	22	26	22	21	21	21	21	21	250
Fluoride, F	mg/L	NM	NM	1.1	1.2	1.0	0.7	0.6	0.7	0.7	0.6	0.8	0.8	0.7	0.7	
Magnesium, Mg	mg/L	476	530	521	525	516	154	216	274	232	158	246	200	218	220	
Nitrate, NO_3^- (as Nitrogen)	mg/L	NM	NM	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	0.4	0.3	< 0.1	0.2	0.2	
Potassium, K	mg/L	NM	NM	32	30	30	12	13	19	13	11	13	12	13	13	
Sodium, Na	mg/L	620	713	779	766	742	260	294	363	275	166	255	278	258	278	
Sulfate, SO_4	mg/L	4360	4260	4270	4520	4280	2150	2420	2690	2500	2010	2460	2350	2390	2400	500

Highlighted value exceeds ARSD 74:54:01:04 Human Health Standard.

NM - The sample was not tested for this parameter.

ANALYTICAL SUMMARY REPORT

November 13, 2012

Powertech USA Inc
PO Box 812
Edgemont, SD 57735

Workorder No.: R12110088 Quote ID: R412

Project Name: #708 plus Alluvial

Energy Laboratories Inc. Rapid City SD received the following 7 samples for Powertech USA Inc on 11/7/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
R12110088-001	DC-3	11/06/12 10:34	11/07/12	Aqueous	Metals by ICP/ICPMS, Dissolved Anion - Cation Balance Anions by Ion Chromatography Solids, Total Dissolved
R12110088-002	713	11/06/12 11:05	11/07/12	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Anion - Cation Balance Conductivity Anions by Ion Chromatography pH Solids, Total Dissolved
R12110088-003	714	11/06/12 13:45	11/07/12	Aqueous	Same As Above
R12110088-004	712	11/06/12 14:20	11/07/12	Aqueous	Same As Above
R12110088-005	711	11/06/12 14:51	11/07/12	Aqueous	Same As Above
R12110088-006	BI-2	11/06/12 15:45	11/07/12	Aqueous	Same As Above
R12110088-007	715	11/06/12 16:33	11/07/12	Aqueous	Same As Above

This report was prepared by Energy Laboratories, Inc., 2821 Plant St., Rapid City, SD 57702. As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By:

Linda K. Larson
Branch Manager

Digitally signed by
Linda Larson
Date: 2012.11.13 16:09:00 -07:00

CLIENT: Powertech USA Inc
Project: #708 plus Alluvial
Sample Delivery Group: R12110088

Report Date: 11/13/12

CASE NARRATIVE

Per Elizabeth Scheinost run cations, anions, balance and TDS on DC-3 11/7/2012 LL
Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial
Lab ID: R12110088-001
Client Sample ID: DC-3

Report Date: 11/13/12
Collection Date: 11/06/12 10:34
Date Received: 11/07/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Solids, Total Dissolved TDS @ 180 C	11000	mg/L		40		1	A2540 C	11/09/12 16:48/jmh
INORGANIC PARAMETERS								
Chloride	1320	mg/L	D	50		50	E300.0	11/08/12 03:59/jmh
Fluoride	ND	mg/L		0.1		1	E300.0	11/08/12 04:17/jmh
Sulfate	6330	mg/L	D	50		50	E300.0	11/08/12 03:59/jmh
DATA QUALITY PARAMETERS								
Anions	169	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Cations	157	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Conductivity, Calculated	11700	umhos/cm		1.00		1	A1030 E	11/13/12 00:00/lkl
TDS Ratio	1.07			0.0100		1	A1030 E	11/13/12 00:00/lkl
A/C Balance	-3.78	%				1	A1030 E	11/13/12 00:00/lkl
NUTRIENT PARAMETERS								
Nitrogen, Nitrate as N	1.7	mg/L		0.1		1	E300.0	11/08/12 04:17/jmh
DISSOLVED METALS ANALYSES								
Calcium	404	mg/L		1		2	E200.7	11/08/12 19:18/eli-ca
Magnesium	701	mg/L		1		2	E200.7	11/08/12 19:18/eli-ca
Potassium	55	mg/L		1		2	E200.7	11/08/12 19:18/eli-ca
Sodium	1780	mg/L		1		2	E200.7	11/08/12 19:18/eli-ca

Report Definitions:
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QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial
Lab ID: R12110088-002
Client Sample ID: 713

Report Date: 11/13/12
Collection Date: 11/06/12 11:05
Date Received: 11/07/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	4190	umhos/cm		5.0		1	A2510 B	11/08/12 09:33/tb
pH	7.18	su		0.01		1	A4500-H B	11/08/12 10:08/tb
Solids, Total Dissolved TDS @ 180 C	4300	mg/L		40		1	A2540 C	11/09/12 16:48/jmh
Alkalinity, Total as CaCO3	256	mg/L		5		1	A2320 B	11/09/12 15:51/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	11/09/12 15:51/ch
Bicarbonate as HCO3	312	mg/L		5		1	A2320 B	11/09/12 15:51/ch
INORGANIC PARAMETERS								
Chloride	26	mg/L		1		1	E300.0	11/08/12 04:53/jmh
Fluoride	0.7	mg/L		0.1		1	E300.0	11/08/12 04:53/jmh
Sulfate	2690	mg/L	D	50		50	E300.0	11/08/12 04:35/jmh
DATA QUALITY PARAMETERS								
Anions	61.9	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Cations	62.4	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Conductivity, Calculated	4910	umhos/cm		1.00		1	A1030 E	11/13/12 00:00/lkl
TDS Ratio	1.07			0.0100		1	A1030 E	11/13/12 00:00/lkl
A/C Balance	0.420	%				1	A1030 E	11/13/12 00:00/lkl
NUTRIENT PARAMETERS								
Nitrogen, Nitrate as N	ND	mg/L		0.1		1	E300.0	11/08/12 04:53/jmh
DISSOLVED METALS ANALYSES								
Calcium	472	mg/L		1		2	E200.7	11/08/12 19:22/eli-ca
Magnesium	274	mg/L		1		2	E200.7	11/08/12 19:22/eli-ca
Potassium	19	mg/L		1		2	E200.7	11/08/12 19:22/eli-ca
Sodium	363	mg/L		1		2	E200.7	11/08/12 19:22/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial
Lab ID: R12110088-003
Client Sample ID: 714

Report Date: 11/13/12
Collection Date: 11/06/12 13:45
Date Received: 11/07/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	3800	umhos/cm		5.0		1	A2510 B	11/08/12 09:34/tb
pH	7.13	su		0.01		1	A4500-H B	11/08/12 10:10/tb
Solids, Total Dissolved TDS @ 180 C	3900	mg/L		40		1	A2540 C	11/09/12 16:49/jmh
Alkalinity, Total as CaCO3	230	mg/L		5		1	A2320 B	11/09/12 15:58/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	11/09/12 15:58/ch
Bicarbonate as HCO3	280	mg/L		5		1	A2320 B	11/09/12 15:58/ch
INORGANIC PARAMETERS								
Chloride	22	mg/L		1		1	E300.0	11/08/12 05:29/jmh
Fluoride	0.7	mg/L		0.1		1	E300.0	11/08/12 05:29/jmh
Sulfate	2500	mg/L	D	50		50	E300.0	11/08/12 05:11/jmh
DATA QUALITY PARAMETERS								
Anions	57.3	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Cations	55.8	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Conductivity, Calculated	4550	umhos/cm		1.00		1	A1030 E	11/13/12 00:00/lkl
TDS Ratio	1.04			0.0100		1	A1030 E	11/13/12 00:00/lkl
A/C Balance	-1.32	%				1	A1030 E	11/13/12 00:00/lkl
NUTRIENT PARAMETERS								
Nitrogen, Nitrate as N	0.3	mg/L		0.1		1	E300.0	11/08/12 05:29/jmh
DISSOLVED METALS ANALYSES								
Calcium	491	mg/L		1		2	E200.7	11/08/12 19:26/eli-ca
Magnesium	232	mg/L		1		2	E200.7	11/08/12 19:26/eli-ca
Potassium	13	mg/L		1		2	E200.7	11/08/12 19:26/eli-ca
Sodium	275	mg/L		1		2	E200.7	11/08/12 19:26/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial
Lab ID: R12110088-004
Client Sample ID: 712

Report Date: 11/13/12
Collection Date: 11/06/12 14:20
Date Received: 11/07/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	3740	umhos/cm		5.0		1	A2510 B	11/08/12 09:36/tb
pH	7.17	su		0.01		1	A4500-H B	11/08/12 10:12/tb
Solids, Total Dissolved TDS @ 180 C	3900	mg/L		40		1	A2540 C	11/09/12 16:49/jmh
Alkalinity, Total as CaCO3	232	mg/L		5		1	A2320 B	11/09/12 16:01/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	11/09/12 16:01/ch
Bicarbonate as HCO3	283	mg/L		5		1	A2320 B	11/09/12 16:01/ch
INORGANIC PARAMETERS								
Chloride	22	mg/L		1		1	E300.0	11/08/12 06:05/jmh
Fluoride	0.6	mg/L		0.1		1	E300.0	11/08/12 06:05/jmh
Sulfate	2420	mg/L	D	50		50	E300.0	11/08/12 05:47/jmh
DATA QUALITY PARAMETERS								
Anions	55.7	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Cations	56.2	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Conductivity, Calculated	4500	umhos/cm		1.00		1	A1030 E	11/13/12 00:00/lkl
TDS Ratio	1.07			0.0100		1	A1030 E	11/13/12 00:00/lkl
A/C Balance	0.470	%				1	A1030 E	11/13/12 00:00/lkl
NUTRIENT PARAMETERS								
Nitrogen, Nitrate as N	ND	mg/L		0.1		1	E300.0	11/08/12 06:05/jmh
DISSOLVED METALS ANALYSES								
Calcium	508	mg/L		1		2	E200.7	11/08/12 19:43/eli-ca
Magnesium	216	mg/L		1		2	E200.7	11/08/12 19:43/eli-ca
Potassium	13	mg/L		1		2	E200.7	11/08/12 19:43/eli-ca
Sodium	294	mg/L		1		2	E200.7	11/08/12 19:43/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial
Lab ID: R12110088-005
Client Sample ID: 711

Report Date: 11/13/12
Collection Date: 11/06/12 14:51
Date Received: 11/07/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	3450	umhos/cm		5.0		1	A2510 B	11/08/12 09:38/tb
pH	7.25	su		0.01		1	A4500-H B	11/08/12 10:13/tb
Solids, Total Dissolved TDS @ 180 C	3500	mg/L		20		1	A2540 C	11/09/12 16:50/jmh
Alkalinity, Total as CaCO3	226	mg/L		5		1	A2320 B	11/09/12 16:05/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	11/09/12 16:05/ch
Bicarbonate as HCO3	275	mg/L		5		1	A2320 B	11/09/12 16:05/ch
INORGANIC PARAMETERS								
Chloride	24	mg/L		1		1	E300.0	11/08/12 07:52/jmh
Fluoride	0.7	mg/L		0.1		1	E300.0	11/08/12 07:52/jmh
Sulfate	2150	mg/L	D	50		50	E300.0	11/08/12 06:58/jmh
DATA QUALITY PARAMETERS								
Anions	50.0	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Cations	49.1	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Conductivity, Calculated	4070	umhos/cm		1.00		1	A1030 E	11/13/12 00:00/lkl
TDS Ratio	1.09			0.0100		1	A1030 E	11/13/12 00:00/lkl
A/C Balance	-0.870	%				1	A1030 E	11/13/12 00:00/lkl
NUTRIENT PARAMETERS								
Nitrogen, Nitrate as N	ND	mg/L		0.1		1	E300.0	11/08/12 07:52/jmh
DISSOLVED METALS ANALYSES								
Calcium	497	mg/L		1		2	E200.7	11/08/12 19:47/eli-ca
Magnesium	154	mg/L		1		2	E200.7	11/08/12 19:47/eli-ca
Potassium	12	mg/L		1		2	E200.7	11/08/12 19:47/eli-ca
Sodium	260	mg/L		1		2	E200.7	11/08/12 19:47/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial
Lab ID: R12110088-006
Client Sample ID: BI-2

Report Date: 11/13/12
Collection Date: 11/06/12 15:45
Date Received: 11/07/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	3800	umhos/cm		5.0		1	A2510 B	11/08/12 09:39/tb
pH	7.26	su		0.01		1	A4500-H B	11/08/12 10:15/tb
Solids, Total Dissolved TDS @ 180 C	3900	mg/L		40		1	A2540 C	11/09/12 16:51/jmh
Alkalinity, Total as CaCO3	234	mg/L		5		1	A2320 B	11/09/12 16:09/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	11/09/12 16:09/ch
Bicarbonate as HCO3	285	mg/L		5		1	A2320 B	11/09/12 16:09/ch
INORGANIC PARAMETERS								
Chloride	21	mg/L		1		1	E300.0	11/08/12 08:28/jmh
Fluoride	0.8	mg/L		0.1		1	E300.0	11/08/12 08:28/jmh
Sulfate	2460	mg/L	D	50		50	E300.0	11/08/12 08:10/jmh
DATA QUALITY PARAMETERS								
Anions	56.5	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Cations	55.6	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Conductivity, Calculated	4510	umhos/cm		1.00		1	A1030 E	11/13/12 00:00/lkl
TDS Ratio	1.07			0.0100		1	A1030 E	11/13/12 00:00/lkl
A/C Balance	-0.790	%				1	A1030 E	11/13/12 00:00/lkl
NUTRIENT PARAMETERS								
Nitrogen, Nitrate as N	0.3	mg/L		0.1		1	E300.0	11/08/12 08:28/jmh
DISSOLVED METALS ANALYSES								
Calcium	481	mg/L		1		2	E200.7	11/08/12 19:51/eli-ca
Magnesium	246	mg/L		1		2	E200.7	11/08/12 19:51/eli-ca
Potassium	13	mg/L		1		2	E200.7	11/08/12 19:51/eli-ca
Sodium	255	mg/L		1		2	E200.7	11/08/12 19:51/eli-ca

Report Definitions:
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QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial
Lab ID: R12110088-007
Client Sample ID: 715

Report Date: 11/13/12
Collection Date: 11/06/12 16:33
Date Received: 11/07/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	3270	umhos/cm		5.0		1	A2510 B	11/08/12 09:42/tb
pH	7.29	su		0.01		1	A4500-H B	11/08/12 10:17/tb
Solids, Total Dissolved TDS @ 180 C	3300	mg/L		20		1	A2540 C	11/09/12 16:51/jmh
Alkalinity, Total as CaCO3	218	mg/L		5		1	A2320 B	11/09/12 16:12/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	11/09/12 16:12/ch
Bicarbonate as HCO3	266	mg/L		5		1	A2320 B	11/09/12 16:12/ch
INORGANIC PARAMETERS								
Chloride	21	mg/L		1		1	E300.0	11/08/12 09:04/jmh
Fluoride	0.6	mg/L		0.1		1	E300.0	11/08/12 09:04/jmh
Sulfate	2010	mg/L	D	50		50	E300.0	11/08/12 08:46/jmh
DATA QUALITY PARAMETERS								
Anions	46.8	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Cations	45.8	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Conductivity, Calculated	3840	umhos/cm		1.00		1	A1030 E	11/13/12 00:00/lkl
TDS Ratio	1.10			0.0100		1	A1030 E	11/13/12 00:00/lkl
A/C Balance	-1.11	%				1	A1030 E	11/13/12 00:00/lkl
NUTRIENT PARAMETERS								
Nitrogen, Nitrate as N	0.4	mg/L		0.1		1	E300.0	11/08/12 09:04/jmh
DISSOLVED METALS ANALYSES								
Calcium	507	mg/L		1		2	E200.7	11/08/12 19:55/eli-ca
Magnesium	158	mg/L		1		2	E200.7	11/08/12 19:55/eli-ca
Potassium	11	mg/L		1		2	E200.7	11/08/12 19:55/eli-ca
Sodium	166	mg/L		1		2	E200.7	11/08/12 19:55/eli-ca

