U.S. Environmental Protection Agency
Underground Injection Control Program

Information on the Dewey-Burdock Uranium Site near Edgemont, South Dakota

Prepared for: The Northern Arapaho Tribe

March 2, 2016 Webinar

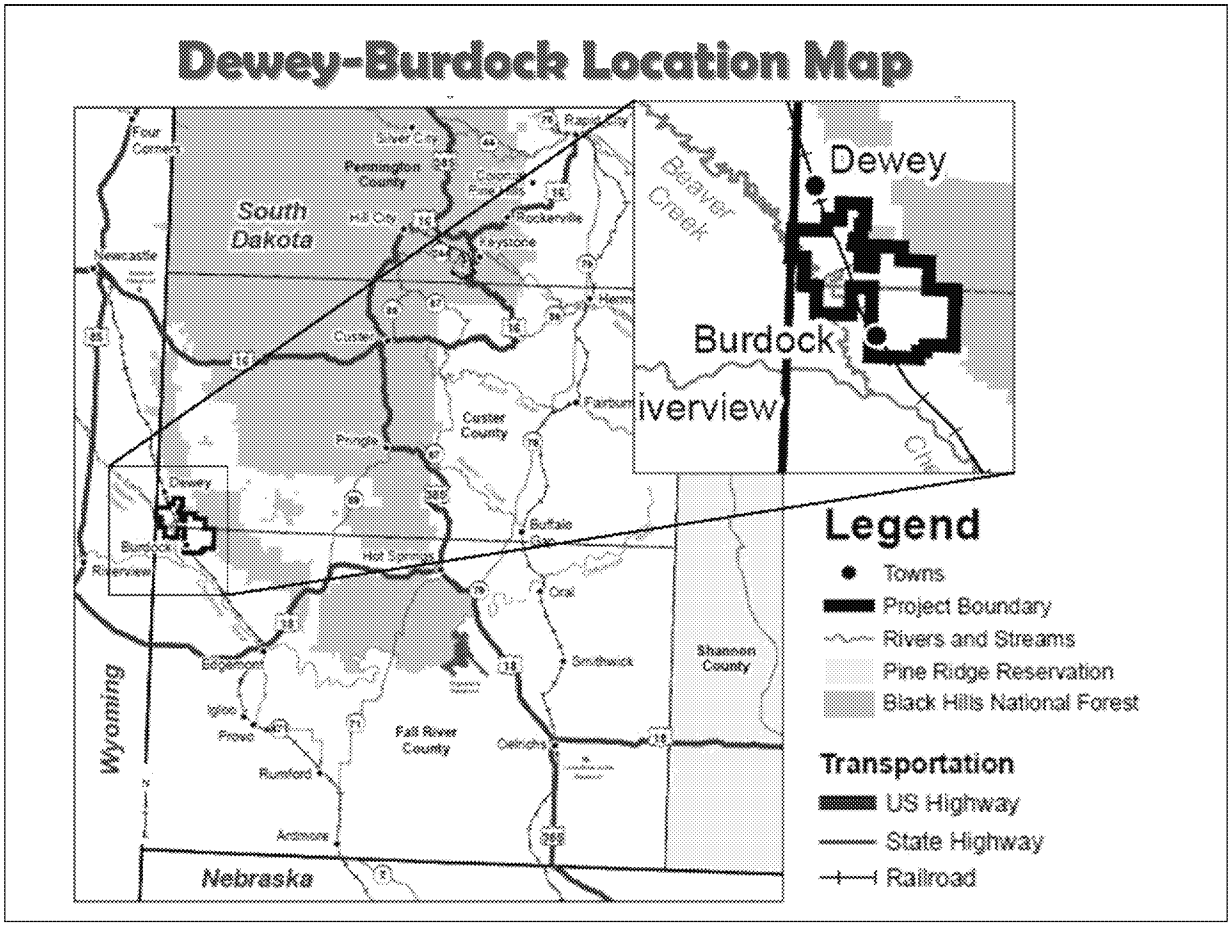
EPA Dewey-Burdock Permit Process

- EPA's Role
  - Underground Injection Control (UIC) Program & Regulatory Mission
  - UIC Permits
- UIC Permitting Process
  - Technical Analysis
  - Tribal Consultation
  - Draft Permits
  - Public Participation Process
- EPA Outreach
  - Public Hearings in SD
  - Additional Tribal Community Outreach
  - Continuing Tribal Consultation

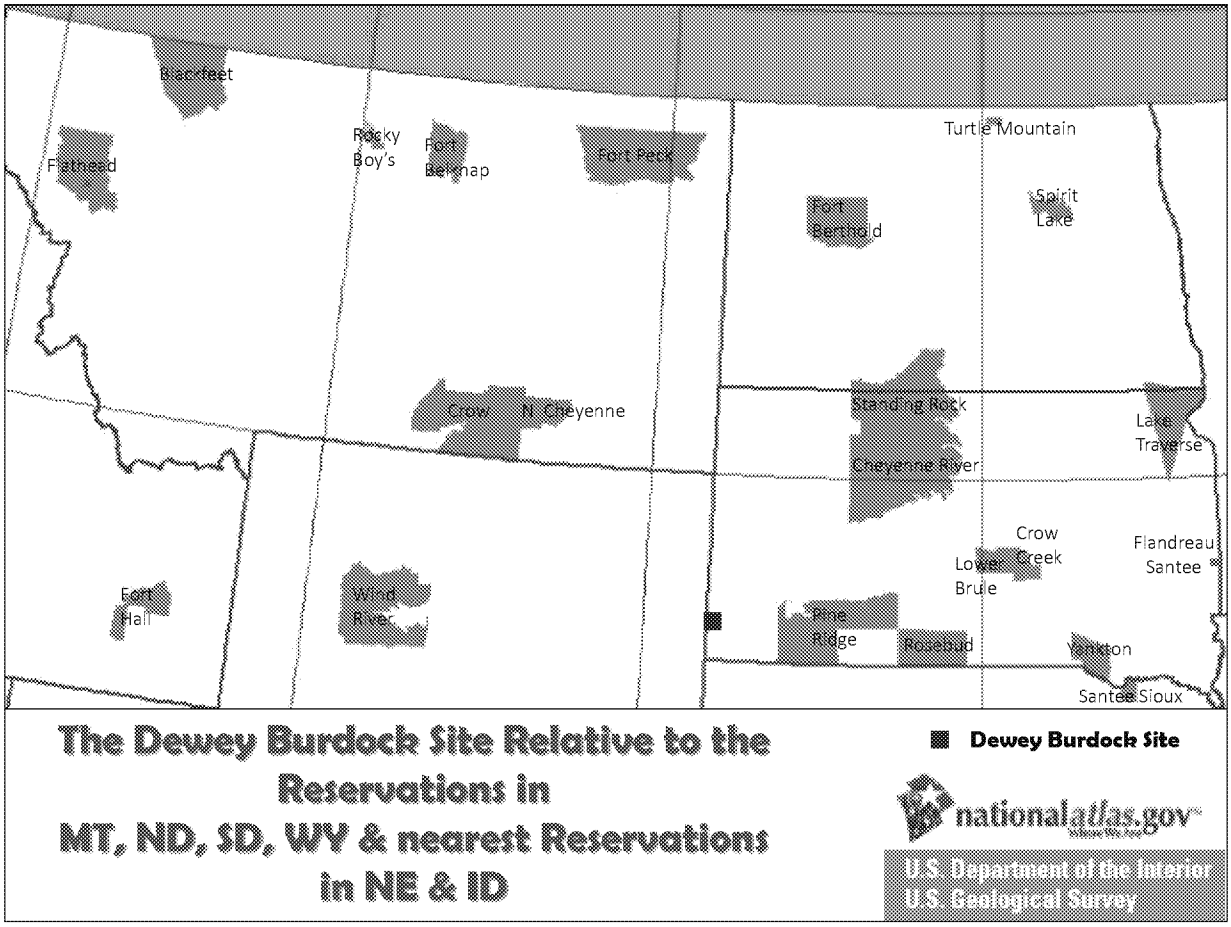
This is information we can cover during the presentation if it is helpful.

