



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 8**

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**STATEMENT OF BASIS  
FOR  
UNDERGROUND INJECTION CONTROL  
CLASS V DRAFT PERMIT  
PERMT NUMBER: CO51237-08412**

**Powertech (USA) Incorporated  
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**Telephone: 1-800-227-8917 x 312-6276**

## I. DESCRIPTION OF INJECTION ACTIVITY

On April 30, 2009, the Environmental Protection Agency (EPA) Region 8 received an application for a Class V Underground Injection Control (UIC) permit submitted by Powertech (USA) Incorporated (Powertech). Powertech proposes to reinject groundwater pumped from the upper portion of the Fox Hills Formation during an aquifer pump test back into the same aquifer; using the pumping well that pumped the groundwater to the surface. EPA is issuing a Draft Permit to authorize the injection of groundwater into the aquifer from which it was pumped. The pump test and injection site is located in the NE quarter of Section 33 in Township 10 North and Range 67 West, as shown in Figure 1. This location is 17 miles northeast of Fort Collins, 29 miles northwest of Greeley, 8 miles northwest of Nunn, and 8 miles northeast of Wellington.

Powertech will be conducting the aquifer pumping test to meet the following objectives:

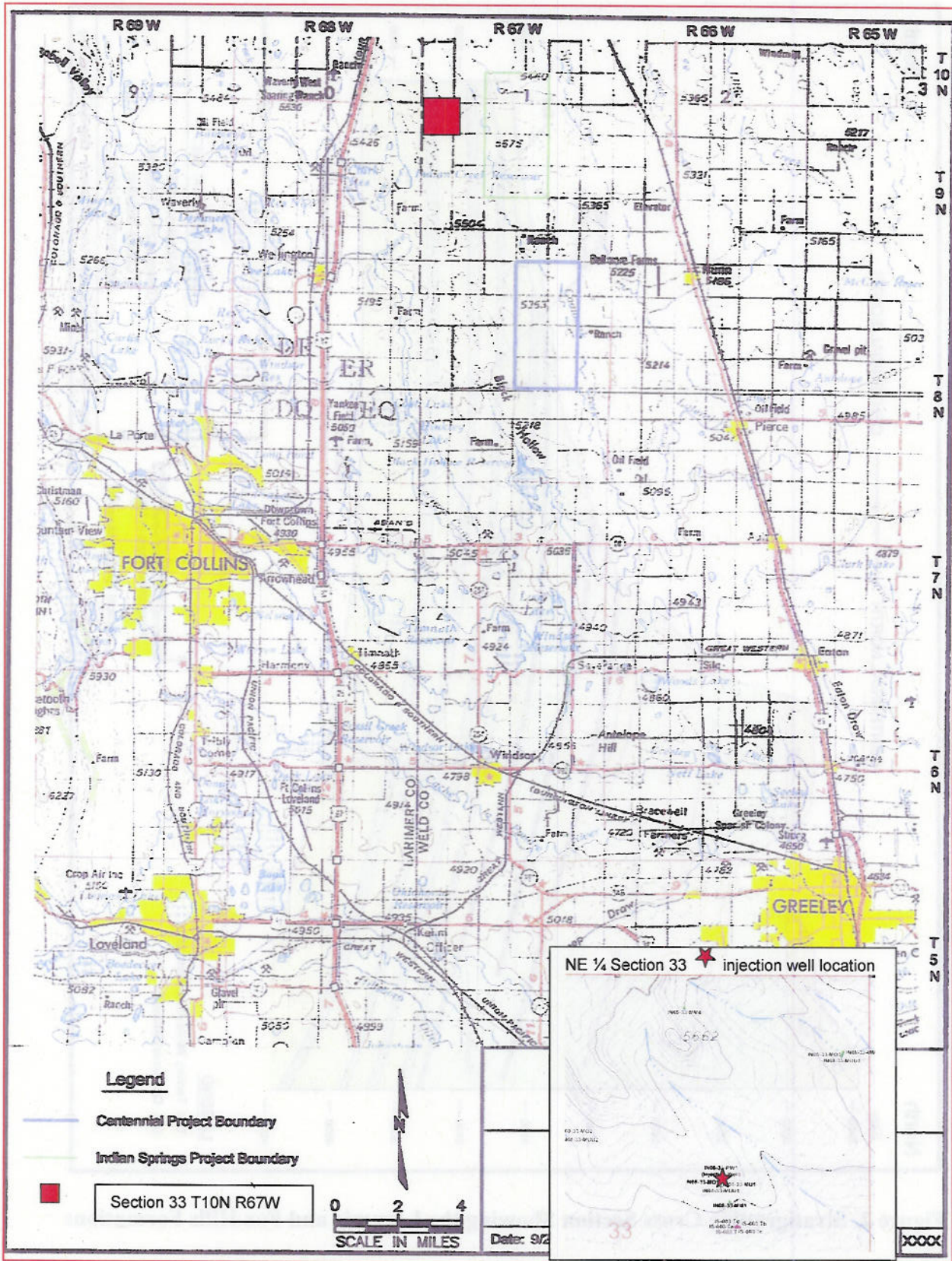
- Site specific and regional characterization of geology and groundwater.
- Assessment of hydrological characteristics and their lateral continuity within the portion of the Fox Hills aquifer containing uranium mineralization.
- Evaluation of hydrologic communication in the mineralized zone between the pumping well and surrounding production zone monitoring wells.
- Assessment of the presence of hydrologic boundaries, if any, within the mineralized portion of the Fox Hills aquifer.
- Evaluation of degree of hydrologic communication, if any, between the mineralized zone within the Fox Hills aquifer and the overlying and underlying aquifers in the test area.