Report Definitions:
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QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial

Report Date: 11/13/12
Work Order: R12110088

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B									Batch: 121109A-ALK-SEL-W	
Sample ID: LCS1_121109A		Laboratory Control Sample				Run: PH_COND1-R_121109A			11/09/12 15:32	
Alkalinity, Total as CaCO3		952	mg/L	5.0	95	90	110			
Sample ID: MBLK1_121109A		Method Blank				Run: PH_COND1-R_121109A			11/09/12 15:36	
Alkalinity, Total as CaCO3		ND	mg/L	2						
Sample ID: R12110069-001ADUP	3	Sample Duplicate				Run: PH_COND1-R_121109A			11/09/12 15:49	
Alkalinity, Total as CaCO3		298	mg/L	5.0				2.6	10	
Carbonate as CO3		ND	mg/L	5.0					10	
Bicarbonate as HCO3		363	mg/L	5.0				2.6	10	
Sample ID: R12110088-002AMS		Sample Matrix Spike				Run: PH_COND1-R_121109A			11/09/12 15:54	
Alkalinity, Total as CaCO3		370	mg/L	5.0	94	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial

Report Date: 11/13/12
Work Order: R12110088

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B									Batch: 121108_1_COND-PROBE-W	
Sample ID: MBLK-1_121108		Method Blank				Run: PH_COND2-R_121108A			11/08/12 09:25	
Conductivity @ 25 C		ND	umhos/cm	5						
Sample ID: R12110084-003ADUP		Sample Duplicate				Run: PH_COND2-R_121108A			11/08/12 09:29	
Conductivity @ 25 C		910	umhos/cm	5.0				0.1	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial

Report Date: 11/13/12
Work Order: R12110088

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C									Batch: TDS121109A	
Sample ID: MB-1_121109A		Method Blank				Run: BAL-TDS_121109A			11/09/12 16:36	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	3						
Sample ID: LCS-2_121109A		Laboratory Control Sample				Run: BAL-TDS_121109A			11/09/12 16:37	
Solids, Total Dissolved TDS @ 180 C		510	mg/L	10	103	90	110			
Sample ID: R12110086-002A MS		Sample Matrix Spike				Run: BAL-TDS_121109A			11/09/12 16:40	
Solids, Total Dissolved TDS @ 180 C		790	mg/L	10	101	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial

Report Date: 11/13/12
Work Order: R12110088

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: PH_COND2-R_121108B		
Sample ID: ICV-1_121108		Initial Calibration Verification Standard							11/08/12 10:02	
pH		7.46	su	0.010	101	98	102			
Method: A4500-H B									Batch: 121108_1_PH-W	
Sample ID: R12110087-001ADUP		Sample Duplicate				Run: PH_COND2-R_121108B			11/08/12 10:07	
pH		6.92	su	0.010				0.3	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial

Report Date: 11/13/12
Work Order: R12110088

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: SUB-C166967	
Sample ID: ICV	4	Initial Calibration Verification Standard							11/08/12 14:11	
Calcium		50	mg/L	0.50	99	95	105			
Magnesium		52	mg/L	0.50	103	95	105			
Potassium		47	mg/L	0.50	95	95	105			
Sodium		53	mg/L	0.50	105	95	105			
Sample ID: ICSA	4	Interference Check Sample A							11/08/12 14:40	
Calcium		490	mg/L	0.50	99	80	120			
Magnesium		530	mg/L	0.50	107	80	120			
Potassium		-0.0072	mg/L	0.50						
Sodium		0.033	mg/L	0.50						
Sample ID: ICSAB	4	Interference Check Sample AB							11/08/12 14:44	
Calcium		500	mg/L	0.50	99	80	120			
Magnesium		520	mg/L	0.50	104	80	120			
Potassium		-0.0062	mg/L	0.50						
Sodium		0.028	mg/L	0.50						
Method: E200.7									Batch: C_R166967	
Sample ID: MB-121108A	4	Method Blank				Run: SUB-C166967			11/08/12 15:08	
Calcium		ND	mg/L	0.06						
Magnesium		ND	mg/L	0.03						
Potassium		ND	mg/L	0.06						
Sodium		ND	mg/L	0.3						
Sample ID: LFB-121108A	4	Laboratory Fortified Blank				Run: SUB-C166967			11/08/12 15:12	
Calcium		48	mg/L	0.50	97	85	115			
Magnesium		50	mg/L	0.50	100	85	115			
Potassium		46	mg/L	0.50	92	85	115			
Sodium		49	mg/L	0.50	99	85	115			
Sample ID: C12110105-011BMS2	4	Sample Matrix Spike				Run: SUB-C166967			11/08/12 19:02	
Calcium		134	mg/L	1.0	84	70	130			
Magnesium		81.4	mg/L	1.0	98	70	130			
Potassium		50.3	mg/L	1.0	92	70	130			
Sodium		100	mg/L	1.0	99	70	130			
Sample ID: C12110105-011BMSD2	4	Sample Matrix Spike Duplicate				Run: SUB-C166967			11/08/12 19:06	
Calcium		135	mg/L	1.0	86	70	130	0.8	20	
Magnesium		81.0	mg/L	1.0	97	70	130	0.5	20	
Potassium		51.5	mg/L	1.0	94	70	130	2.3	20	
Sodium		101	mg/L	1.0	100	70	130	0.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 plus Alluvial

Report Date: 11/13/12
Work Order: R12110088

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: DIONEX_121107A	
Sample ID: CCV110712-28	4	Continuing Calibration Verification Standard							11/08/12 02:12	
Chloride		71.7	mg/L	1.0	96	90	110			
Fluoride		7.29	mg/L	0.10	97	90	110			
Nitrogen, Nitrate as N		7.16	mg/L	0.10	96	90	110			
Sulfate		71.2	mg/L	1.0	95	90	110			
Sample ID: CCV110712-41	4	Continuing Calibration Verification Standard							11/08/12 06:23	
Chloride		71.9	mg/L	1.0	96	90	110			
Fluoride		7.31	mg/L	0.10	97	90	110			
Nitrogen, Nitrate as N		7.17	mg/L	0.10	96	90	110			
Sulfate		71.4	mg/L	1.0	95	90	110			
Method: E300.0										Batch: R58791
Sample ID: LFB110712-14	4	Laboratory Fortified Blank				Run: DIONEX_121107A			11/07/12 22:19	
Chloride		38.4	mg/L	1.0	96	90	110			
Fluoride		3.98	mg/L	0.10	100	90	110			
Nitrogen, Nitrate as N		3.93	mg/L	0.10	98	90	110			
Sulfate		38.9	mg/L	1.0	97	90	110			
Sample ID: R12110087-001AMS	4	Sample Matrix Spike				Run: DIONEX_121107A			11/08/12 03:05	
Chloride		2070	mg/L	50	93	90	110			
Fluoride		205	mg/L	5.0	99	90	110			
Nitrogen, Nitrate as N		208	mg/L	5.0	96	90	110			
Sulfate		6480	mg/L	50	119	90	110			S
Sample ID: R12110087-001AMSD	4	Sample Matrix Spike Duplicate				Run: DIONEX_121107A			11/08/12 03:23	
Chloride		2070	mg/L	50	93	90	110	0.2	10	
Fluoride		205	mg/L	5.0	99	90	110	0.1	10	
Nitrogen, Nitrate as N		208	mg/L	5.0	96	90	110	0.1	10	
Sulfate		6480	mg/L	50	119	90	110	0.1	10	S
Sample ID: R12110088-005AMS	4	Sample Matrix Spike				Run: DIONEX_121107A			11/08/12 07:16	
Chloride		2010	mg/L	50	92	90	110			
Fluoride		206	mg/L	5.0	100	90	110			
Nitrogen, Nitrate as N		202	mg/L	5.0	101	90	110			
Sulfate		4170	mg/L	50	101	90	110			
Sample ID: R12110088-005AMSD	4	Sample Matrix Spike Duplicate				Run: DIONEX_121107A			11/08/12 07:34	
Chloride		2010	mg/L	50	92	90	110	0.1	10	
Fluoride		206	mg/L	5.0	100	90	110	0.3	10	
Nitrogen, Nitrate as N		202	mg/L	5.0	101	90	110	0.0	10	
Sulfate		4170	mg/L	50	101	90	110	0.1	10	

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

Chain of Custody and Analytical Request Record

Page 1 of 1

PLEASE PRINT (Provide as much information as possible.)

Company Name: Scott Env.	Project Name, PWS, Permit, Etc.: Powertech alluvial wells	Sample Origin State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: Scott Env / Power tech	Contact Name: Allen Scott Phone/Fax:	Email:	Sampler: (Please Print)
Invoice Address: Power tech	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats:

☐ DW ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids
Vegetation Bioassay Other
DW - Drinking Water

ANALYSIS REQUESTED: Aspen Quote

SEE ATTACHED

Standard Turnaround (TAT)

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by:
Cooler ID(s):
Receipt Temp 2.4 °C
On Ice: (Y) N
Custody Seal
On Bottle Y N
On Cooler Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	LABORATORY USE ONLY
1	DC-1	11-6-12	10:24	water	1211 0088-001
2	PE-3	11-6-12	11:05	"	002
3	713	11-6-12	12:56	"	003
4	714	11-6-12	13:45	"	004
5	712	11-6-12	14:20	"	005
6	711	11-6-12	14:51	"	006
7	BI-2	11-6-12	15:45	"	007
8	715	11-6-12	16:33	"	
9					
10					

Custody Record MUST be Signed

Relinquished by (print): Allen Scott	Date/Time: 11-7-12 9:37	Signature:	Received by (print):	Date/Time: Signature:
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time: Signature:
Sample Disposal: Return to Client: _____	Lab Disposal: _____		Received by Laboratory: Steve Forland	Date/Time: 11-7-12 9:37 Signature:

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ANALYTICAL SUMMARY REPORT

August 08, 2012

Powertech USA Inc
PO Box 812
Edgemont, SD 57735

Workorder No.: R12070404 Quote ID: R412 - #708 Alluvial

Project Name: #708 Alluvial/Dewey Burdoch

Energy Laboratories Inc. Rapid City SD received the following 1 sample for Powertech USA Inc on 7/24/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
R12070404-001	708	07/23/12 15:13	07/24/12	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Anions by Ion Chromatography pH Dissolved Filtration Solids, Total Dissolved

This report was prepared by Energy Laboratories, Inc., 2821 Plant St., Rapid City, SD 57702. As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By:

Linda K. Larson
Branch Manager

Digitally signed by
Linda Larson
Date: 2012.08.08 17:33:21 -06:00

CLIENT: Powertech USA Inc
Project: #708 Alluvial/Dewey Burdoch
Sample Delivery Group: R12070404

Report Date: 08/08/12

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial/Dewey Burdoch
Lab ID: R12070404-001
Client Sample ID: 708

Report Date: 08/08/12
Collection Date: 07/23/12 15:13
Date Received: 07/24/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	5920	umhos/cm		5.0		1	A2510 B	08/02/12 08:24/tb
pH	7.22	su		0.01		1	A4500-H B	07/24/12 17:11/tb
Solids, Total Dissolved TDS @ 180 C	6200	mg/L		10		1	A2540 C	07/27/12 15:39/jmh
Alkalinity, Total as CaCO3	288	mg/L		5		1	A2320 B	07/25/12 15:32/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	07/25/12 15:32/ch
Bicarbonate as HCO3	351	mg/L		5		1	A2320 B	07/25/12 15:32/ch
INORGANIC PARAMETERS								
Chloride	42	mg/L		1		1	E300.0	07/25/12 00:17/jmh
Sulfate	4360	mg/L	D	50		50	E300.0	07/27/12 09:13/tb
DISSOLVED METALS ANALYSES								
Calcium	440	mg/L		1		5	E200.7	07/27/12 13:24/eli-ca
Magnesium	476	mg/L		1		5	E200.7	07/27/12 13:24/eli-ca
Sodium	620	mg/L		1		5	E200.7	07/27/12 13:24/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc **Report Date:** 08/08/12

Project: #708 Alluvial/Dewey Burdoch **Work Order:** R12070404

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B									Batch: 120725A-ALK-SEL-W	
Sample ID: LCS1_120725A		Laboratory Control Sample				Run: PH_COND1-R_120725A			07/25/12 13:48	
Alkalinity, Total as CaCO3		940	mg/L	5.0	94	90	110			
Sample ID: MBLK1_120725A	3	Method Blank				Run: PH_COND1-R_120725A			07/25/12 13:48	
Alkalinity, Total as CaCO3		4	mg/L	2						
Bicarbonate as HCO3		5	mg/L							
Carbonate as CO3			mg/L							
Sample ID: R12070291-008AMS		Sample Matrix Spike				Run: PH_COND1-R_120725A			07/25/12 15:20	
Alkalinity, Total as CaCO3		306	mg/L	5.0	99	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc **Report Date:** 08/08/12

Project: #708 Alluvial/Dewey Burdoch **Work Order:** R12070404

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B								Batch: 120802_1_COND-PROBE-W		
Sample ID: MBLK-1_120802		Method Blank				Run: PH_COND2-R_120802A			08/02/12 08:22	
Conductivity @ 25 C		ND	umhos/cm	5						
Sample ID: R12070404-001ADUP		Sample Duplicate				Run: PH_COND2-R_120802A			08/02/12 08:25	
Conductivity @ 25 C		5920	umhos/cm	5.0				0.0	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc **Report Date:** 08/08/12

Project: #708 Alluvial/Dewey Burdoch **Work Order:** R12070404

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C										Batch: TDS120727A
Sample ID: MB-1_120727A		Method Blank				Run: BAL-TDS_120727A				07/27/12 15:35
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	3						
Sample ID: LCS-2_120727A		Laboratory Control Sample				Run: BAL-TDS_120727A				07/27/12 15:36
Solids, Total Dissolved TDS @ 180 C		200	mg/L	10	102	90	110			
Sample ID: R12070397-002A MS		Sample Matrix Spike				Run: BAL-TDS_120727A				07/27/12 15:38
Solids, Total Dissolved TDS @ 180 C		14000	mg/L	10	106	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial/Dewey Burdoch

Report Date: 08/08/12
Work Order: R12070404

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: PH_COND2-R_120724A		
Sample ID: ICV-1_120724		Initial Calibration Verification Standard							07/24/12 15:04	
pH		7.44	su	0.010	100	98	102			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc **Report Date:** 08/08/12
Project: #708 Alluvial/Dewey Burdoch **Work Order:** R12070404