The EPA Region 8 UIC Program Has Received Permit Applications for Two Types of Injection Wells

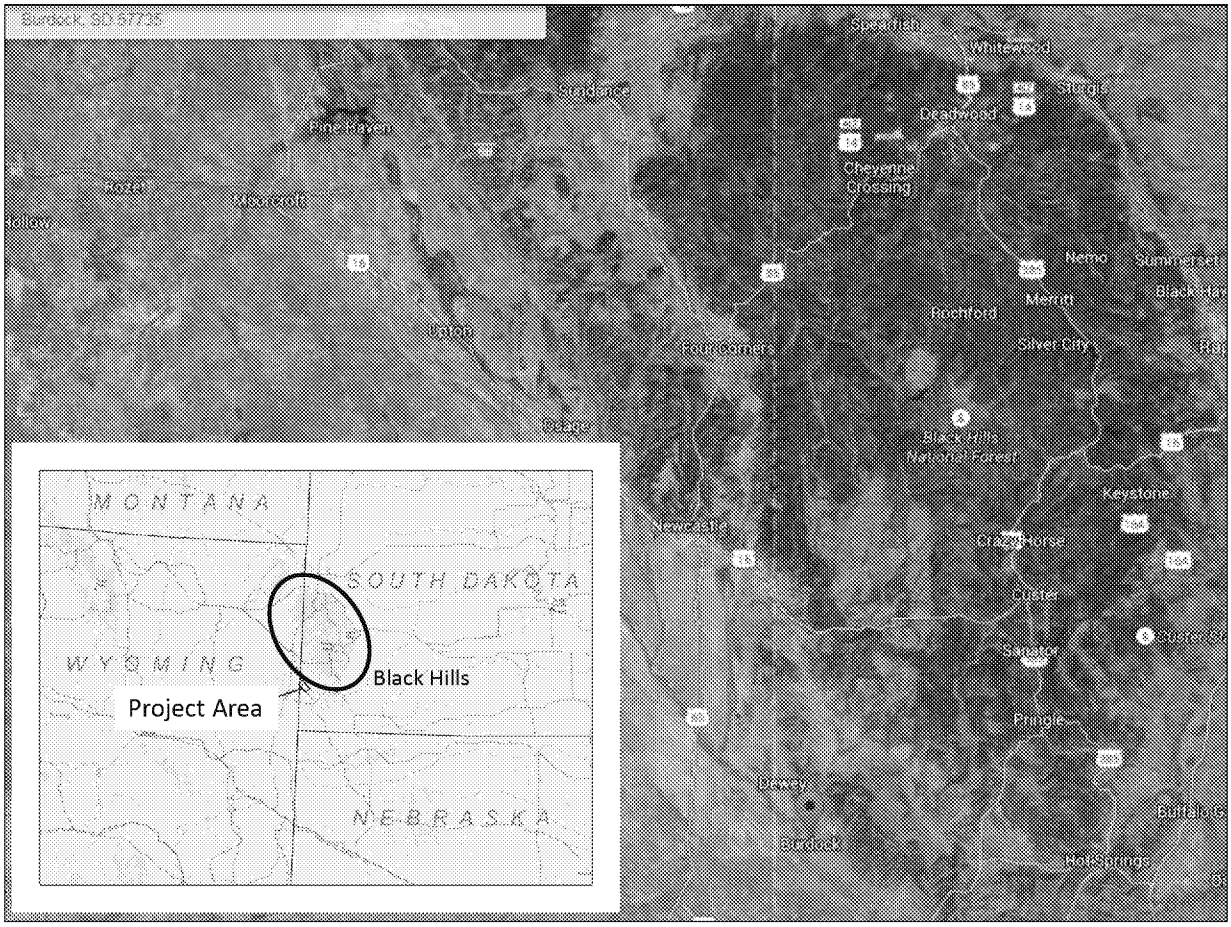
1. A Class III Permit Application for the injection of lixiviant to mobilize uranium in the ore bodies.
2. A Class V Permit Application for the disposal of treated ISR waste fluids into deep wells.



The Dewey Burdock site is located in the SW corner of Custer County and the NW corner of Fall River County on the Wyoming/South Dakota border. In the southern Black Hills. About 45 miles west of the Pine Ridge Reservation. Very close to Cheyenne River which is a concern for Oglala Sioux and Cheyenne River Sioux Tribes since the Cheyenne River borders their reservations.