## II. DESCRIPTION OF HYDROGEOLOGY

The proposed injection well will be completed in the Upper Fox Hills Formation and will penetrate the overlying Laramie Formation shown in Figure 2. The Upper Fox Hills includes the "A" Sands and the "WE" Sand. The injection well will be screened in only the "A" Sands, and will, therefore, be pumping water from, and injecting water into, the "A" Sands. Groundwater in the "A" Sands is separated from groundwater in the overlying Laramie Formation by an impermeable, stratigraphic unit labeled "Basal Lignite" in Figure 2. This unit acts as a confining unit, preventing mixing between groundwater in the "A" Sands of the Upper Fox Hills Formation and the groundwater in the overlying Laramie Formation. The stratigraphic unit labeled "Mudstone" at the base of the Upper Fox Hills Formation also acts as a confining unit. One of the purposes of the aquifer pump test is to verify that the Basal Lignite, the Mudstone between the "WE" Sand and the "B" Sand, and possibly the unlabelled mudstone between the "A" Sands and the "WE" Sands, are confining units impermeable to groundwater movement.

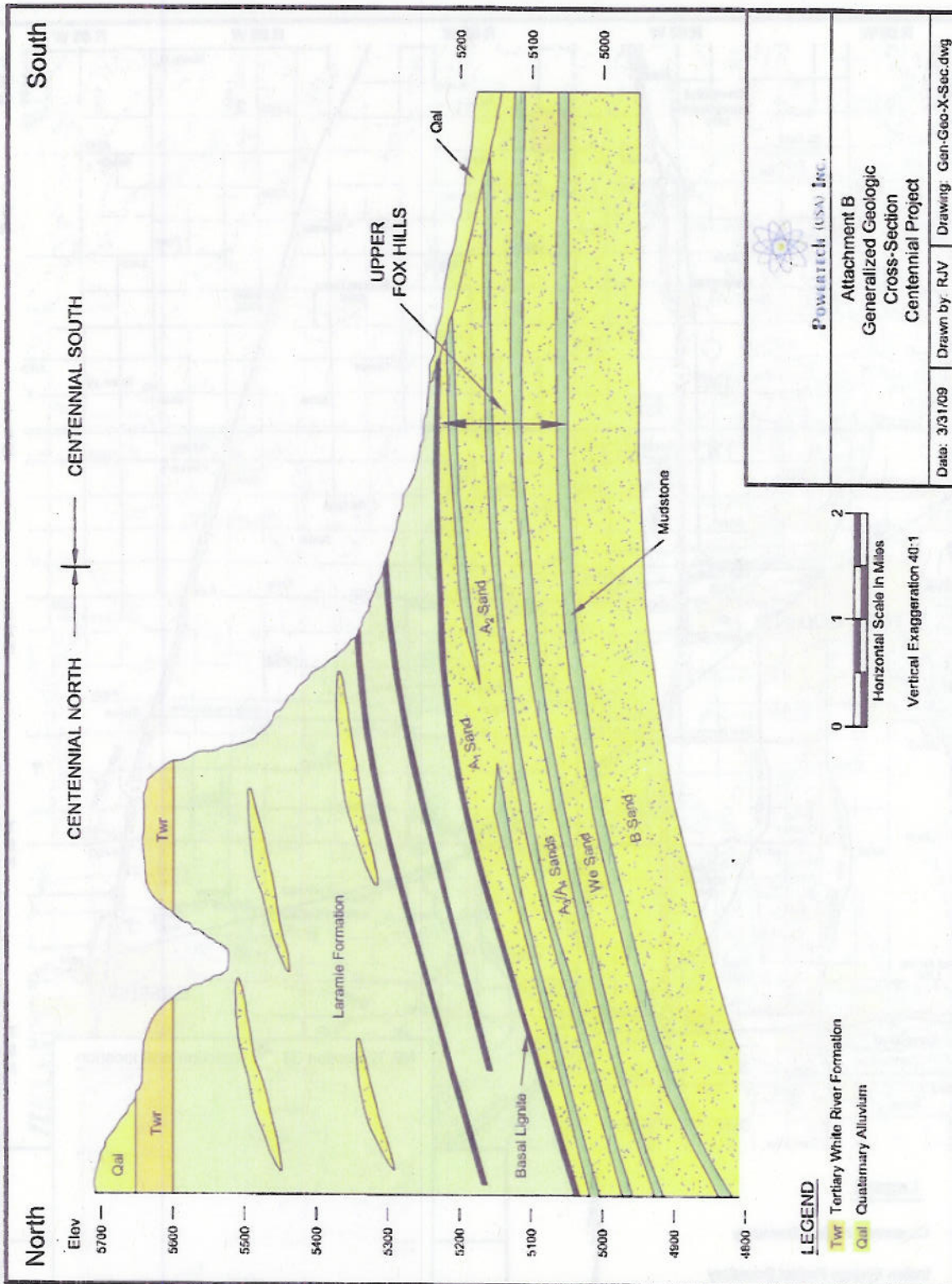
The injection well site is located within the Cheyenne Basin, located north of Denver-Julesburg Basin as shown in Figure 3. The Cheyenne Basin is separated by the Denver-Julesburg Basin by the Greeley Arch. The injection well location is in the portion of the Cheyenne Basin where the geologic strata are dipping gently from west to east.