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: SUB-C162484	
Sample ID: ICV	3	Initial Calibration Verification Standard							07/27/12 11:57	
Calcium		51	mg/L	0.50	103	95	105			
Magnesium		49	mg/L	0.50	99	95	105			
Sodium		51	mg/L	0.50	102	95	105			
Sample ID: ICSA	3	Interference Check Sample A							07/27/12 12:11	
Calcium		460	mg/L	0.50	93	80	120			
Magnesium		500	mg/L	0.50	101	80	120			
Sodium		0.33	mg/L	0.50						
Sample ID: ICSAB	3	Interference Check Sample AB							07/27/12 12:15	
Calcium		470	mg/L	0.50	93	80	120			
Magnesium		500	mg/L	0.50	101	80	120			
Sodium		0.37	mg/L	0.50						
Method: E200.7									Batch: C_R162484	
Sample ID: MB-120727A	3	Method Blank				Run: SUB-C162484			07/27/12 12:38	
Calcium		ND	mg/L	0.02						
Magnesium		0.01	mg/L	0.01						
Sodium		ND	mg/L	0.2						
Sample ID: LFB-120727A	3	Laboratory Fortified Blank				Run: SUB-C162484			07/27/12 12:41	
Calcium		52	mg/L	0.50	104	85	115			
Magnesium		48	mg/L	0.50	96	85	115			
Sodium		49	mg/L	0.50	97	85	115			
Sample ID: C12070943-001BMS2	3	Sample Matrix Spike				Run: SUB-C162484			07/27/12 13:36	
Calcium		80.4	mg/L	1.0	104	70	130			
Magnesium		53.4	mg/L	1.0	97	70	130			
Sodium		77.1	mg/L	1.0	100	70	130			
Sample ID: C12070943-001BMSD2	3	Sample Matrix Spike Duplicate				Run: SUB-C162484			07/27/12 13:40	
Calcium		80.5	mg/L	1.0	104	70	130	0.2	20	
Magnesium		53.5	mg/L	1.0	97	70	130	0.1	20	
Sodium		77.7	mg/L	1.0	101	70	130	0.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc **Report Date:** 08/08/12

Project: #708 Alluvial/Dewey Burdoch **Work Order:** R12070404

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0										Batch: R57307
Sample ID: LFB072412-14	Laboratory Fortified Blank					Run: DIONEX_120724A				07/24/12 22:11
Chloride		38.3	mg/L	1.0	96	90	110			
Sample ID: R12070404-001AMS	Sample Matrix Spike					Run: DIONEX_120724A				07/25/12 00:35
Chloride		84.0	mg/L	1.0	105	90	110			
Sample ID: R12070404-001AMSD	Sample Matrix Spike Duplicate					Run: DIONEX_120724A				07/25/12 00:52
Chloride		84.3	mg/L	1.0	106	90	110	0.3	10	
Method: E300.0									Analytical Run: DIONEX_120726A	
Sample ID: CCV072612-42	Continuing Calibration Verification Standard									07/27/12 06:32
Sulfate		77.3	mg/L	1.0	103	90	110			
Method: E300.0										Batch: R57379
Sample ID: LFB072612-14	Laboratory Fortified Blank					Run: DIONEX_120726A				07/26/12 22:28
Sulfate		39.8	mg/L	1.0	100	90	110			
Sample ID: R12070405-005AMS	Sample Matrix Spike					Run: DIONEX_120726A				07/27/12 11:36
Sulfate		4360	mg/L	50	111	90	110			S
Sample ID: R12070405-005AMSD	Sample Matrix Spike Duplicate					Run: DIONEX_120726A				07/27/12 11:54
Sulfate		4380	mg/L	50	112	90	110	0.7	10	S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page _____ of _____

PLEASE PRINT (Provide as much information as possible.)

Company Name: Scott Environmental	Project Name, PWS, Permit, Etc.: Dewey / Burdock alluvial wells	Sample Origin State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: Scott Environmental PowerTech, Inc.	Contact Name: Allen Scott Phone/Fax: 673-4859	Email:	Sampler: (Please Print) Allen Scott
Invoice Address: PowerTech, Inc.	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats:

☐ DW
☐ POTW/WWTP
☐ State: _____
☐ Other: _____
☐ EDD/EDT (Electronic Data) Format: _____
☐ LEVEL IV
☐ NELAC

ANALYSIS REQUESTED

Standard Turnaround (TAT) → RUSH: Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by:
Cooler ID(s):
Receipt Temp 3.6 °C
On Ice: (Y) N
Custody Seal: On Bottle Y N; On Cooler Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Number of Containers / Sample Type: A W S V B O DW / Air Water Solis/Solids Vegetation Bioassay Other DW - Drinking Water	Arsenic quote	SEE ATTACHED
1 BC-3	7-23-12	11:47	Water		✓	
2 BC-3 Dup.	7-23-12	11:55	"		✓	
3 BC-1	7-23-12	13:33	"		✓	
4 BC-2	7-23-12	14:34	"		✓	
5 708	7-23-12	15:13	"		✓	
6 DC-2	7-23-12	16:30	"		✓	
7 DC-1	7-24-12	8:00	"		✓	
8 DC-4	7-24-12	9:07	"		✓	
9						
10						

LABORATORY USE ONLY: R12070404-001

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Allen Scott	7-24-12 14:35				
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
			Received by Laboratory: Steve Fontanel	Date/Time: 7-24-12 1436	Signature:

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

ANALYTICAL SUMMARY REPORT

September 05, 2012

Powertech USA Inc
PO Box 812
Edgemont, SD 57735

Workorder No.: R12080363 Quote ID: R412

Project Name: #708 Alluvial

Energy Laboratories Inc. Rapid City SD received the following 1 sample for Powertech USA Inc on 8/21/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
R12080363-001	708	08/20/12 14:25	08/21/12	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Anions by Ion Chromatography pH Dissolved Filtration Solids, Total Dissolved

This report was prepared by Energy Laboratories, Inc., 2821 Plant St., Rapid City, SD 57702. As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By:

Linda K. Larson
Branch Manager

Digitally signed by
Linda Larson
Date: 2012.09.06 11:14:56 -06:00

CLIENT: Powertech USA Inc
Project: #708 Alluvial
Sample Delivery Group: R12080363

Report Date: 09/05/12

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial
Lab ID: R12080363-001
Client Sample ID: 708

Report Date: 09/05/12
Collection Date: 08/20/12 14:25
Date Received: 08/21/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	6300	umhos/cm		5.0		1	A2510 B	08/21/12 17:39/tb
pH	7.29	su		0.01		1	A4500-H B	08/21/12 18:16/tb
Solids, Total Dissolved TDS @ 180 C	6300	mg/L		100		1	A2540 C	08/27/12 12:33/tb
Alkalinity, Total as CaCO3	298	mg/L		5		1	A2320 B	08/24/12 14:26/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	08/24/12 14:26/ch
Bicarbonate as HCO3	363	mg/L		5		1	A2320 B	08/24/12 14:26/ch
INORGANIC PARAMETERS								
Chloride	44	mg/L		1		1	E300.0	08/22/12 04:53/tb
Sulfate	4260	mg/L	D	50		50	E300.0	08/22/12 05:11/tb
DISSOLVED METALS ANALYSES								
Calcium	414	mg/L		1		1	E200.7	08/23/12 18:03/eli-ca
Magnesium	530	mg/L		1		1	E200.7	08/23/12 18:03/eli-ca
Sodium	713	mg/L		1		1	E200.7	08/23/12 18:03/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 09/05/12
Work Order: R12080363

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B									Batch: 120824A-ALK-SEL-W	
Sample ID: LCS1_BatchId		Laboratory Control Sample				Run: PH_COND1-R_120824A			08/24/12 11:13	
Alkalinity, Total as CaCO3		936	mg/L	5.0	94	90	110			
Sample ID: MBLK1_BatchId		Method Blank				Run: PH_COND1-R_120824A			08/24/12 11:17	
Alkalinity, Total as CaCO3		ND	mg/L	2						
Sample ID: R12080362-004AMS		Sample Matrix Spike				Run: PH_COND1-R_120824A			08/24/12 13:59	
Alkalinity, Total as CaCO3		414	mg/L	5.0	103	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Report Date: 09/05/12
Project: #708 Alluvial
Work Order: R12080363

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B									Batch: 120821_1_COND-PROBE-W	
Sample ID: MBLK-1_120821		Method Blank				Run: PH_COND2-R_120821A			08/21/12 13:00	
Conductivity @ 25 C		ND	umhos/cm	5						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 09/05/12
Work Order: R12080363

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C										Batch: TDS120827A
Sample ID: MB-1_120827A		Method Blank				Run: BAL-TDS_120827A				08/27/12 12:29
Solids, Total Dissolved TDS @ 180 C		10	mg/L	3						
Sample ID: LCS-2_120827A		Laboratory Control Sample				Run: BAL-TDS_120827A				08/27/12 12:30
Solids, Total Dissolved TDS @ 180 C		230	mg/L	20	108	90	110			
Sample ID: R12080362-006A MS		Sample Matrix Spike				Run: BAL-TDS_120827A				08/27/12 12:32
Solids, Total Dissolved TDS @ 180 C		4300	mg/L	40	101	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 09/05/12
Work Order: R12080363

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: PH_COND2-R_120821B		
Sample ID: ICV-1_120821		Initial Calibration Verification Standard							08/21/12 17:57	
pH		7.42	su	0.010	100	98	102			
Method: A4500-H B									Batch: 120821_1_PH-W	
Sample ID: R12080362-001ADUP		Sample Duplicate				Run: PH_COND2-R_120821B			08/21/12 18:03	
pH		7.15	su	0.010				0.3	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 09/05/12
Work Order: R12080363

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: SUB-C163707	
Sample ID: ICV	3	Initial Calibration Verification Standard							08/23/12 15:34	
Calcium		51	mg/L	0.50	102	95	105			
Magnesium		51	mg/L	0.50	102	95	105			
Sodium		52	mg/L	0.50	104	95	105			
Sample ID: ICSA	3	Interference Check Sample A							08/23/12 15:48	
Calcium		460	mg/L	0.50	92	80	120			
Magnesium		510	mg/L	0.50	102	80	120			
Sodium		0.35	mg/L	0.50						
Sample ID: ICSAB	3	Interference Check Sample AB							08/23/12 15:52	
Calcium		460	mg/L	0.50	92	80	120			
Magnesium		510	mg/L	0.50	102	80	120			
Sodium		0.23	mg/L	0.50						
Method: E200.7									Batch: C_R163707	
Sample ID: MB-120823A	3	Method Blank				Run: SUB-C163707			08/23/12 15:56	
Calcium		ND	mg/L	0.02						
Magnesium		0.03	mg/L	0.01						
Sodium		ND	mg/L	0.2						
Sample ID: LFB-120823A	3	Laboratory Fortified Blank				Run: SUB-C163707			08/23/12 16:00	
Calcium		48	mg/L	0.50	97	85	115			
Magnesium		48	mg/L	0.50	96	85	115			
Sodium		48	mg/L	0.50	97	85	115			
Sample ID: C12080923-008BMS2	3	Sample Matrix Spike				Run: SUB-C163707			08/23/12 17:52	
Calcium		48.3	mg/L	1.0	92	70	130			
Magnesium		46.6	mg/L	1.0	91	70	130			
Sodium		155	mg/L	1.0	84	70	130			
Sample ID: C12080923-008BMSD2	3	Sample Matrix Spike Duplicate				Run: SUB-C163707			08/23/12 17:56	
Calcium		51.2	mg/L	1.0	98	70	130	5.7	20	
Magnesium		49.3	mg/L	1.0	96	70	130	5.6	20	
Sodium		171	mg/L	1.0	115	70	130	9.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 09/05/12
Work Order: R12080363

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: DIONEX_120821A	
Sample ID: CCV082112-57	2	Continuing Calibration Verification Standard							08/22/12 01:36	
Chloride		73.1	mg/L	1.0	98	90	110			
Sulfate		71.2	mg/L	1.0	95	90	110			
Method: E300.0									Batch: R57749	
Sample ID: LFB082112-14	2	Laboratory Fortified Blank				Run: DIONEX_120821A			08/21/12 13:22	
Chloride		38.7	mg/L	1.0	97	90	110			
Sulfate		37.7	mg/L	1.0	94	90	110			
Sample ID: R12080307-008AMS	2	Sample Matrix Spike				Run: DIONEX_120821A			08/22/12 06:41	
Chloride		4440	mg/L	100	97	90	110			
Sulfate		8320	mg/L	100	106	90	110			
Sample ID: R12080307-008AMSD	2	Sample Matrix Spike Duplicate				Run: DIONEX_120821A			08/22/12 06:59	
Chloride		4460	mg/L	100	97	90	110	0.4	10	
Sulfate		8320	mg/L	100	106	90	110	0.0	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Chain of Custody and Analytical Request Record

PLEASE PRINT (Provide as much information as possible.)

Company Name: Scott Environmental	Project Name, PWS, Permit, Etc.: Dewey/Burdock Alluvial Wells	Sample Origin State: SD	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: Scott Env. Powertech, USA	Contact Name: Allan Scott Phone/Fax: 673-1552	Email:	Sampler: (Please Print) Allan Scott
Invoice Address: Powertech, USA	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats:

☐ DW ☐ EDD/EDT (Electronic Data) Format: _____
☐ POTW/WWTP ☐ LEVEL IV
☐ State: _____ ☐ NELAC
☐ Other: _____

ANALYSIS REQUESTED

Standard Turnaround (TAT) — RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by:
Cooler ID(s):
Receipt Temp 2.2 °C
On Ice: (Y) N
Custody Seal: On Bottle Y N; On Cooler Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Number of Containers Sample Type: A W S V B O DW Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water	Gross Alpha	SEE ATTACHED
1	DC-2	8-20-12	9:25	Water		✓	
2	DC-4	8-20-12	10:11	"		✓	
3	BC-3	8-20-12	11:23	"		✓	
4	BC-1	8-20-12	12:29	"		✓	
5	BC-1 Dup.	8-20-12	12:38	"		✓	
6	BC-2	8-20-12	13:41	"		✓	
7	708	8-20-12	14:25	"		✓	
8	DC-1	8-21-12	9:05	"		✓	
9							
10							

LABORATORY USE ONLY: 1208363001

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Allan Scott	8-21-12 13:01	Allan Scott			
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
			Received by Laboratory: Steve Troland	8-21-12 1301	Steve Troland

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

ANALYTICAL SUMMARY REPORT

September 25, 2012

Powertech USA Inc
PO Box 812
Edgemont, SD 57735

Workorder No.: R12090144 Quote ID: R412

Project Name: #708 Alluvial

Energy Laboratories Inc. Rapid City SD received the following 1 sample for Powertech USA Inc on 9/11/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
R12090144-001	708	09/10/12 15:24	09/11/12	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Anions by Ion Chromatography pH Dissolved Filtration Solids, Total Dissolved

This report was prepared by Energy Laboratories, Inc., 2821 Plant St., Rapid City, SD 57702. As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By:

Linda K. Larson
Branch Manager

Digitally signed by Linda Larson
Date: 2012.09.25 17:12:51 -06:00

CLIENT: Powertech USA Inc
Project: #708 Alluvial
Sample Delivery Group: R12090144

Report Date: 09/25/12

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

-----Original Message-----
From: Lisa Scheinost [mailto:escheinost@powertechuranium.com]
Sent: Wednesday, September 05, 2012 14:42
To: llarson@energylab.com
Cc: scottenv@gwtc.net
Subject: RE: Full Anion/Cation Balance Requested for 708 on Sept 10-11 2012 Round