The Dewey Burdock site relative to the Reservations in MT, ND, SD, WY & nearest reservations in NE & ID



Aerial photo of the Black Hills. The Red Race Track shows up a little better on the western side. There is a highland rim on the outside of the Red Race Track. Buffalo Gap is a gap in this highland rim. The Dewey-Burdock site is just on the outside of that highland rim.

Regulatory Authority of the Underground Injection Control Program at the Dewey Burdock Site

The UIC Program is authorized under the Safe Drinking Water Act to protect *Underground Sources of Drinking Water* from contamination resulting from injection activities.

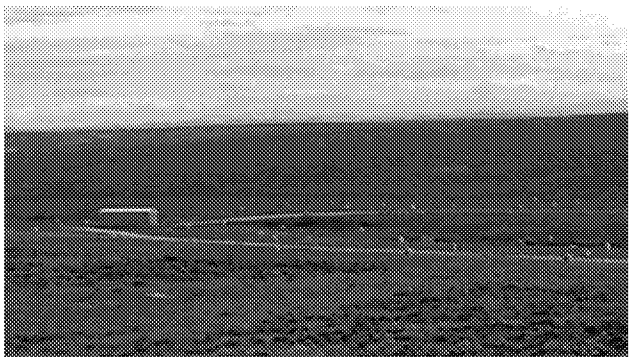
Underground source of drinking water (USDW) means an aquifer or part of an aquifer which supplies drinking water or contains fewer than 10,000 mg/l total dissolved solids.

Other Regulatory Agencies at the Dewey-Burdock Site

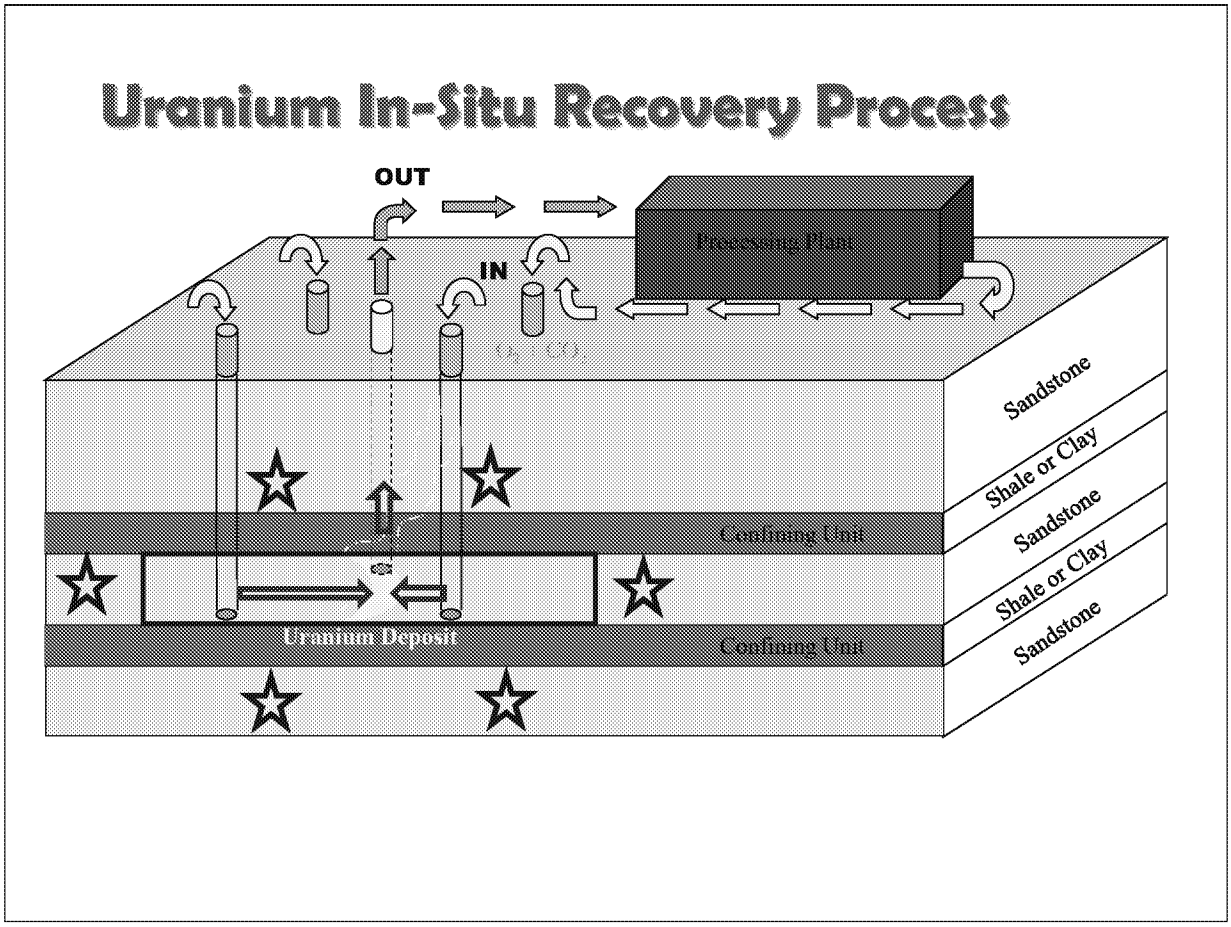
- The Nuclear Regulatory Commission issued a License for the entire site.
- The South Dakota Department of Environment and Natural Resources has proposed issuance of a Large Mine Permit for the entire site.
- The BLM approved a Plan of Operations for portions of the site on BLM land.
- The South Dakota Department of Environment and Natural Resources has proposed issuance of a groundwater discharge permit for the land application of treated ISR waste fluids.