**Figure 1. Location of Pump Test/Injection Well, IN08-33-PW1**





**Figure 2. Stratigraphic Cross Section Showing the Laramie and Fox Hills Formations**

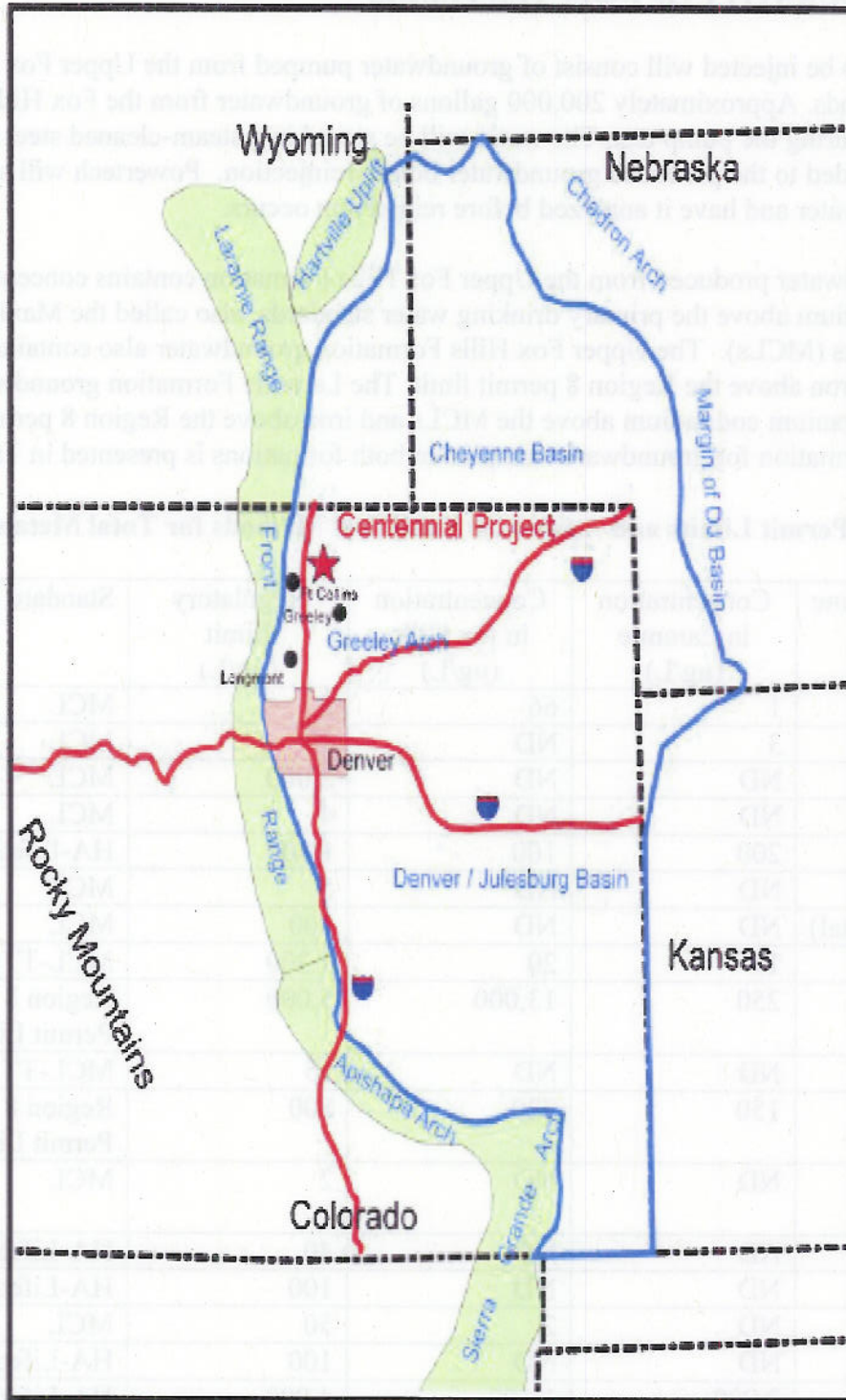


Figure 3. Structural Geology Features near the Injection Area (Figure 7 from Voss, 2007).



### III. TYPE AND QUANTITY OF INJECTED FLUIDS

The fluid to be injected will consist of groundwater pumped from the Upper Fox Hill Formation "A" Sands. Approximately 200,000 gallons of groundwater from the Fox Hills aquifer will be produced during the pump test. The water will be stored in a steam-cleaned steel tank. Nothing will be added to the produced groundwater before reinjection. Powertech will sample the stored groundwater and have it analyzed before reinjection occurs.

The groundwater produced from the Upper Fox Hills Formation contains concentrations of uranium and radium above the primary drinking water standards, also called the Maximum Contaminant Limits (MCLs). The Upper Fox Hills Formation groundwater also contains concentrations of iron above the Region 8 permit limit. The Laramie Formation groundwater does not contain uranium and radium above the MCLs and iron above the Region 8 permit limit. Water quality information for groundwater sampled in both formations is presented in Table 1.