Thanks Linda. Please add F and NO3 (and K) to the 708 analyte list, if you would. I appreciate it. Lisa
Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial
Lab ID: R12090144-001
Client Sample ID: 708

Report Date: 09/25/12
Collection Date: 09/10/12 15:24
Date Received: 09/11/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	6250	umhos/cm		5.0		1	A2510 B	09/12/12 09:40/tb
pH	7.28	su		0.01		1	A4500-H B	09/12/12 08:55/tb
Solids, Total Dissolved TDS @ 180 C	6500	mg/L		100		1	A2540 C	09/17/12 09:25/jmh
Alkalinity, Total as CaCO3	302	mg/L		5		1	A2320 B	09/17/12 15:09/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	09/17/12 15:09/ch
Bicarbonate as HCO3	368	mg/L		5		1	A2320 B	09/17/12 15:09/ch
INORGANIC PARAMETERS								
Chloride	46	mg/L		1		1	E300.0	09/11/12 22:48/tb
Fluoride	1.1	mg/L		0.1		1	E300.0	09/11/12 22:48/tb
Sulfate	4270	mg/L	D	50		50	E300.0	09/11/12 23:06/tb
NUTRIENT PARAMETERS								
Nitrogen, Nitrate as N	ND	mg/L		0.1		1	E300.0	09/11/12 22:48/tb
DISSOLVED METALS ANALYSES								
Calcium	426	mg/L		1		2	E200.7	09/14/12 17:38/eli-ca
Magnesium	521	mg/L		1		2	E200.7	09/14/12 17:38/eli-ca
Potassium	32	mg/L		1		2	E200.7	09/14/12 17:38/eli-ca
Sodium	779	mg/L		1		2	E200.7	09/14/12 17:38/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 09/25/12
Work Order: R12090144

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B									Batch: 120917A-ALK-SEL-W	
Sample ID: LCS1_120917A		Laboratory Control Sample				Run: PH_COND1-R_120917A			09/17/12 14:03	
Alkalinity, Total as CaCO3		968	mg/L	5.0	97	90	110			
Sample ID: MBLK1_120917A		Method Blank				Run: PH_COND1-R_120917A			09/17/12 14:06	
Alkalinity, Total as CaCO3		ND	mg/L	2						
Sample ID: R12090103-002AMS		Sample Matrix Spike				Run: PH_COND1-R_120917A			09/17/12 14:21	
Alkalinity, Total as CaCO3		302	mg/L	5.0	98	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc **Report Date:** 09/25/12

Project: #708 Alluvial **Work Order:** R12090144

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B								Batch: 120912_1_COND-PROBE-W		
Sample ID: MBLK-1_120912		Method Blank				Run: PH_COND2-R_120912B			09/12/12 09:36	
Conductivity @ 25 C		ND	umhos/cm	5						
Sample ID: R12090144-001ADUP		Sample Duplicate				Run: PH_COND2-R_120912B			09/12/12 09:42	
Conductivity @ 25 C		6250	umhos/cm	5.0				0.0	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 09/25/12
Work Order: R12090144

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C										Batch: TDS120917A
Sample ID: MB-1_120917A		Method Blank				Run: BAL-TDS_120917A				09/17/12 09:20
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	3						
Sample ID: LCS-2_120917A		Laboratory Control Sample				Run: BAL-TDS_120917A				09/17/12 09:20
Solids, Total Dissolved TDS @ 180 C		550	mg/L	10	110	90	110			
Sample ID: R12090133-003C MS		Sample Matrix Spike				Run: BAL-TDS_120917A				09/17/12 09:23
Solids, Total Dissolved TDS @ 180 C		2700	mg/L	40	102	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 09/25/12
Work Order: R12090144

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: PH_COND2-R_120912A		
Sample ID: ICV-1_120912		Initial Calibration Verification Standard							09/12/12 08:44	
pH		7.43	su	0.010	100	98	102			
Method: A4500-H B								Batch: 120912_1_PH-W		
Sample ID: ICV1-1_120912		Initial Calibration Verification Standard				Run: PH_COND2-R_120912A			09/12/12 08:42	
pH		12.0	su	0.010	100	99	101			
Sample ID: R12090144-001ADUP		Sample Duplicate				Run: PH_COND2-R_120912A			09/12/12 08:59	
pH		7.33	su	0.010				0.7	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc **Report Date:** 09/25/12
Project: #708 Alluvial **Work Order:** R12090144

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: SUB-C164605	
Sample ID: ICV	4	Initial Calibration Verification Standard							09/14/12 12:05	
Calcium		50	mg/L	0.50	100	95	105			
Magnesium		49	mg/L	0.50	98	95	105			
Potassium		51	mg/L	2.7	102	95	105			
Sodium		51	mg/L	0.50	101	95	105			
Sample ID: ICSA	4	Interference Check Sample A							09/14/12 12:45	
Calcium		490	mg/L	0.50	98	80	120			
Magnesium		490	mg/L	0.50	99	80	120			
Potassium		-0.0019	mg/L	0.50						
Sodium		0.24	mg/L	0.50						
Sample ID: ICSAB	4	Interference Check Sample AB							09/14/12 12:49	
Calcium		490	mg/L	0.50	98	80	120			
Magnesium		500	mg/L	0.50	100	80	120			
Potassium		-0.00050	mg/L	0.50						
Sodium		0.50	mg/L	0.50						
Method: E200.7									Batch: C_R164605	
Sample ID: MB-120914A	4	Method Blank				Run: SUB-C164605			09/14/12 13:09	
Calcium		ND	mg/L	0.06						
Magnesium		ND	mg/L	0.03						
Potassium		ND	mg/L	0.06						
Sodium		ND	mg/L	0.3						
Sample ID: LFB-120914A	4	Laboratory Fortified Blank				Run: SUB-C164605			09/14/12 13:13	
Calcium		48	mg/L	0.50	97	85	115			
Magnesium		47	mg/L	0.50	95	85	115			
Potassium		44	mg/L	0.50	89	85	115			
Sodium		47	mg/L	0.50	94	85	115			
Sample ID: C12090319-002BMS2	4	Sample Matrix Spike				Run: SUB-C164605			09/14/12 16:42	
Calcium		49.5	mg/L	1.0	94	70	130			
Magnesium		48.7	mg/L	1.0	95	70	130			
Potassium		45.2	mg/L	1.0	88	70	130			
Sodium		157	mg/L	1.0	94	70	130			
Sample ID: C12090319-002BMSD2	4	Sample Matrix Spike Duplicate				Run: SUB-C164605			09/14/12 16:46	
Calcium		49.9	mg/L	1.0	95	70	130	0.8	20	
Magnesium		49.0	mg/L	1.0	96	70	130	0.6	20	
Potassium		46.4	mg/L	1.0	90	70	130	2.6	20	
Sodium		159	mg/L	1.0	98	70	130	1.4	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Report Date: 09/25/12
Project: #708 Alluvial
Work Order: R12090144

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0										Batch: R58045
Sample ID: LFB091112-14	4	Laboratory Fortified Blank				Run: DIONEX_120913A				09/11/12 21:37
Chloride		38.8	mg/L	1.0	97	90	110			
Fluoride		3.92	mg/L	0.10	98	90	110			
Nitrogen, Nitrate as N		3.80	mg/L	0.10	95	90	110			
Sulfate		37.9	mg/L	1.0	95	90	110			
Sample ID: R12090129-001BMS	4	Sample Matrix Spike				Run: DIONEX_120913A				09/11/12 22:12
Chloride		46.6	mg/L	1.0	97	90	110			
Fluoride		4.15	mg/L	0.10	95	90	110			
Nitrogen, Nitrate as N		4.66	mg/L	0.10	93	90	110			
Sulfate		75.9	mg/L	1.0	102	90	110			
Sample ID: R12090129-001BMSD	4	Sample Matrix Spike Duplicate				Run: DIONEX_120913A				09/11/12 22:30
Chloride		46.5	mg/L	1.0	97	90	110	0.2	10	
Fluoride		4.15	mg/L	0.10	95	90	110	0.0	10	
Nitrogen, Nitrate as N		4.67	mg/L	0.10	93	90	110	0.2	10	
Sulfate		76.3	mg/L	1.0	103	90	110	0.5	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page _____ of _____

PLEASE PRINT (Provide as much information as possible.)

Company Name: Scott Env,	Project Name, PWS, Permit, Etc. Dewey/Burdock alluvial wells	Sample Origin State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: Powertech, USA Scott Env,	Contact Name: Allen Scott Phone/Fax:	Email: scottenvconsulting	Sampler: (Please Print) Allen Scott
Invoice Address: Powertech, USA	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats:

☐ DW
☐ POTW/WWTP
☐ State: _____
☐ Other: _____
☐ EDD/EDT (Electronic Data) Format: _____
☐ LEVEL IV
☐ NELAC

ANALYSIS REQUESTED

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water

SEE ATTACHED

Standard Turnaround (TAT)

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by:
Cooler ID(s):
Receipt Temp 5.6 °C
On Ice: Y N
Custody Seal
On Bottle Y N
On Cooler Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	As Po Quote
1	DC-2	9-10-12	9:35	Water	✓
2	DC-4	9-10-12	10:36	"	✓
3	DC-4 Dup	9-10-12	10:37	"	✓
4	BC-3	9-10-12	12:03	"	✓
5	BC-1	9-10-12	13:41	"	✓
6	BC-2	9-10-12	14:42	"	✓
7	708	9-10-12	15:24	"	✓
8	DC-1	9-11-12	9:17	"	✓
9					
10					

LABORATORY USE ONLY
1209014-001

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Allen Scott	9-11-12 13:58				
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
			Received by Laboratory: Blue Foiland	9-11-12 1358	

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Energy Laboratories Inc.
2821 Plant St
Rapid City, SD 57702-
(605) 342-1225

R12090144

CHAIN-OF-CUSTODY RECORD

13-Sep-12

Custody Seal: Y N
Intacted: Y N
Signature Match: Y N

Shipped By:
Receipt Temp:

Subcontractor:
ELI - Casper
2393 Salt Creek Hwy.
Casper, WY 82601
TEL: FAX:
Acct #:

Subcontractor's Client: Powertech USA Inc

Shipped By:

Requested Tests

Sample ID	Matrix	Collection Date	Bottle Type	200_7_8-W-D
R12090144-001B	Aqueous	09/10/12 03:24 P	1-500ML-P-F-HNO3	1

Comments:

QC Level:
STD

	Date/Time		Date/Time
Relinquished by:	9-12-12 1600	**Received by:**	
Relinquished by:		**Received by:**	

ANALYTICAL SUMMARY REPORT

October 24, 2012

Powertech USA Inc
PO Box 812
Edgemont, SD 57735

Workorder No.: R12100059 Quote ID: R412

Project Name: #708 Alluvial

Energy Laboratories Inc. Rapid City SD received the following 1 sample for Powertech USA Inc on 10/3/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
R12100059-001	708	10/02/12 16:17	10/03/12	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Anions by Ion Chromatography pH Dissolved Filtration Solids, Total Dissolved

This report was prepared by Energy Laboratories, Inc., 2821 Plant St., Rapid City, SD 57702. As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By:

Linda K. Larson
Branch Manager

Digitally signed by Linda Larson
Date: 2012.10.24 09:18:21 -06:00

CLIENT: Powertech USA Inc
Project: #708 Alluvial
Sample Delivery Group: R12100059

Revised Date: 10/24/12
Report Date: 10/17/12

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Revised Date: 10/24/12
Report Date: 10/17/12
Collection Date: 10/02/12 16:17
Date Received: 10/03/12
Matrix: AQUEOUS

Client: Powertech USA Inc
Project: #708 Alluvial
Lab ID: R12100059-001
Client Sample ID: 708

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	6300	umhos/cm		5.0		1	A2510 B	10/04/12 10:03/tb
pH	7.21	su		0.01		1	A4500-H B	10/04/12 11:32/tb
Solids, Total Dissolved TDS @ 180 C	7000	mg/L		10		1	A2540 C	10/08/12 17:02/tb
Alkalinity, Total as CaCO3	298	mg/L		5		1	A2320 B	10/10/12 11:42/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	10/10/12 11:42/ch
Bicarbonate as HCO3	363	mg/L		5		1	A2320 B	10/10/12 11:42/ch
INORGANIC PARAMETERS								
Chloride	47	mg/L		1		1	E300.0	10/04/12 02:51/tb
Fluoride	1.2	mg/L		0.1		1	E300.0	10/04/12 02:51/tb
Sulfate	4520	mg/L	D	50		50	E300.0	10/05/12 00:02/tb
NUTRIENT PARAMETERS								
Nitrogen, Nitrate as N	ND	mg/L		0.1		1	E300.0	10/04/12 02:51/tb
DISSOLVED METALS ANALYSES								
Calcium	442	mg/L		1		5	E200.7	10/15/12 20:22/eli-ca
Magnesium	525	mg/L		1		5	E200.7	10/15/12 20:22/eli-ca
Potassium	30	mg/L		1		5	E200.7	10/15/12 20:22/eli-ca
Sodium	766	mg/L	D	2		5	E200.7	10/16/12 16:51/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Revised Date: 10/24/12

Client: Powertech USA Inc

Report Date: 10/17/12

Project: #708 Alluvial

Work Order: R12100059

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B									Batch: 121010A-ALK-SEL-W	
Sample ID: R12100062-002ADUP	3	Sample Duplicate				Run: PH_COND1-R_121010A			10/10/12 14:33	
Alkalinity, Total as CaCO3		262	mg/L	5.0				2.3	10	
Carbonate as CO3		ND	mg/L	5.0					10	
Bicarbonate as HCO3		319	mg/L	5.0				2.3	10	
Sample ID: R12100062-003AMS		Sample Matrix Spike				Run: PH_COND1-R_121010A			10/10/12 15:01	
Alkalinity, Total as CaCO3		462	mg/L	5.0	86	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Revised Date: 10/24/12

Client: Powertech USA Inc

Report Date: 10/17/12

Project: #708 Alluvial

Work Order: R12100059

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B									Batch: 121004_1_COND-PROBE-W	
Sample ID: MBLK-1_121004		Method Blank				Run: PH_COND2-R_121004A			10/04/12 09:46	
Conductivity @ 25 C		ND	umhos/cm	5						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Revised Date: 10/24/12

Client: Powertech USA Inc

Report Date: 10/17/12

Project: #708 Alluvial

Work Order: R12100059

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C									Batch: TDS121008A	
Sample ID: MB-1_121008A		Method Blank				Run: BAL-TDS_121008A			10/08/12 16:45	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	3						
Sample ID: LCS-2_121008A		Laboratory Control Sample				Run: BAL-TDS_121008A			10/08/12 16:47	
Solids, Total Dissolved TDS @ 180 C		510	mg/L	10	102	90	110			
Sample ID: R12100054-001A MS		Sample Matrix Spike				Run: BAL-TDS_121008A			10/08/12 16:55	
Solids, Total Dissolved TDS @ 180 C		12000	mg/L	10	98	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Revised Date: 10/24/12
Report Date: 10/17/12
Work Order: R12100059