Dewey-Burdock Uranium In-Situ Recovery Site

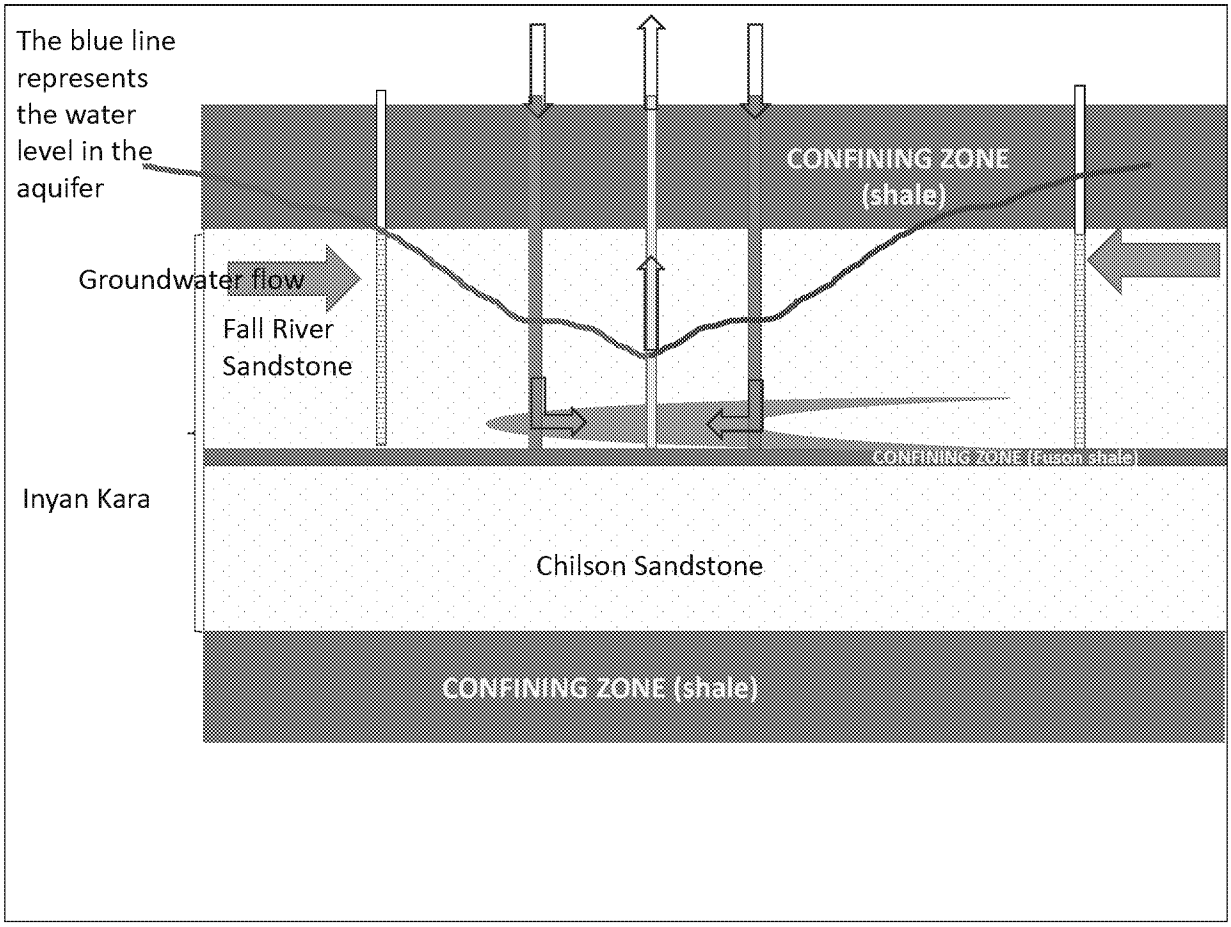
- The Dewey-Burdock site will recover uranium using injection wells.
- There will be no open pits, underground mine workings or tailings piles.
- The uranium will be extracted from the ore deposit using an injected lixiviant.
- The uranium-bearing solution will be pumped to the surface using extraction wells.



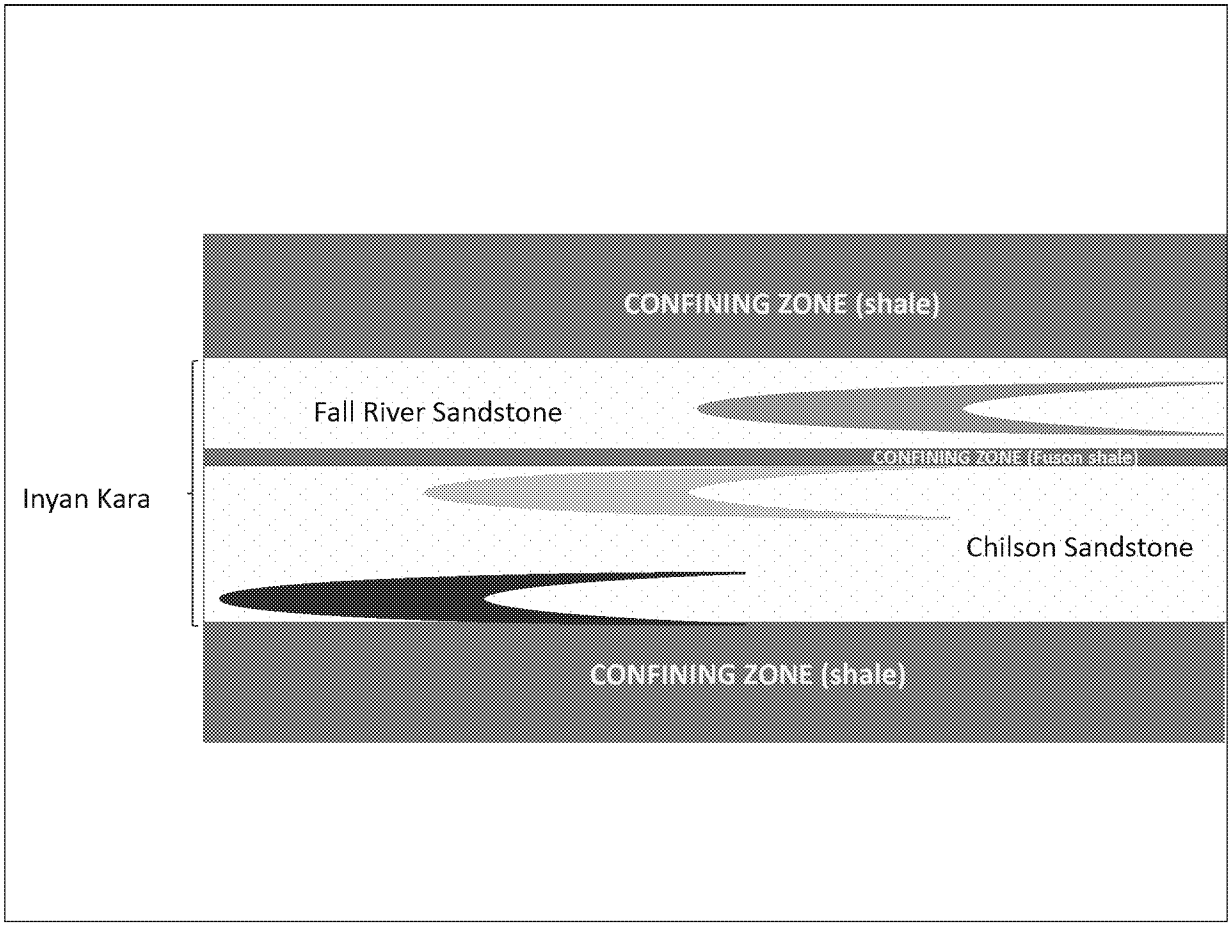
Example of an In-Situ Uranium Recovery Site in WY