**Table 1: Permit Limits and Approved Analytical Methods for Total Metals**

Parameter Name	Concentration in Laramie (µg/L)	Concentration in fox Hills (µg/L)	Regulatory Limit (µg/L)	Standard Type*
Antimony	1	66	6	MCL
Arsenic	3	ND	10	MCL
Barium	ND	ND	2,000	MCL
Beryllium	ND	ND	4	MCL
Boron	200	100	1,400	HA-Lifetime
Cadmium	ND	ND	5	MCL
Chromium(total)	ND	ND	100	MCL
Copper	10	20	1,300	MCL-TT
Iron	250	13,000	5,000	Region 8 Permit Limit
Lead	ND	ND	15	MCL-TT
Manganese	150	220	800	Region 8 Permit Limit
Mercury (inorganic)	ND	ND	2	MCL
Molybdenum	ND	ND	40	HA-Lifetime
Nickel	ND	ND	100	HA-Lifetime
Selenium	ND	2	50	MCL
Silver	ND	ND	100	HA-Lifetime
Strontium	2,900	1,500	4,000	HA-Lifetime
Thallium	ND	ND	2	MCL
Uranium	11.2	250	30	MCL
Zinc	80	30	2,000	HA-Lifetime



\*

<b>HA:</b> Health Advisory. An estimate of acceptable drinking water levels for a chemical substance based on health effects information; a Health Advisory is not a legally enforceable Federal standard, but serves as technical guidance to assist federal, state, and local officials.
<b>HA-Lifetime:</b> The concentration of a chemical in drinking water that is not expected to cause any adverse, noncarcinogenic effects for a lifetime of exposure. The Lifetime HA is based on exposure of a 70-kg adult consuming 2-liters of water per day. The Lifetime HA for Group C carcinogens includes an adjustment for possible carcinogenicity.
<b>MCL:</b> Maximum Contaminant Level. The highest level of a contaminant allowed in drinking water. MCLs are set as close to the MCLG as feasible using the best available analytical and treatment technologies and taking cost into consideration. MCLs are enforceable standards.
<b>MCL-TT:</b> Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.
<b>Region 8 Permit Limit:</b> Limit calculated by Region 8 Drinking Water Toxicologist based on human-health criteria.

EPA has determined that the injection activity will not endanger groundwater in the injection zone, because it is the same water that was pumped from the injection zone. Nothing will be added to the groundwater after it is pumped from the Upper Fox Hills Formation, and before it is reinjected, that will change the water quality. Therefore, this Draft Permit has no requirements for injectate sampling and analysis. However, EPA is requiring Powertech provide a summary report of the aquifer pump testing results to help verify that there is no migration of Fox Hills Formation fluids into the overlying Laramie Formation while the injection well is operational.

#### IV. REASON FOR THE PERMIT

The UIC Program, created under the authority of the Safe Drinking Water Act (SDWA), is a preventive program tasked with protecting existing and future underground sources of drinking water (USDWs). The UIC regulates the discharge of fluids into the subsurface through injection wells. An injection well that discharges fluids into or above a USDW is a Class V injection well. Class V wells injecting fluids containing constituents with Primary Drinking Water Standard or Health Advisories may have the potential to contaminate or degrade groundwater, and are usually required to operate under a permit. The groundwater being pumped from, and reinjected into, the Upper Fox Hills Formation has higher concentrations of some contaminants regulated under the SDWA than the Laramie Formation. Because the injection well will penetrate the Laramie Formation, EPA is issuing a permit for this injection activity to establish well construction standards as permit requirements for the protection of groundwater in the Laramie Formation from contamination resulting from the proposed injection activities.

#### V. INJECTION WELL CONSTRUCTION DESIGN

The permit requires that well construction design prevents movement of injectate into the overlying Laramie Formation. EPA has evaluated the construction design plan, which Powertech has proposed for the injection well and has determined that the design is protective of the Laramie Formation groundwater. The injection well will be constructed according to the specifications shown in Figure 4. The cement between the well casing and the borehole wall will prevent the movement of fluids along the injection well and will insulate the injection zone to the "A" Sands of the Fox Hills Formation. Powertech proposed conducting mechanical integrity tests on all wells associated with the aquifer pump test to demonstrate that none of the wells will serve as conduits for the migration of fluids across the confinement zones. The aquifer pump test will also verify the integrity of the injection well and the confining zones.