Client: Powertech USA Inc
Project: #708 Alluvial

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: PH_COND2-R_121004B		
Sample ID: ICV-1_121004		Initial Calibration Verification Standard							10/04/12 11:12	
pH		7.40	su	0.010	100	98	102			
Method: A4500-H B								Batch: 121004_1_PH-W		
Sample ID: ICV1-1_121004		Initial Calibration Verification Standard				Run: PH_COND2-R_121004B			10/04/12 11:11	
pH		12.0	su	0.010	100	99	101			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Revised Date: 10/24/12
Report Date: 10/17/12
Work Order: R12100059

Client: Powertech USA Inc
Project: #708 Alluvial

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: SUB-C165834	
Sample ID: ICV	3	Initial Calibration Verification Standard							10/15/12 12:13	
Calcium		51	mg/L	0.50	102	95	105			
Magnesium		49	mg/L	0.50	97	95	105			
Potassium		52	mg/L	2.7	104	95	105			
Sample ID: ICSA	3	Interference Check Sample A							10/15/12 14:53	
Calcium		510	mg/L	0.50	102	80	120			
Magnesium		500	mg/L	0.50	100	80	120			
Potassium		-0.0019	mg/L	0.50						
Sample ID: ICSAB	3	Interference Check Sample AB							10/15/12 14:57	
Calcium		490	mg/L	0.50	98	80	120			
Magnesium		500	mg/L	0.50	100	80	120			
Potassium		-0.00010	mg/L	0.50						
Method: E200.7									Batch: C_R165834	
Sample ID: MB-121015A	3	Method Blank				Run: SUB-C165834			10/15/12 15:18	
Calcium		ND	mg/L	0.06						
Magnesium		ND	mg/L	0.03						
Potassium		ND	mg/L	0.06						
Sample ID: LFB-121015A	3	Laboratory Fortified Blank				Run: SUB-C165834			10/15/12 15:54	
Calcium		50	mg/L	0.50	100	85	115			
Magnesium		49	mg/L	0.50	97	85	115			
Potassium		43	mg/L	0.50	86	85	115			
Sample ID: C12100087-004BMS2	3	Sample Matrix Spike				Run: SUB-C165834			10/15/12 20:14	
Calcium		52.6	mg/L	1.0	99	70	130			
Magnesium		48.8	mg/L	1.0	97	70	130			
Potassium		45.9	mg/L	1.0	91	70	130			
Sample ID: C12100087-004BMSD2	3	Sample Matrix Spike Duplicate				Run: SUB-C165834			10/15/12 20:18	
Calcium		51.9	mg/L	1.0	98	70	130	1.4	20	
Magnesium		48.6	mg/L	1.0	97	70	130	0.5	20	
Potassium		47.1	mg/L	1.0	93	70	130	2.4	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Revised Date: 10/24/12
Report Date: 10/17/12
Work Order: R12100059

Client: Powertech USA Inc
Project: #708 Alluvial

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: SUB-C165910	
Sample ID: ICV		Initial Calibration Verification Standard							10/16/12 13:24	
Sodium		52	mg/L	0.50	104	95	105			
Sample ID: ICSA		Interference Check Sample A							10/16/12 14:11	
Sodium		0.19	mg/L	0.50						
Sample ID: ICSAB		Interference Check Sample AB							10/16/12 14:15	
Sodium		0.090	mg/L	0.50						
Method: E200.7									Batch: C_R165910	
Sample ID: MB-121016A		Method Blank				Run: SUB-C165910			10/16/12 14:35	
Sodium		ND	mg/L	0.3						
Sample ID: LFB-121016A		Laboratory Fortified Blank				Run: SUB-C165910			10/16/12 14:39	
Sodium		48	mg/L	0.50	96	85	115			
Sample ID: C12100224-006BMS2		Sample Matrix Spike				Run: SUB-C165910			10/16/12 16:43	
Sodium		182	mg/L	1.0	96	70	130			
Sample ID: C12100224-006BMSD2		Sample Matrix Spike Duplicate				Run: SUB-C165910			10/16/12 16:47	
Sodium		184	mg/L	1.0	101	70	130	1.3	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Revised Date: 10/24/12
Report Date: 10/17/12
Work Order: R12100059

Client: Powertech USA Inc
Project: #708 Alluvial

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: DIONEX_121003A	
Sample ID: CCV100312-28	3	Continuing Calibration Verification Standard							10/04/12 00:45	
Chloride		73.8	mg/L	1.0	98	90	110			
Fluoride		7.50	mg/L	0.10	100	90	110			
Nitrogen, Nitrate as N		7.41	mg/L	0.10	99	90	110			
Method: E300.0									Batch: R58335	
Sample ID: LFB100312-14	3	Laboratory Fortified Blank				Run: DIONEX_121003A			10/03/12 20:52	
Chloride		40.0	mg/L	1.0	100	90	110			
Fluoride		4.18	mg/L	0.10	105	90	110			
Nitrogen, Nitrate as N		4.09	mg/L	0.10	102	90	110			
Sample ID: R12100063-001AMS	3	Sample Matrix Spike				Run: DIONEX_121003A			10/04/12 01:39	
Chloride		377	mg/L	5.0	98	90	110			
Fluoride		21.6	mg/L	0.50	99	90	110			
Nitrogen, Nitrate as N		55.5	mg/L	0.50	94	90	110			
Sample ID: R12100063-001AMSD	3	Sample Matrix Spike Duplicate				Run: DIONEX_121003A			10/04/12 01:57	
Chloride		377	mg/L	5.0	99	90	110	0.1	10	
Fluoride		21.7	mg/L	0.50	99	90	110	0.4	10	
Nitrogen, Nitrate as N		55.7	mg/L	0.50	95	90	110	0.4	10	
Method: E300.0									Batch: R58355	
Sample ID: LFB100412-14		Laboratory Fortified Blank				Run: DIONEX_121004A			10/04/12 21:02	
Sulfate		40.9	mg/L	1.0	102	90	110			
Sample ID: R12100062-003AMS		Sample Matrix Spike				Run: DIONEX_121004A			10/05/12 01:49	
Sulfate		12000	mg/L	100	111	90	110			S
Sample ID: R12100062-003AMSD		Sample Matrix Spike Duplicate				Run: DIONEX_121004A			10/05/12 02:07	
Sulfate		12100	mg/L	100	112	90	110	0.4	10	S

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

ENERGY

Chain of Custody and Analytical Request Record

Page ____ of ____

PLEASE PRINT (Provide as much information as possible.)

Company Name: Scott Env.		Project Name, PWS, Permit, Etc.: PowerTech alluvial wells	Sample Origin State: SD	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: PowerTech / Scott Env.		Contact Name: Allen Scott Phone/Fax:	Email:	Sampler: (Please Print) Allen Scott
Invoice Address: PowerTech		Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats:

☐ DW
☐ POTW/WWTP
☐ State: _____
☐ Other: _____
☐ EDD/EDT (Electronic Data)
Format: _____
☐ LEVEL IV
☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water

ANALYSIS REQUESTED

SEE ATTACHED

Standard Turnaround (TAT)

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by: Fedex

Cooler ID(s):

Receipt Temp 2.6 °C

On Ice: Y N

Custody Seal
On Bottle Y N
On Cooler Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	As Per Quote												
✓	DC-2	10-2-12	10:17	Water	✓												
✓	DC-2 Dup.	10-2-12	10:18	"	✓												
✓ 3	DC-4	10-2-12	11:53	"	✓												
✓ 4	BC-3	10-2-12	13:40	"	✓												
✓ 5	BC-1	10-2-12	14:31	"	✓												
✓ 6	BC-2	10-2-12	15:37	"	✓												
✓ 7	708	10-2-12	16:17	"	✓											R12100059	
✓ 8	DC-1	10-3-12	9:05	"	✓												
9																	
10																	

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print): Allen Scott	Date/Time: 10-3-12 12:53	Signature:	Received by (print): / Date/Time: / Signature:
Relinquished by (print):	Date/Time:	Signature:	Received by (print): / Date/Time: / Signature:
Sample Disposal:	Return to Client: _____	Lab Disposal: _____	Received by Laboratory: Linda Carson 10/3/12 1254

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

ANALYTICAL SUMMARY REPORT

November 13, 2012

Powertech USA Inc
PO Box 812
Edgemont, SD 57735

Workorder No.: R12110069 Quote ID: R412 - #708 plus Alluvial

Project Name: #708 Alluvial

Energy Laboratories Inc. Rapid City SD received the following 1 sample for Powertech USA Inc on 11/6/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
R12110069-001	708	11/05/12 16:13	11/06/12	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Anion - Cation Balance Conductivity Anions by Ion Chromatography pH Dissolved Filtration Solids, Total Dissolved

This report was prepared by Energy Laboratories, Inc., 2821 Plant St., Rapid City, SD 57702. As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By:

Linda K. Larson
Branch Manager

Digitally signed by
Linda Larson
Date: 2012.11.13 16:27:54 -07:00

CLIENT: Powertech USA Inc
Project: #708 Alluvial
Sample Delivery Group: R12110069

Report Date: 11/13/12

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial
Lab ID: R12110069-001
Client Sample ID: 708

Report Date: 11/13/12
Collection Date: 11/05/12 16:13
Date Received: 11/06/12
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
PHYSICAL PARAMETERS								
Conductivity @ 25 C	5200	umhos/cm		5.0		1	A2510 B	11/06/12 12:27/tb
pH	7.27	su		0.01		1	A4500-H B	11/06/12 12:49/tb
Solids, Total Dissolved TDS @ 180 C	6600	mg/L		10		1	A2540 C	11/07/12 15:59/jmh
Alkalinity, Total as CaCO3	306	mg/L		5		1	A2320 B	11/09/12 15:44/ch
Carbonate as CO3	ND	mg/L		5		1	A2320 B	11/09/12 15:44/ch
Bicarbonate as HCO3	373	mg/L		5		1	A2320 B	11/09/12 15:44/ch
INORGANIC PARAMETERS								
Chloride	45	mg/L		1		1	E300.0	11/06/12 22:11/tb
Fluoride	1.0	mg/L		0.1		1	E300.0	11/06/12 22:11/tb
Sulfate	4280	mg/L	D	50		50	E300.0	11/06/12 21:17/tb
DATA QUALITY PARAMETERS								
Anions	96.5	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Cations	96.2	meq/L		1.00		1	A1030 E	11/13/12 00:00/lkl
Conductivity, Calculated	7170	umhos/cm		1.00		1	A1030 E	11/13/12 00:00/lkl
TDS Ratio	1.06			0.0100		1	A1030 E	11/13/12 00:00/lkl
A/C Balance	-0.140	%				1	A1030 E	11/13/12 00:00/lkl
NUTRIENT PARAMETERS								
Nitrogen, Nitrate as N	ND	mg/L		0.1		1	E300.0	11/06/12 22:11/tb
DISSOLVED METALS ANALYSES								
Calcium	415	mg/L		1		2	E200.7	11/08/12 19:59/eli-ca
Magnesium	516	mg/L		1		2	E200.7	11/08/12 19:59/eli-ca
Potassium	30	mg/L		1		2	E200.7	11/08/12 19:59/eli-ca
Sodium	742	mg/L		1		2	E200.7	11/08/12 19:59/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 11/13/12
Work Order: R12110069

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B									Batch: 121109A-ALK-SEL-W	
Sample ID: LCS1_121109A		Laboratory Control Sample				Run: PH_COND1-R_121109A			11/09/12 15:32	
Alkalinity, Total as CaCO3		952	mg/L	5.0	95	90	110			
Sample ID: MBLK1_121109A		Method Blank				Run: PH_COND1-R_121109A			11/09/12 15:36	
Alkalinity, Total as CaCO3		ND	mg/L	2						
Sample ID: R12110069-001ADUP	3	Sample Duplicate				Run: PH_COND1-R_121109A			11/09/12 15:49	
Alkalinity, Total as CaCO3		298	mg/L	5.0				2.6	10	
Carbonate as CO3		ND	mg/L	5.0					10	
Bicarbonate as HCO3		363	mg/L	5.0				2.6	10	
Sample ID: R12110088-002AMS		Sample Matrix Spike				Run: PH_COND1-R_121109A			11/09/12 15:54	
Alkalinity, Total as CaCO3		370	mg/L	5.0	94	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 11/13/12
Work Order: R12110069

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B									Batch: 121106_1_COND-PROBE-W	
Sample ID: MBLK-1_121106		Method Blank				Run: PH_COND2-R_121106B			11/06/12 10:02	
Conductivity @ 25 C		ND	umhos/cm	5						
Sample ID: R12110069-001ADUP		Sample Duplicate				Run: PH_COND2-R_121106B			11/06/12 12:29	
Conductivity @ 25 C		5210	umhos/cm	5.0				0.2	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 11/13/12
Work Order: R12110069

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C										Batch: TDS121107A
Sample ID: MB-1_121107A		Method Blank				Run: BAL-TDS_121107A				11/07/12 15:45
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	3						
Sample ID: LCS-2_121107A		Laboratory Control Sample				Run: BAL-TDS_121107A				11/07/12 15:46
Solids, Total Dissolved TDS @ 180 C		500	mg/L	10	100	90	110			
Sample ID: R12110036-005A MS		Sample Matrix Spike				Run: BAL-TDS_121107A				11/07/12 15:50
Solids, Total Dissolved TDS @ 180 C		4100	mg/L	10	101	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 11/13/12
Work Order: R12110069

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: PH_COND2-R_121106A		
Sample ID: ICV-1_121106		Initial Calibration Verification Standard								11/06/12 09:17
pH		7.43	su	0.010	100	98	102			
Method: A4500-H B									Batch: 121106_1_PH-W	
Sample ID: ICV1-1_121106		Initial Calibration Verification Standard				Run: PH_COND2-R_121106A				11/06/12 09:16
pH		12.0	su	0.010	100	99	101			
Sample ID: R12110069-001ADUP		Sample Duplicate				Run: PH_COND2-R_121106A				11/06/12 12:54
pH		7.28	su	0.010				0.1	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc
Project: #708 Alluvial

Report Date: 11/13/12
Work Order: R12110069

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: SUB-C166967	
Sample ID: ICV	4	Initial Calibration Verification Standard							11/08/12 14:11	
Calcium		50	mg/L	0.50	99	95	105			
Magnesium		52	mg/L	0.50	103	95	105			
Potassium		47	mg/L	0.50	95	95	105			
Sodium		53	mg/L	0.50	105	95	105			
Sample ID: ICSA	4	Interference Check Sample A							11/08/12 14:40	
Calcium		490	mg/L	0.50	99	80	120			
Magnesium		530	mg/L	0.50	107	80	120			
Potassium		-0.0072	mg/L	0.50						
Sodium		0.033	mg/L	0.50						
Sample ID: ICSAB	4	Interference Check Sample AB							11/08/12 14:44	
Calcium		500	mg/L	0.50	99	80	120			
Magnesium		520	mg/L	0.50	104	80	120			
Potassium		-0.0062	mg/L	0.50						
Sodium		0.028	mg/L	0.50						
Method: E200.7									Batch: C_R166967	
Sample ID: MB-121108A	4	Method Blank				Run: SUB-C166967			11/08/12 15:08	
Calcium		ND	mg/L	0.06						
Magnesium		ND	mg/L	0.03						
Potassium		ND	mg/L	0.06						
Sodium		ND	mg/L	0.3						
Sample ID: LFB-121108A	4	Laboratory Fortified Blank				Run: SUB-C166967			11/08/12 15:12	
Calcium		48	mg/L	0.50	97	85	115			
Magnesium		50	mg/L	0.50	100	85	115			
Potassium		46	mg/L	0.50	92	85	115			
Sodium		49	mg/L	0.50	99	85	115			
Sample ID: C12110105-011BMS2	4	Sample Matrix Spike				Run: SUB-C166967			11/08/12 19:02	
Calcium		134	mg/L	1.0	84	70	130			
Magnesium		81.4	mg/L	1.0	98	70	130			
Potassium		50.3	mg/L	1.0	92	70	130			
Sodium		100	mg/L	1.0	99	70	130			
Sample ID: C12110105-011BMSD2	4	Sample Matrix Spike Duplicate				Run: SUB-C166967			11/08/12 19:06	
Calcium		135	mg/L	1.0	86	70	130	0.8	20	
Magnesium		81.0	mg/L	1.0	97	70	130	0.5	20	
Potassium		51.5	mg/L	1.0	94	70	130	2.3	20	
Sodium		101	mg/L	1.0	100	70	130	0.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Rapid City, SD Branch