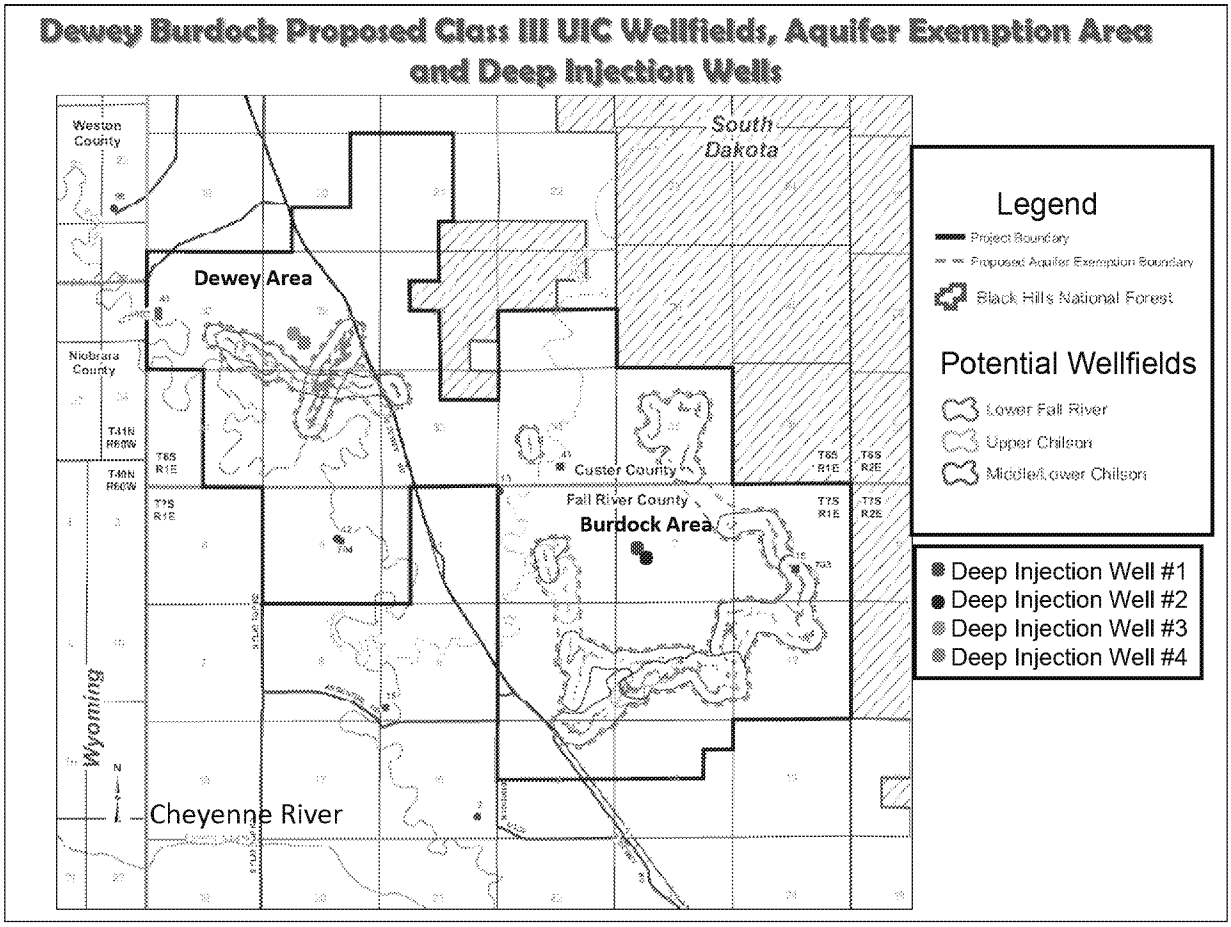
Example of injection wells injecting lixiviant into the ore deposit. The recovery wells pump the uranium-bearing lixiviant out of the ground to the processing plant where the uranium is extracted. The lixiviant is the Inyan Kara native ground water with oxygen and carbon dioxide added. The confining zones keep the lixiviant in the injection zone and prevent it from moving out vertically.
Stars represent monitoring wells where we do not want to see any change in water quality.



This slide shows the Inyan Kara aquifers that are proposed for the aquifer exemption (discussed later). The recovery wells pump more groundwater out of the aquifer than the injection wells pump back into it. That causes the water level in the aquifer to lower in and around the wellfield. This causes the groundwater flow direction to be toward the wellfield. That is how the horizontal control of the lixiviant if maintained. The monitoring wells (shown in white) are part of the perimeter monitoring well ring that is installed to monitor the groundwater level and groundwater quality outside the wellfield.



The colors of the ore zone on the next map correspond to where the ore bodies are located within the Inyan Kara aquifers. The Fuson Shale is a confining zone between the Fall River Sandstone and the Chilson Sandstone.



This map shows the wellfield locations in the Dewey and Burdock areas of the site.
There are 4 proposed wellfields in Dewey Area & 10 proposed wellfields in the Burdock Area.
The lines around the wellfield show the location of the perimeter monitoring well ring. The dashed green line is the aquifer exemption boundary.

Regulatory Authority of the Underground Injection Control Program at the Dewey Burdock Site

UIC Program regulations specify the following requirements for injection wells:

- construction,
- operation,
- monitoring,
- closure,
- financial assurance.