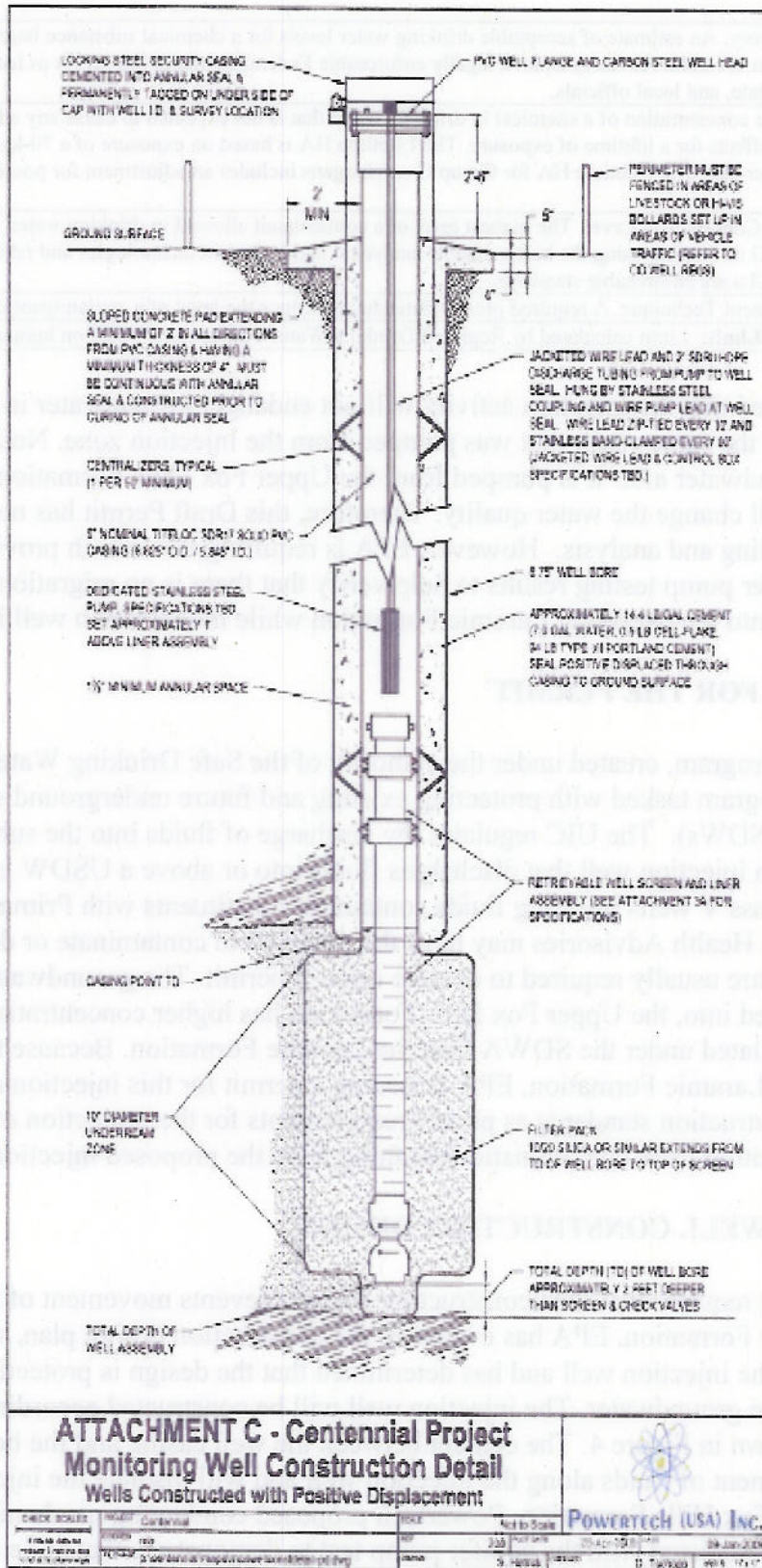


Figure 4. Injection Well Construction Design



## VI. GROUNDWATER USE WITHIN ONE-HALF MILE OF INJECTION WELL

The current use of groundwater within a one-half mile radius of the injection well consists of livestock watering. There are two (2) livestock-watering wells located approximately one-quarter mile away from the injection wells. These wells are completed within the proposed injection zone, and located either up-gradient or cross-gradient of the injection well, relative to groundwater flow within the Upper Fox Hill Formation.

The nearest domestic well completed in the Fox Hills Formation is located approximately 1 mile west of (up-gradient from) the injection well. This private, domestic well is completed deeper than the injection zone, and is probably in the B Sand of the Lower Fox Hills Formation as shown in Figures 2 and 4.

## VII. PUBLIC PARTICIPATION PROCESS FOR THE DRAFT PERMIT

Powertech has submitted all the required information and data necessary for permit issuance in accordance with Title 40 Code of Federal Regulations (40 CFR), Parts 144, 146 and 147, and a Draft Permit has been prepared.

A public notice of the Draft Permit will be published in the *Greeley Tribune*. The public notice will include an announcement that EPA is seeking public comments on the Draft Permit and will be holding a public hearing. The public hearing is currently scheduled for July 20, 2009, from 6:00 to 8:30 pm at the Island Grove 4-H Building located at 527 North 15<sup>th</sup> Avenue in Greeley, Colorado. EPA will also be accepting public comments at the public hearing. A court recorder will be present at the public hearing, to record any verbal statements made during the public hearing as part of the administrative record for the final permit decision. Region 8 is receiving comments on the Draft Permit until July 24, 2009. Comments can be submitted to EPA either by email or in writing.

Send comments to:

Valois Shea  
Mailcode: 8P-W-GW  
1595 Wynkoop Street  
Denver, CO 80202  
or  
email them to [shea.valois@epa.gov](mailto:shea.valois@epa.gov).