Client: Powertech USA Inc **Report Date:** 11/13/12

Project: #708 Alluvial **Work Order:** R12110069

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: DIONEX_121106A	
Sample ID: CCV110612-28	4	Continuing Calibration Verification Standard							11/06/12 20:41	
Chloride		71.9	mg/L	1.0	96	90	110			
Fluoride		7.32	mg/L	0.10	98	90	110			
Nitrogen, Nitrate as N		7.18	mg/L	0.10	96	90	110			
Sulfate		71.4	mg/L	1.0	95	90	110			
Method: E300.0									Batch: R58767	
Sample ID: LFB110612-14	4	Laboratory Fortified Blank				Run: DIONEX_121106A			11/06/12 16:48	
Chloride		37.9	mg/L	1.0	95	90	110			
Fluoride		3.96	mg/L	0.10	99	90	110			
Nitrogen, Nitrate as N		3.87	mg/L	0.10	97	90	110			
Sulfate		38.3	mg/L	1.0	96	90	110			
Sample ID: R12110069-001AMS	4	Sample Matrix Spike				Run: DIONEX_121106A			11/06/12 21:35	
Chloride		1970	mg/L	50	90	90	110			
Fluoride		201	mg/L	5.0	96	90	110			
Nitrogen, Nitrate as N		196	mg/L	5.0	98	90	110			
Sulfate		6440	mg/L	50	108	90	110			
Sample ID: R12110069-001AMSD	4	Sample Matrix Spike Duplicate				Run: DIONEX_121106A			11/06/12 21:53	
Chloride		1970	mg/L	50	89	90	110	0.1	10	S
Fluoride		201	mg/L	5.0	96	90	110	0.0	10	
Nitrogen, Nitrate as N		196	mg/L	5.0	98	90	110	0.2	10	
Sulfate		6440	mg/L	50	108	90	110	0.0	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

Chain of Custody and Analytical Request Record

Page 1 of 1

PLEASE PRINT (Provide as much information as possible.)

Company Name: Scott Env.	Project Name, PWS, Permit, Etc.: Powertech alluvial/wells	Sample Origin State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: Powertech	Contact Name: Allen Scott Phone/Fax:	Email:	Sampler: (Please Print)
Invoice Address: Powertech	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats:

☐ DW ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

ANALYSIS REQUESTED

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids
Vegetation Bioassay Other
DW - Drinking Water

Air Per Quote

SEE ATTACHED

Standard Turnaround (TAT)

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by:

Cooler ID(s):

Receipt Temp 1.8 °C

On Ice: (Y) N

Custody Seal
On Bottle Y N
On Cooler Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX
1	DC-2	11-5-12	10:20	Water
2	DC-4	"	11:34	"
3	BC-3	"	12:45	"
4	BC-1	"	14:04	"
5	BC-2	"	15:23	"
6	BC-2 Dup.	"	15:24	"
7	~~BC~~ TOB	"	16:13	"
8				
9				
10				

LABORATORY USE ONLY
1211006 9-001

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Allen Scott	11-6-12 8:04	[signature]			
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
			Received by Laboratory: Steve Troiland	Date/Time: 11-6-12 8:04	Signature: [signature]

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

POWERTECH (USA) INC.

ATTACHMENT B

Additional Alluvial Characterization Well Completion Report

AMERICAN ENGINEERING TESTING, INC.

CONSULTANTS
· ENVIRONMENTAL
· GEOTECHNICAL
· MATERIALS
· FORENSICS

November 5, 2012

Mr. Frank Lichnovsky
Powertech (USA), Inc.
PO Box 812
Edgemont, SD 57735

Subject: Well Completion Reports
Powertech Inc.
Sites NW of Edgemont, South Dakota
AET No. 17-01493

Dear Frank:

Please find the attached boring location maps, well construction logs, and South Dakota well completion reports for six monitoring wells drilled on October 29-31, 2012. If you have any questions regarding the attached reports, please call our office at (605) 388-0029.

Respectfully,

Kristen R. Yates

Kristen R. Yates, EI, CPRR
Geotechnical Project Manager

attachments

cc. Mr. Ken Buhler - SDDENR

1745 Samco Road | Rapid City, SD 57702
Phone (605) 388-0029 | Toll Free (800) 972-6364 | Fax (605) 388-0064 | www.amengtest.com | AA/EEO
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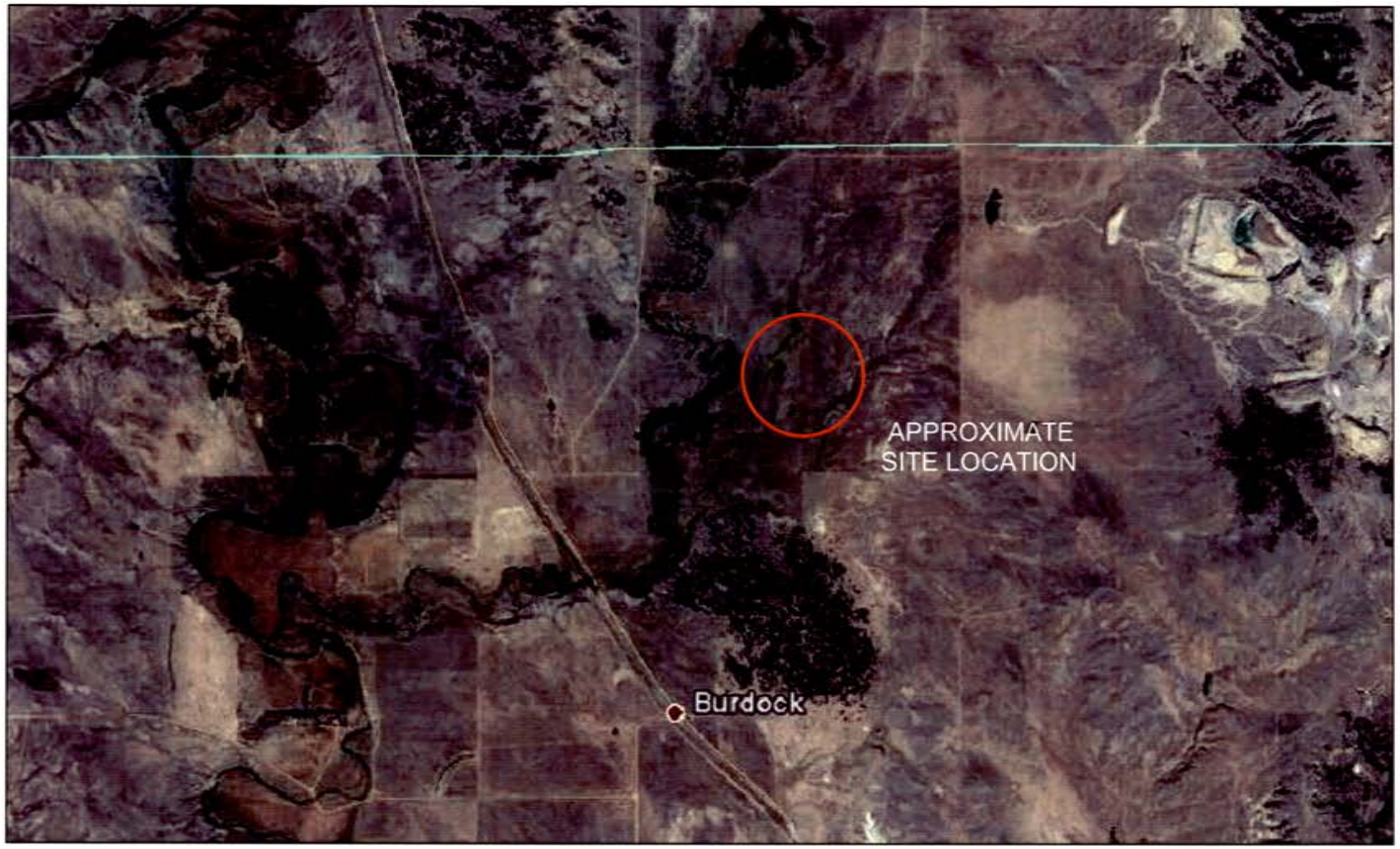
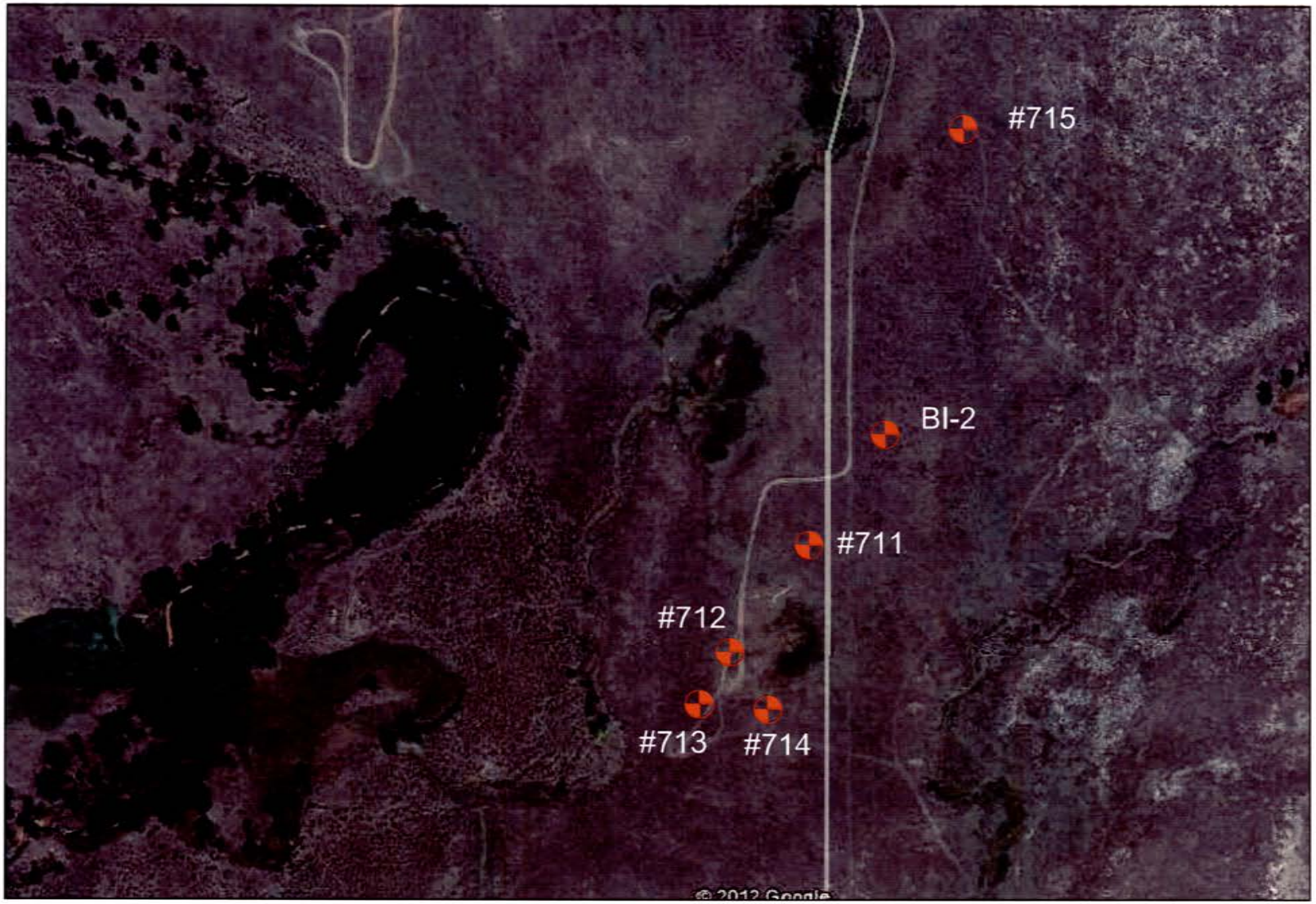


N

SCALE
(FEET)
0 3000

AMERICAN ENGINEERING TESTING, INC.	PROJECT: POWERTECH USA		PROJECT NO. 17-01593
	SUBJECT: SITE LOCATION MAP		DATE: NOVEMBER 5, 2012
	SCALE: 1 INCH = 3000 FEET	DRAWN BY: KY	REVIEWED BY: RNT



N

SCALE (FEET)
0 400

AMERICAN ENGINEERING TESTING, INC.	PROJECT: POWERTECH USA		PROJECT NO. 17-01593
	SUBJECT: BORING LOCATION MAP		DATE: NOVEMBER 5, 2012
	SCALE: 1 INCH = 400 FEET	DRAWN BY: KY	REVIEWED BY: RNT

AMERICAN ENGINEERING TESTING, INC.