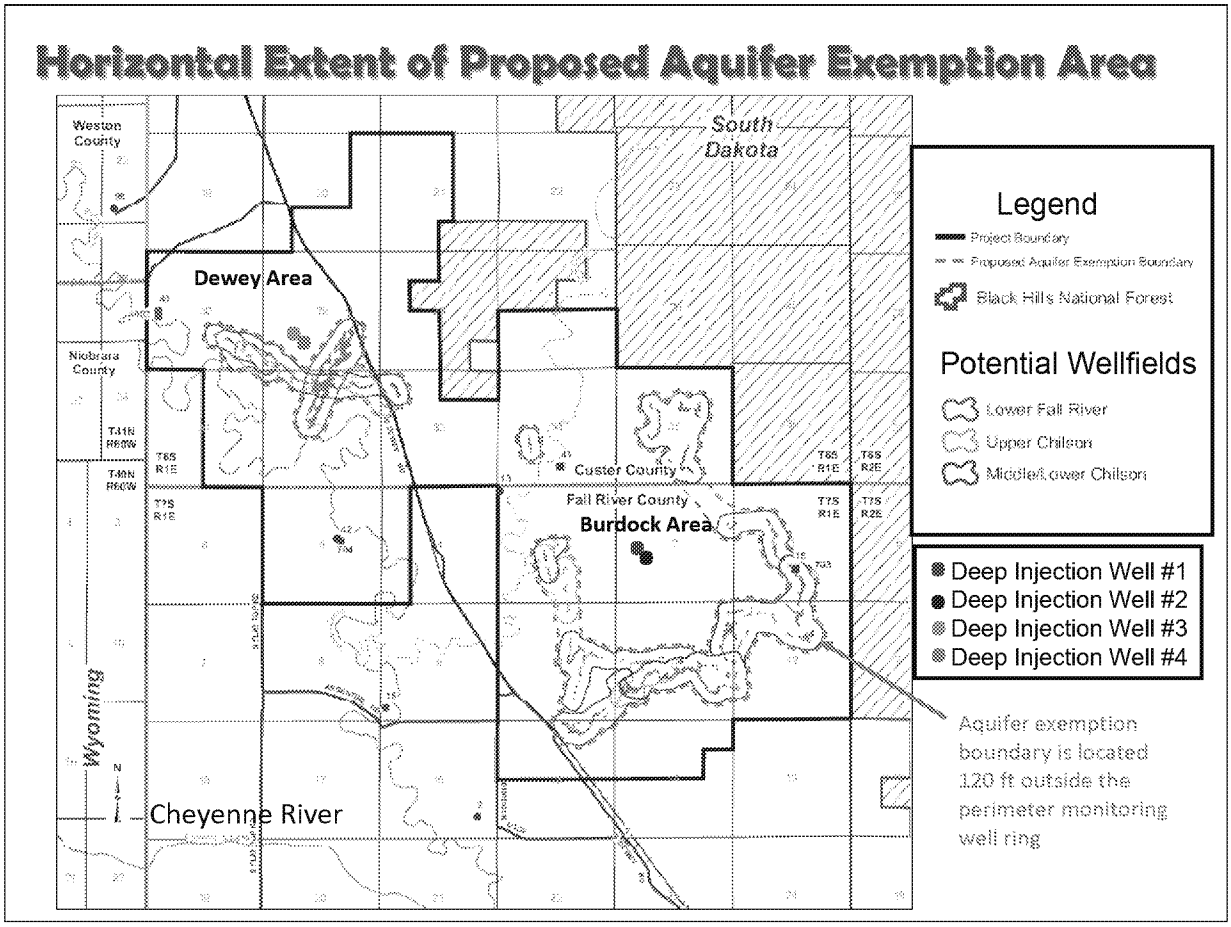
The EPA has been requested to Review an Aquifer Exemption

An Aquifer Exemption is required to inject into the Class III wells for uranium recovery.

An Aquifer Exemption is allowed under UIC regulations IF the USDW

1. Does not currently serve as a source of drinking water and
2. Is mineral producing or can be demonstrated to contain commercially producible minerals.

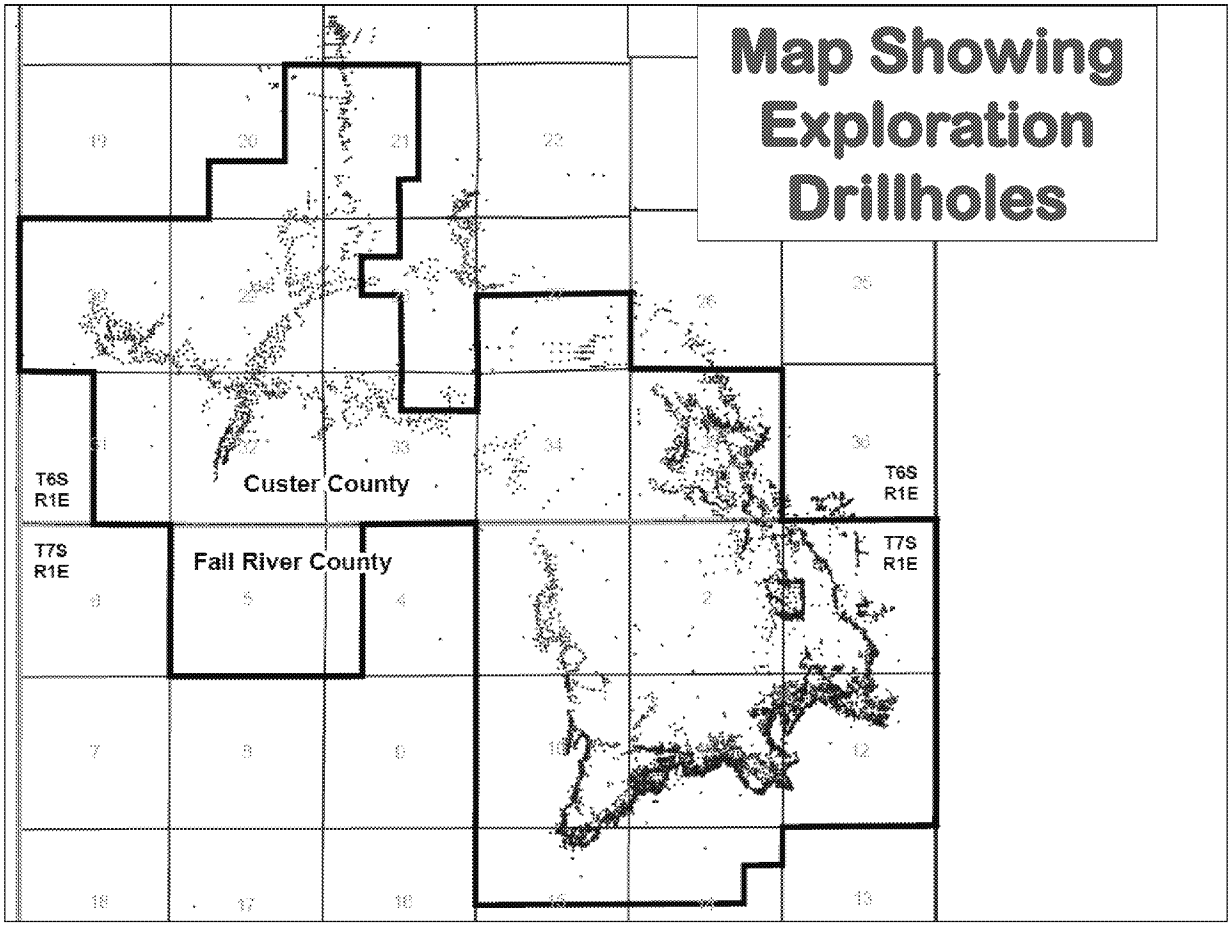
UIC regulations do not allow injection activities to contaminate an underground source of drinking water. UIC regulations allow EPA to exempt portions of an aquifer for mineral extraction if the company can demonstrate the aquifer contains commercially producible minerals.