The administrative record for the Draft Permit consists of the permit application, the Draft Permit document, the Statement of Basis, and the geological references listed in the Statement of Basis. These documents are available for public review at the EPA Region 8 UIC library on the second floor at the address shown above. These documents will also be available for public review at the following locations:

Wellington Public Library  
800 Wilson Avenue  
Wellington, CO  
Library Hours:  
Monday 10 a.m. - 6 p.m.  
Tuesday 10 a.m. - 6 p.m.  
Wednesday 10 a.m. - 8 p.m.  
Thursday 10 a.m. - 6 p.m.  
Friday 10 a.m. - 3:30 p.m.  
Saturday 10 a.m. - 1 p.m.

Northern Plains Public Library  
216 2nd Street  
Ault, CO  
Library Hours:  
Monday - Friday 9 am - 7 pm  
Saturday 9 am - noon

### **VIII. THE EPA PROCEDURES FOR REACHING A FINAL DECISION ON THE DRAFT PERMIT**

In making the final permit decision, EPA will consider all comments received during the public comment period and during the public hearing. The final permit decision may be to issue the permit without any changes, to issue the permit with changes, or to deny issuance the permit. EPA will respond to all public comments in a Responsiveness Summary document that will be released at the time the final permit decision is issued. Everyone who submits comments to EPA and attends the public hearing will receive this Responsiveness Summary document along with notification of the final permit decision.

If EPA receives comments during the public comment period or the public meeting, then the final permit decision will not become effective until thirty (30) days after the date it is issued. The purpose of this thirty (30)-day period is to allow time for anyone who commented on the Draft Permit to appeal the final permit decision to the Environmental Appeals Board. Information for how to appeal the final permit decision will be provided in the notification of the final-permit decision.

For additional information, contact Valois Shea at 1-800-227- 8917, extension 312-6276, or 303-312-6276, or at the addresses listed above.

### **REFERENCES**

Voss, W. C., 2007, Report on the Centennial Project Weld County, Colorado, 41 pages.