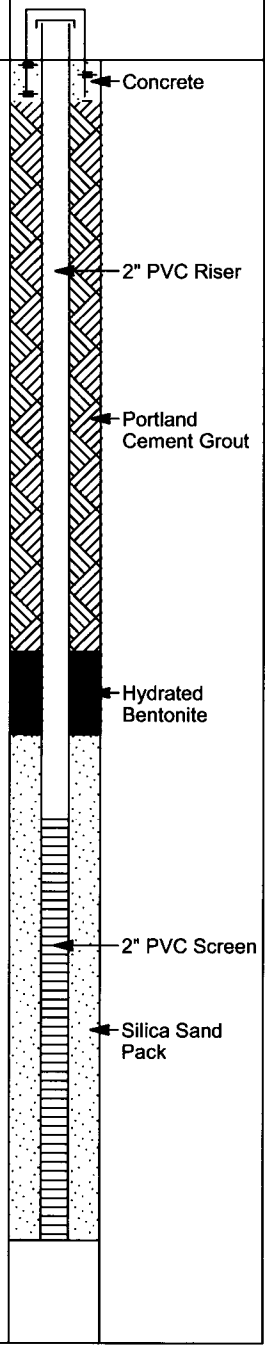
BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	17-01593	**BORING/WELL NUMBER**	#711
PROJECT NAME	Powertech USA, Inc	**DATE DRILLED**	10/29/12
LOCATION	near Edgemont, South Dakota	**CASING TYPE/DIAMETER**	2-inch diam. Sch 40 PVC
DRILLING METHOD	4.25" HSA	**SCREEN TYPE**	2-inch diam. Sch 40 PVC 0.010 slot
SAMPLING METHOD	NA	**PACKING TYPE**	8-16 Silica Sand
GROUND ELEVATION	3643.00	**GROUT TYPE**	Portland Cement
TOP OF CASING	3646	**DEPTH TO WATER**	15.26
LOGGED BY	FL	**GROUND WATER ELEVATION**	3630.74
REMARKS			

PID (ppm)	Blow Count	RECOVERY (inches)	SAMPLER TYPE	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
					1	FA		**Sand** fine to medium grained, orange to light brown
					2			
					3			
					4			
					5			
					6			
					7			
					8			
					9	FA		**Sandy Clay** red
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19	FA		**Clayey Sand** fine grained at top to coarse grained at bottom, red, wet
					20			
					21			
					22			
					23	CA		**Gravel** red
					24			
					25			
					26			
					27	SHALE		**Shale** black
					28			End of Boring

GW LEVEL

BORING ABANDONED



AET_ENVI 17-01593.GPJ AET WITH PID INFO 11/5/12

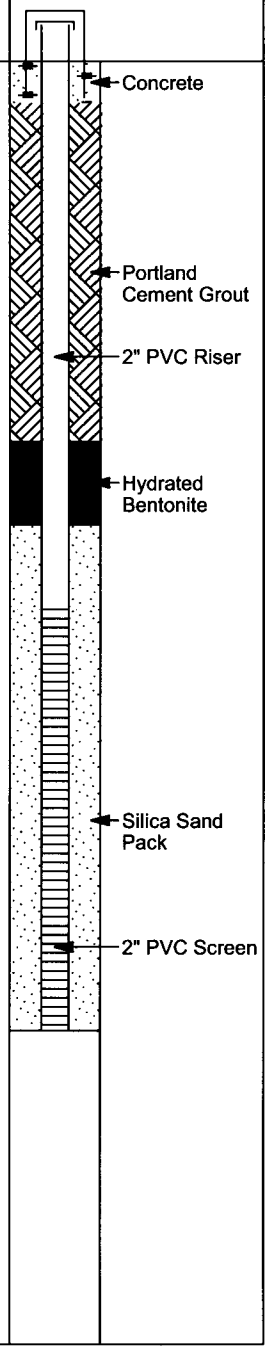
AMERICAN ENGINEERING TESTING, INC.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	17-01593	**BORING/WELL NUMBER**	#712
PROJECT NAME	Powertech USA, Inc	**DATE DRILLED**	10/29/12
LOCATION	near Edgemont, South Dakota	**CASING TYPE/DIAMETER**	2-inch diam. Sch 40 PVC
DRILLING METHOD	4.25" HSA	**SCREEN TYPE**	2-inch diam. Sch 40 PVC 0.010 slot
SAMPLING METHOD	NA	**PACKING TYPE**	8-16 Silica Sand
GROUND ELEVATION	3634.00	**GROUT TYPE**	Portland Cement
TOP OF CASING	3637	**DEPTH TO WATER**	7.63
LOGGED BY	FL	**GROUND WATER ELEVATION**	3629.37
REMARKS			

PID (ppm)	Blow Count	RECOVERY (inches)	SAMPLER TYPE	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	GW LEVEL
					1, 2	FA		**Sand** fine to medium grained, light yellow	
					3, 4, 5, 6, 7	FA		**Sandy Clay** light yellow	▼
					8, 9, 10, 11, 12, 13	FA		**Sandy Clay** red	
					14, 15, 16, 17, 18, 19	FA		**Clayey Sand** fine grained at top to coarse grained at bottom, red, wet	
					20, 21, 22	CA		**Gravel** red	
					23, 24	SHALE		**Shale** black	
					25			End of Boring	

BORING ABANDONED



AET_ENVI 17-01593.GPJ AET WITH PID INFO 11/5/12

AMERICAN ENGINEERING TESTING, INC.

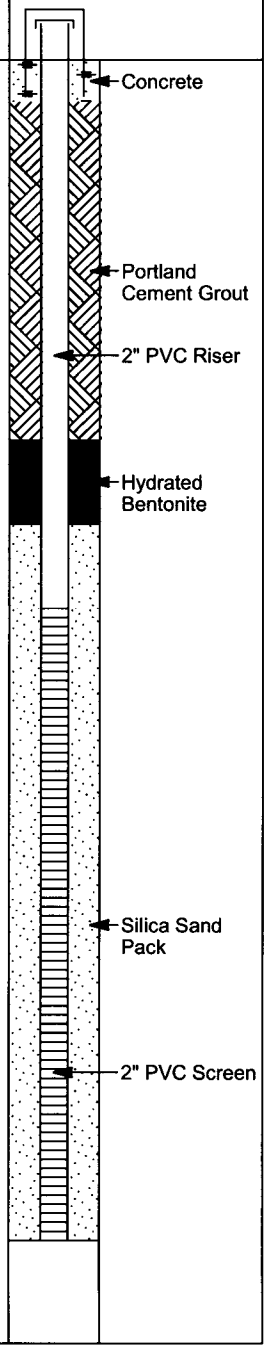
BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	17-01593	**BORING/WELL NUMBER**	#713
PROJECT NAME	Powertech USA, Inc	**DATE DRILLED**	10/29/12
LOCATION	near Edgemont, South Dakota	**CASING TYPE/DIAMETER**	2-inch diam. Sch 40 PVC
DRILLING METHOD	4.25" HSA	**SCREEN TYPE**	2-inch diam. Sch 40 PVC 0.010 slot
SAMPLING METHOD	NA	**PACKING TYPE**	8-16 Silica Sand
GROUND ELEVATION	3635.00	**GROUT TYPE**	Portland Cement
TOP OF CASING	3638	**DEPTH TO WATER**	20.59
LOGGED BY	FL	**GROUND WATER ELEVATION**	3617.41
REMARKS			

PID (ppm)	Blow Count	RECOVERY (inches)	SAMPLER TYPE	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
					1, 2	FA		**Sand** fine to medium grained, light yellow to tan
					3, 4, 5, 6, 7	FA		**Sandy Clay**light yellow to tan
					8, 9, 10, 11, 12, 13	FA		**Sandy Clay** red
					14, 15, 16, 17, 18, 19, 20	FA		**Clayey Sand** fine grained at top to coarse grained at bottom, red, wet
					21, 22, 23, 24, 25	CA		**Gravel** red
					26, 27	SHALE		**Shale** black
					28			End of Boring

GW LEVEL

BORING ABANDONED



AET_ENVI 17-01593.GPJ AET WITH PID INFO 11/5/12

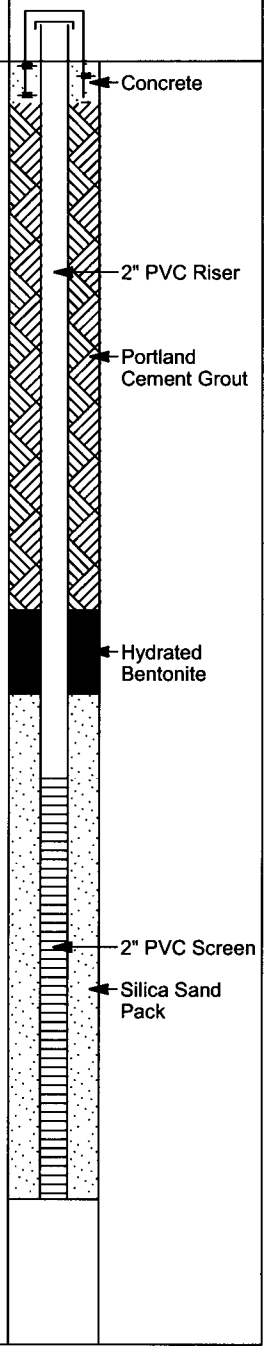
AMERICAN
ENGINEERING
TESTING, INC.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	17-01593	**BORING/WELL NUMBER**	#714
PROJECT NAME	Powertech USA, Inc	**DATE DRILLED**	10/29/12
LOCATION	near Edgemont, South Dakota	**CASING TYPE/DIAMETER**	2-inch diam. Sch 40 PVC
DRILLING METHOD	4.25" HSA	**SCREEN TYPE**	2-inch diam. Sch 40 PVC 0.010 slot
SAMPLING METHOD	NA	**PACKING TYPE**	8-16 Silica Sand
GROUND ELEVATION	3639.00	**GROUT TYPE**	Portland Cement
TOP OF CASING	3642	**DEPTH TO WATER**	8.62
LOGGED BY	FL	**GROUND WATER ELEVATION**	3633.38
REMARKS			

PID (ppm)	Blow Count	RECOVERY (inches)	SAMPLER TYPE	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	GW LEVEL
					1, 2	FA		**Sand** fine to medium grained, light red	
					3, 4, 5, 6, 7, 8, 9, 10, 11, 12	FA		**Sandy Clay** dark red	▼
					13, 14	FA		**Sandy Clay** red	
					15, 16, 17, 18, 19, 20, 21, 22, 23, 24	FA		**Clayey Sand** fine grained at top to coarse grained at bottom, red, wet	
					25, 26	CA		**Gravel** red	
					27	SHALE		**Shale** black	
					28			End of Boring	

BORING ABANDONED



AET_ENVI 17-01593.GPJ AET WITH PID INFO 11/5/12

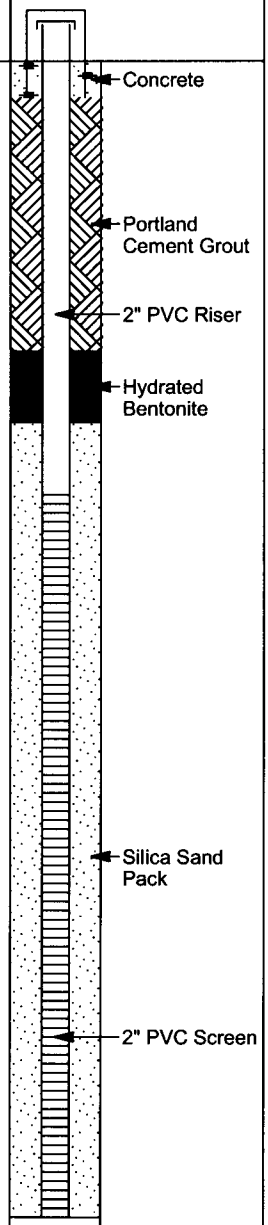
AMERICAN ENGINEERING TESTING, INC.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	17-01593	**BORING/WELL NUMBER**	#715
PROJECT NAME	Powertech USA, Inc	**DATE DRILLED**	10/30/12
LOCATION	near Edgemont, South Dakota	**CASING TYPE/DIAMETER**	2-inch diam. Sch 40 PVC
DRILLING METHOD	4.25" HSA	**SCREEN TYPE**	2-inch diam. Sch 40 PVC 0.010 slot
SAMPLING METHOD	NA	**PACKING TYPE**	10-20 Silica Sand
GROUND ELEVATION	3653.00	**GROUT TYPE**	Portland Cement
TOP OF CASING	3655	**DEPTH TO WATER**	16.29
LOGGED BY	FL	**GROUND WATER ELEVATION**	3638.71
REMARKS			

PID (ppm)	Blow Count	RECOVERY (inches)	SAMPLER TYPE	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	GW LEVEL
					1, 2, 3, 4	FA		**Sand** fine to medium grained, light yellow to tan	
					5, 6, 7, 8, 9, 10, 11, 12	FA		**Sandy Clay** red	
					13, 14, 15, 16, 17, 18, 19, 20, 21, 22	FA		**Clayey Sand** fine grained at top to coarse grained at bottom, red, wet	▼
					23, 24, 25, 26, 27, 28, 29, 30	CA		**Gravel** red	
					31, 32	SHALE		**Shale** black	
								End of Boring	

BORING ABANDONED



AET_ENVI 17-01593.GPJ AET WITH PID INFO 11/5/12

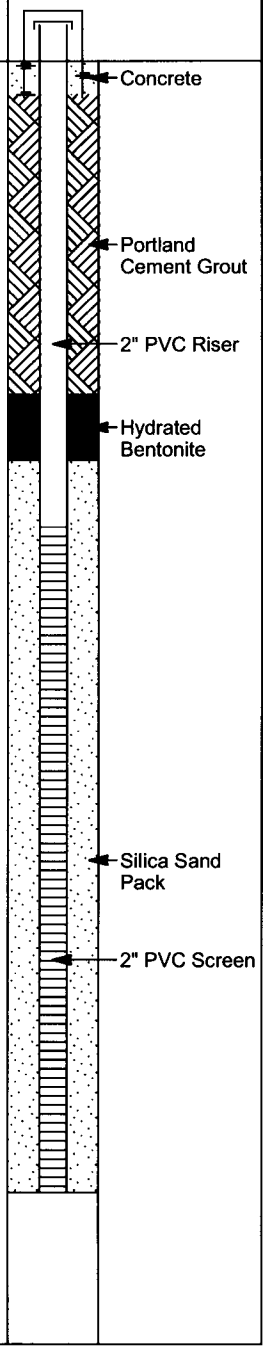
AMERICAN ENGINEERING TESTING, INC.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	17-01593	**BORING/WELL NUMBER**	BI-2
PROJECT NAME	Powertech USA, Inc	**DATE DRILLED**	10/30/12
LOCATION	near Edgemont, South Dakota	**CASING TYPE/DIAMETER**	2-inch diam. Sch 40 PVC
DRILLING METHOD	4.25" HSA	**SCREEN TYPE**	2-inch diam. Sch 40 PVC 0.010 slot
SAMPLING METHOD	NA	**PACKING TYPE**	8-16 Silica Sand
GROUND ELEVATION	3649.00	**GROUT TYPE**	Portland Cement
TOP OF CASING	3652	**DEPTH TO WATER**	15.21
LOGGED BY	FL	**GROUND WATER ELEVATION**	3636.79
REMARKS			

PID (ppm)	Blow Count	RECOVERY (inches)	SAMPLER TYPE	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	GW LEVEL
					1, 2, 3, 4	FA		**Sand** fine to medium grained, light yellow to red	
					5, 6	FA		**Sandy Clay** brown	
					7, 8, 9, 10, 11, 12	FA		**Sandy Clay** red	▼
					13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25	FA		**Clayey Sand** fine grained at top to coarse grained at bottom, red, wet	
					26, 27, 28, 29, 30, 31, 32, 33	CA		**Gravel** red	
					34, 35	SHALE		**Shale** black	
								End of Boring	

BORING ABANDONED



AET_ENVI 17-01593.GPJ AET WITH PID INFO 11/5/12

SD EForm - 1621LD V1

SOUTH DAKOTA WATER WELL COMPLETION REPORT

11- 02

Location SW ¼ SE ¼ Sec 3 Twp 7S Rg 1E

County Custer

Please mark well location with an "X"

North

W E

1 Mile

Well Completion Date
10/31/12

Distance to nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)?
_____ ft. from Unknown (identify source)

PROPOSED USE:
☐ Domestic/Stock ☐ Municipal ☐ Business ☐ Test holes
☐ Irrigation ☐ Industrial ☐ Institutional ☑ Monitoring well

METHOD OF DRILLING:
3.25" ID, 6.25 OD HSA
to 28 feet

CASING DATA: ☐ Steel ☑ Plastic ☐ Other
If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
LB/FT	2.00 IN	0.0 FT	18.0 FT	6.25 IN
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
Cement		Lb/gal	0.0 Ft	14.0 Ft
Bentonite		Lb/gal	14.0 Ft	16.0 Ft

Describe grouting procedure

SCREEN: ☐ Perforated pipe ☑ Manufactured
Diameter 2.00 Inches Length 10.0 Feet
Material Sch 40 PVC
Slot Size 0.010" Set From 18.0 Feet to 28.0 Feet
Other information 8-16 Silica Sand from 16' to 28'

WAS A PACKER OR SEAL USED? ☐ Yes ☑ No
If so, what material?
Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?
☐ Yes, How?
☑ No, Why Not? Monitoring Well Only
Lab to which water quality sample sent for analysis

Well Owner: Powertech (USA) Inc.
Business Name: Powertech (USA) Inc.
Address: PO Box 812
City, State, Zip: Edgemont SD 57735

WELL LOG:

FORMATION	DEPTH FROM	DEPTH TO
Sand – orange to light brown	0	9
Sandy Clay – red	9	19
Clayey Sand – red	19	23
Gravel – red	23	27
Shale - black	27	28

STATIC WATER LEVEL 15 FEET
If flowing: closed in pressure _____ PSI
GPM flow _____ through _____ Inch pipe
Controlled by ☐ Valve ☐ Reducers ☐ Other
Reduced flow rate _____ GPM
Can well be completely shut in?