The aquifer exemption boundary is the dashed green line. It is located 120 feet outside of wellfield perimeter monitoring ring. Inside the aquifer exemption boundary injection of the lixiviant can extract the uranium out of the ore deposit, in effect contaminating the aquifer. Outside this aquifer exemption boundary, no contamination is allowed under the permit. Any contamination outside the aquifer exemption is a violation of the permit.

UIC Regulations

- UIC regulations require the permittee to conduct considerable testing to provide EPA hydrogeological and other data before any injection wells are authorized to operate.
- The data must demonstrate vertical confinement to prevent movement of fluids out of the injection zone so that no USDWs are contaminated.
- The data must also demonstrate that it is possible to contain injection zone fluids horizontally to prevent contaminant migration into USDWs.

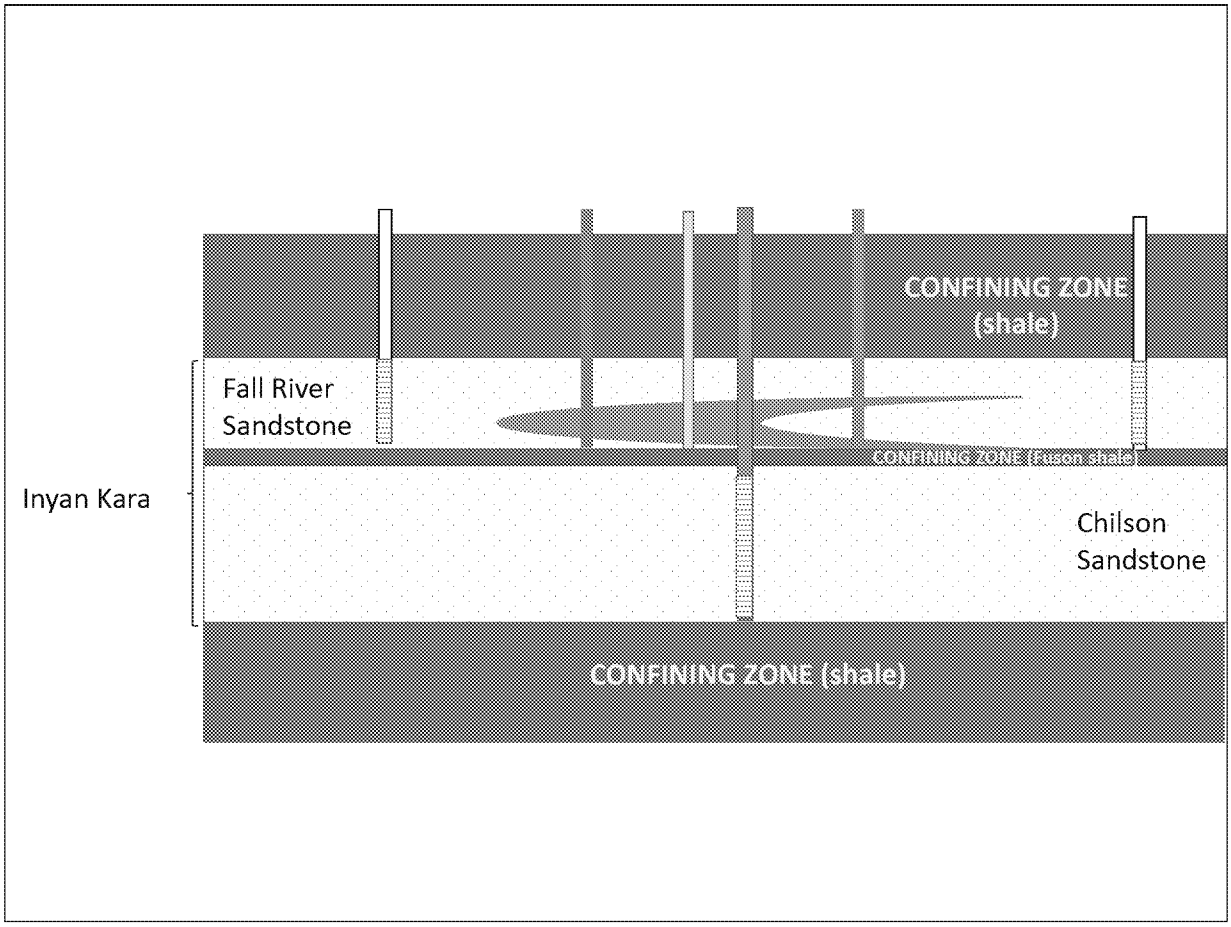


There are 5932 historic exploration drillholes drilled in the late 1960s and early 1970s. South Dakota had requirements for plugging these drillholes, but the requirements are not as stringent as they are today. Tribes are concerned that improperly plugged drillholes left behind holes in the confining zones that can allow the uranium-bearing lixiviant to move out of the injection zone and contaminate other aquifers and even flow to the surface and contaminate surface water which could reach the Cheyenne River.

UIC Regulations

- UIC regulations require protection of USDWs around the AE area through extensive monitoring.
- UIC regulations require that no ISR process contaminants cross the aquifer exemption boundary during or after ISR operations.