WELL TEST DATA:
☐ Pumped Describe: NA
☐ Bailed
☐ Other
Pumping Level Below Land Surface
_____ Ft. After _____ Hrs. pumped _____ GPM
_____ Ft. After _____ Hrs. pumped _____ GPM
If pump installed, pump rate: GPM

REMARKS
Monitoring Well #711
Lat/Long (43.4673N, 103.98602W) from PWE handheld GPS

This well was drilled under license # 678 and this report is true and accurate.
Drilling firm: American Engineering Testing, Inc.
Signature of License Representative: B. B. Hodge

Signature of Well Owner or Equitable Property Holder:

Date:

SD EForm - 1621LD V1

SOUTH DAKOTA WATER WELL COMPLETION REPORT

11- 02

Location SE ¼ SW ¼ Sec 3 Twp 7S Rg 1E

County Custer

Please mark well location with an "X"

North

W E

1 Mile

Well Completion Date: 10/31/12

Distance to nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)?

_____ ft. from Unknown (identify source)

Well Owner: Powertech (USA) Inc.

Business Name: Powertech (USA) Inc.

Address: PO Box 812

City, State, Zip: Edgemont SD 57735

WELL LOG:

FORMATION	DEPTH FROM	DEPTH TO
Sand –light yellow	0	3
Sandy Clay – light yellow to red	3	14
Clayey Sand – red	14	20
Gravel – red	20	23
Shale - black	23	25

PROPOSED USE:

☐ Domestic/Stock ☐ Municipal ☐ Business ☐ Test holes
☐ Irrigation ☐ Industrial ☐ Institutional ☑ Monitoring well

METHOD OF DRILLING:
3.25" ID, 6.25 OD HSA
to 23 feet

STATIC WATER LEVEL 7 FEET

If flowing: closed in pressure _____ PSI

GPM flow _____ through _____ Inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other _____

Reduced flow rate _____ GPM

Can well be completely shut in?

CASING DATA: ☐ Steel ☑ Plastic ☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
LB/FT	2.00 IN	0.0 FT	13.0 FT	6.25 IN
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

WELL TEST DATA:

☐ Pumped Describe: NA
☐ Bailed
☐ Other

Pumping Level Below Land Surface

_____ Ft. After _____ Hrs. pumped _____ GPM

_____ Ft. After _____ Hrs. pumped _____ GPM

If pump installed, pump rate: _____ GPM

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
Cement		Lb/gal	0.0 Ft	9.0 Ft
Bentonite		Lb/gal	9.0 Ft	11.0 Ft

Describe grouting procedure

SCREEN: ☐ Perforated pipe ☑ Manufactured

Diameter 2.00 Inches Length 10.0 Feet

Material Sch 40 PVC

Slot Size 0.010" Set From 13.0 Feet to 23.0 Feet

Other information 8-16 Silica Sand from 11' to 23'

REMARKS

Monitoring Well #712

Lat/Long (43.46653N, 103.98682W) from PWE handheld GPS

WAS A PACKER OR SEAL USED? ☐ Yes ☑ No

If so, what material? _____

Describe packer(s) and location

This well was drilled under license # 678 and this report is true and accurate.

Drilling firm: American Engineering Testing, Inc.

Signature of License Representative: [signature]

DISINFECTION: Was well disinfected upon completion?

☐ Yes, How? _____

☑ No, Why Not? Monitoring Well Only

Lab to which water quality sample sent for analysis

Signature of Well Owner or Equitable Property Holder:

Date: _____

SD EForm - 1621LD V1

SOUTH DAKOTA WATER WELL COMPLETION REPORT

11- 02

Location SE ¼ SW ¼ Sec 3 Twp 7S Rg 1E

County Custer

Please mark well location with an "X"

North

W E

1 Mile

Well Completion Date: 10/31/12

Distance to nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)?

_____ ft. from Unknown (identify source)

PROPOSED USE:

☐ Domestic/Stock ☐ Municipal ☐ Business ☐ Test holes
☐ Irrigation ☐ Industrial ☐ Institutional ☑ Monitoring well

METHOD OF DRILLING:
3.25" ID, 6.25 OD HSA
to 28 feet

CASING DATA: ☐ Steel ☑ Plastic ☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
LB/FT	2.00 IN	0.0 FT	13.0 FT	6.25 IN
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
Cement		Lb/gal	0.0 Ft	9.0 Ft
Bentonite		Lb/gal	9.0 Ft	11.0 Ft

Describe grouting procedure

SCREEN: ☐ Perforated pipe ☑ Manufactured

Diameter 2.00 Inches Length 15.0 Feet

Material Sch 40 PVC

Slot Size 0.010" Set From 13.0 Feet to 28.0 Feet

Other information 8-16 Silica Sand from 11' to 28'

WAS A PACKER OR SEAL USED? ☐ Yes ☑ No

If so, what material?

Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?

☐ Yes, How?

☑ No, Why Not? Monitoring Well Only

Lab to which water quality sample sent for analysis

Well Owner: Powertech (USA) Inc.

Business Name: Powertech (USA) Inc.

Address: PO Box 812

City, State, Zip: Edgemont SD 57735

WELL LOG:

FORMATION	DEPTH FROM	DEPTH TO
Sand –light yellow to tan	0	3
Sandy Clay – light yellow to red	3	14
Clayey Sand – red	14	21
Gravel – red	21	26
Shale - black	26	28

STATIC WATER LEVEL 21 FEET

If flowing: closed in pressure _____ PSI

GPM flow _____ through _____ Inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other

Reduced flow rate _____ GPM

Can well be completely shut in?

WELL TEST DATA:

☐ Pumped Describe: NA

☐ Bailed

☐ Other

Pumping Level Below Land Surface

_____ Ft. After _____ Hrs. pumped _____ GPM

_____ Ft. After _____ Hrs. pumped _____ GPM

If pump installed, pump rate: _____ GPM

REMARKS
Monitoring Well #713
Lat/Long (43.46615N, 103.9871W) from PWE handheld GPS

This well was drilled under license # 678 and this report is true and accurate.

Drilling firm: American Engineering Testing, Inc.

Signature of License Representative:

Signature of Well Owner or Equitable Property Holder:

Date:

SD EForm - 1621LD V1

SOUTH DAKOTA WATER WELL COMPLETION REPORT

11- 02

Location SE ¼ SW ¼ Sec 3 Twp 7S Rg 1E

County Custer

Please mark well location with an "X"

North

W E

1 Mile

Well Completion Date: 10/31/12

Distance to nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)?

_____ ft. from Unknown (identify source)

PROPOSED USE:

☐ Domestic/Stock ☐ Municipal ☐ Business ☐ Test holes
☐ Irrigation ☐ Industrial ☐ Institutional ☑ Monitoring well

METHOD OF DRILLING:
3.25" ID, 6.25 OD HSA
to 28 feet

CASING DATA: ☐ Steel ☑ Plastic ☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
LB/FT	2.00 IN	0.0 FT	17.0 FT	6.25 IN
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
Cement		Lb/gal	0.0 Ft	13.0 Ft
Bentonite		Lb/gal	13.0 Ft	15.0 Ft

Describe grouting procedure

SCREEN: ☐ Perforated pipe ☑ Manufactured

Diameter 2.00 Inches Length 10.0 Feet

Material Sch 40 PVC

Slot Size 0.010" Set From 17.0 Feet to 27.0 Feet

Other information 8-16 Silica Sand from 15' to 27'

WAS A PACKER OR SEAL USED? ☐ Yes ☑ No

If so, what material?

Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?

☐ Yes, How?

☑ No, Why Not? Monitoring Well Only

Lab to which water quality sample sent for analysis

Well Owner: Powertech (USA) Inc.

Business Name: Powertech (USA) Inc.

Address: PO Box 812

City, State, Zip: Edgemont SD 57735

WELL LOG:

FORMATION	DEPTH FROM	DEPTH TO
Sand –light red	0	3
Sandy Clay – dark red to red	3	15
Clayey Sand – red	15	25
Gravel – red	25	27
Shale - black	27	28

STATIC WATER LEVEL 9 FEET

If flowing: closed in pressure _____ PSI

GPM flow _____ through _____ Inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other

Reduced flow rate _____ GPM

Can well be completely shut in?

WELL TEST DATA:

☐ Pumped Describe: NA

☐ Bailed

☐ Other

Pumping Level Below Land Surface

_____ Ft. After _____ Hrs. pumped _____ GPM

_____ Ft. After _____ Hrs. pumped _____ GPM

If pump installed, pump rate: _____ GPM

REMARKS

Monitoring Well #714

Lat/Long (43.46611N, 103.98643W) from PWE handheld GPS

This well was drilled under license # 678 and this report is true and accurate.

Drilling firm: American Engineering Testing, Inc.

Signature of License Representative:

Signature of Well Owner or Equitable Property Holder:

Date:

SD EForm - 1621LD V1

SOUTH DAKOTA WATER WELL COMPLETION REPORT

11- 02

Location NE ¼ SE ¼ Sec 3 Twp 7S Rg 1E

County Custer

Please mark well location with an "X"

North

W E

1 Mile

Well Completion Date: 10/31/12

Distance to nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)?

_____ ft. from Unknown (identify source)

Well Owner: Powertech (USA) Inc.

Business Name: Powertech (USA) Inc.

Address: PO Box 812

City, State, Zip: Edgemont SD 57735

WELL LOG:

FORMATION	DEPTH FROM	DEPTH TO
Sand –light yellow to tan	0	5
Sandy Clay – red	5	13
Clayey Sand – red	13	23
Gravel – red	23	31
Shale - black	31	32

PROPOSED USE:

- [ ] Domestic/Stock
- [ ] Irrigation
- [ ] Municipal
- [ ] Industrial
- [ ] Business
- [ ] Institutional
- [ ] Test holes
- [x] Monitoring well

METHOD OF DRILLING:
3.25" ID, 6.25 OD HSA
to 28 feet

CASING DATA: [ ] Steel [x] Plastic [ ] Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
LB/FT	2.00 IN	0.0 FT	12.0 FT	6.25 IN
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
Cement		Lb/gal	0.0 Ft	8.0 Ft
Bentonite		Lb/gal	8.0 Ft	10.0 Ft

Describe grouting procedure

SCREEN: [ ] Perforated pipe [x] Manufactured

Diameter 2.00 Inches Length 20.0 Feet

Material Sch 40 PVC

Slot Size 0.010" Set From 12.0 Feet to 32.0 Feet

Other information 10-20 Silica Sand from 10' to 32'

WAS A PACKER OR SEAL USED? [ ] Yes [x] No

If so, what material?

Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?

[ ] Yes, How?

[x] No, Why Not? Monitoring Well Only

Lab to which water quality sample sent for analysis

STATIC WATER LEVEL 16 FEET

If flowing: closed in pressure _____ PSI

GPM flow _____ through _____ Inch pipe

Controlled by [ ] Valve [ ] Reducers [ ] Other

Reduced flow rate _____ GPM

Can well be completely shut in?

WELL TEST DATA:

[ ] Pumped Describe: NA

[ ] Bailed

[ ] Other

Pumping Level Below Land Surface

_____ Ft. After _____ Hrs. pumped _____ GPM

_____ Ft. After _____ Hrs. pumped _____ GPM

If pump installed, pump rate: _____ GPM

REMARKS

Monitoring Well #715

Lat/Long (43.47031N, 103.98447W) from PWE handheld GPS

This well was drilled under license # 678 and this report is true and accurate.

Drilling firm: American Engineering Testing, Inc.

Signature of License Representative:

Signature of Well Owner or Equitable Property Holder:

Date:

SD EForm - 1621LD V1

SOUTH DAKOTA WATER WELL COMPLETION REPORT

11- 02

Location NE ¼ SE ¼ Sec 3 Twp 7S Rg 1E

County Custer

Please mark well location with an "X"

North

W E

1 Mile

Well Completion Date: 10/31/12

Distance to nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)?

_____ ft. from Unknown (identify source)

Well Owner: Powertech (USA) Inc.

Business Name: Powertech (USA) Inc.

Address: PO Box 812

City, State, Zip: Edgemont SD 57735

WELL LOG:

FORMATION	DEPTH FROM	DEPTH TO
Sand –light yellow to tan	0	5
Sandy Clay – brown to red	5	13
Clayey Sand – red	13	26
Gravel – red	26	34
Shale - black	34	35

PROPOSED USE:

☐ Domestic/Stock ☐ Municipal ☐ Business ☐ Test holes
☐ Irrigation ☐ Industrial ☐ Institutional ☑ Monitoring well

METHOD OF DRILLING:
3.25" ID, 6.25 OD HSA
to 28 feet

STATIC WATER LEVEL 15 FEET

If flowing: closed in pressure _____ PSI

GPM flow _____ through _____ Inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other _____

Reduced flow rate _____ GPM

Can well be completely shut in?

CASING DATA: ☐ Steel ☑ Plastic ☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
LB/FT	2.00 IN	0.0 FT	14.0 FT	6.25 IN
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

WELL TEST DATA:

☐ Pumped Describe: NA
☐ Bailed
☐ Other

Pumping Level Below Land Surface

_____ Ft. After _____ Hrs. pumped _____ GPM

_____ Ft. After _____ Hrs. pumped _____ GPM

If pump installed, pump rate: _____ GPM

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
Cement		Lb/gal	0.0 Ft	10.0 Ft
Bentonite		Lb/gal	10.0 Ft	12.0 Ft

Describe grouting procedure

SCREEN: ☐ Perforated pipe ☑ Manufactured

Diameter 2.00 Inches Length 20.0 Feet

Material Sch 40 PVC

Slot Size 0.010" Set From 14.0 Feet to 34.0 Feet

Other information 8-16 Silica Sand from 12' to 34'

REMARKS

Monitoring Well BI-2

Lat/Long (43.4681N, 103.98526W) from PWE handheld GPS

WAS A PACKER OR SEAL USED? ☐ Yes ☑ No

If so, what material? _____

Describe packer(s) and location

This well was drilled under license # 678 and this report is true and accurate.

Drilling firm: American Engineering Testing, Inc.

Signature of License Representative: [signature]

DISINFECTION: Was well disinfected upon completion?

☐ Yes, How? _____

☑ No, Why Not? Monitoring Well Only

Lab to which water quality sample sent for analysis

Signature of Well Owner or Equitable Property Holder:

Date: _____