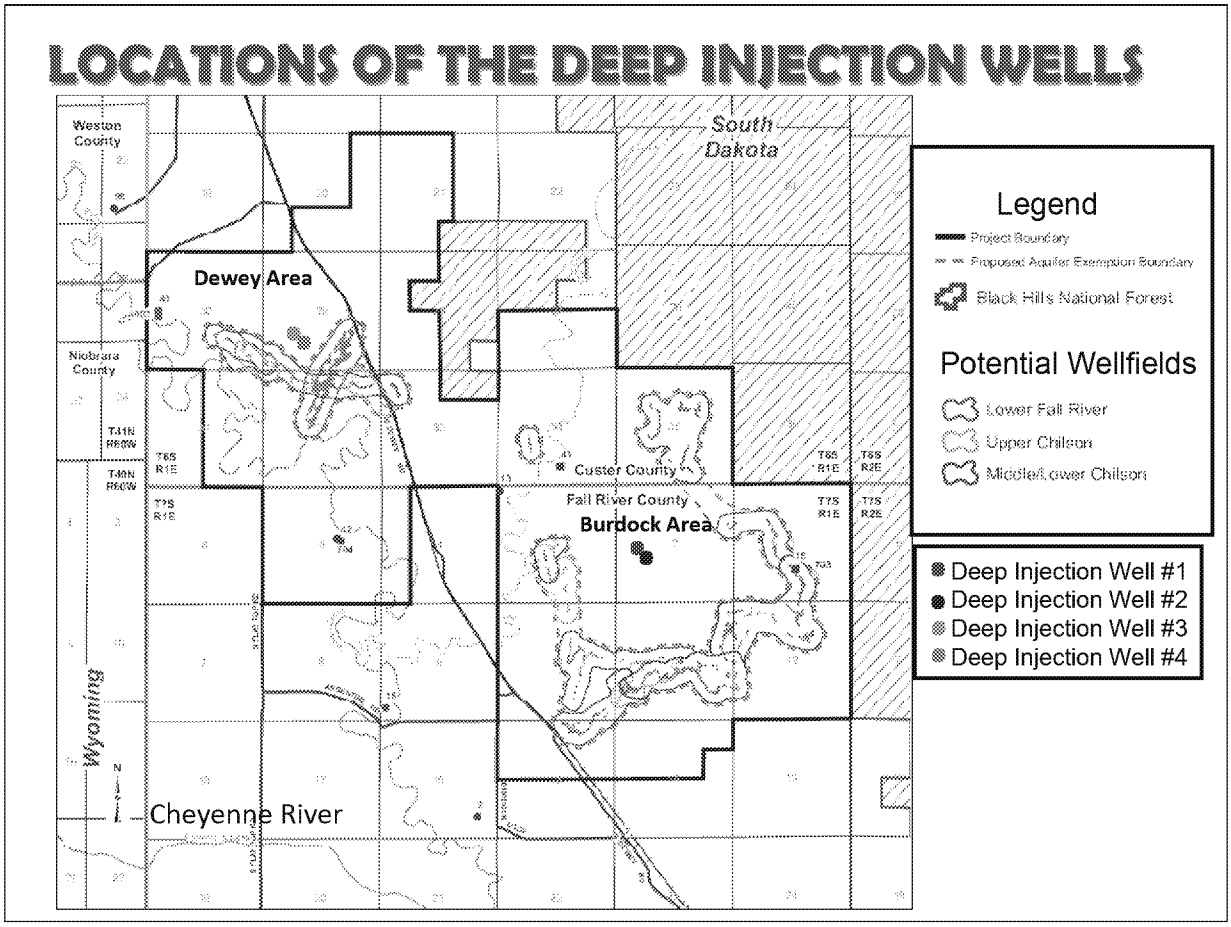
UIC regulations require protection of USDWs so Powertech will be required to identify which boreholes were improperly plugged and plug them to prevent any migration of contaminants outside the injection zone.



The blue well is an example of a monitoring well in the aquifer below the injection zone that will detect if contamination crossing the confining zone into the Chilson Sandstone.

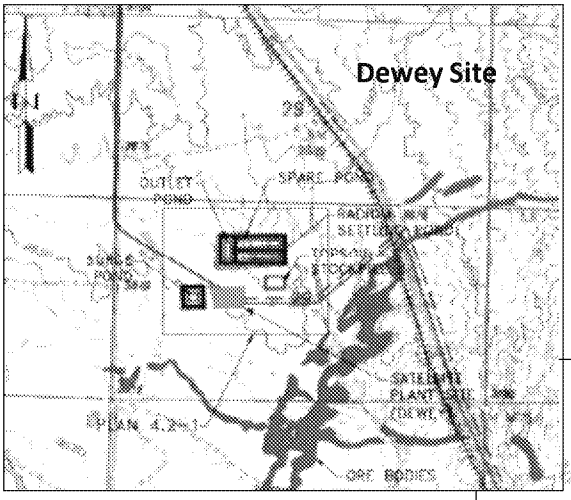
UIC Regulations

- UIC regulations authorize enforcement action when UIC regulations and/or permit conditions are violated.
- Enforcement actions can include requirements for groundwater remediation activities if appropriate.

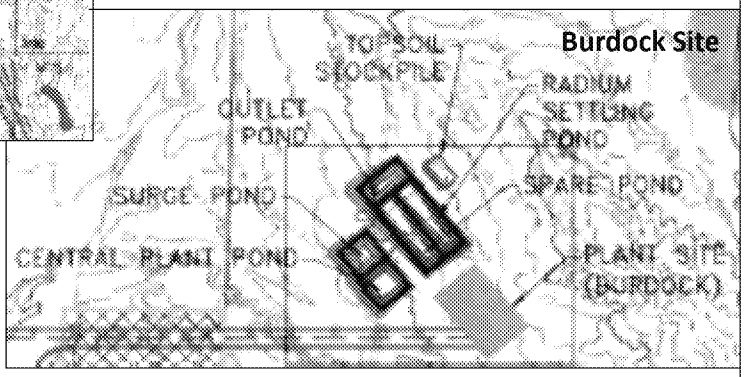


The blue, green, purple and red dots show the locations of the deep injection wells that are proposed for disposal of treated ISR waste fluids.

Treatment and Storage Ponds for Deep Well Injectate

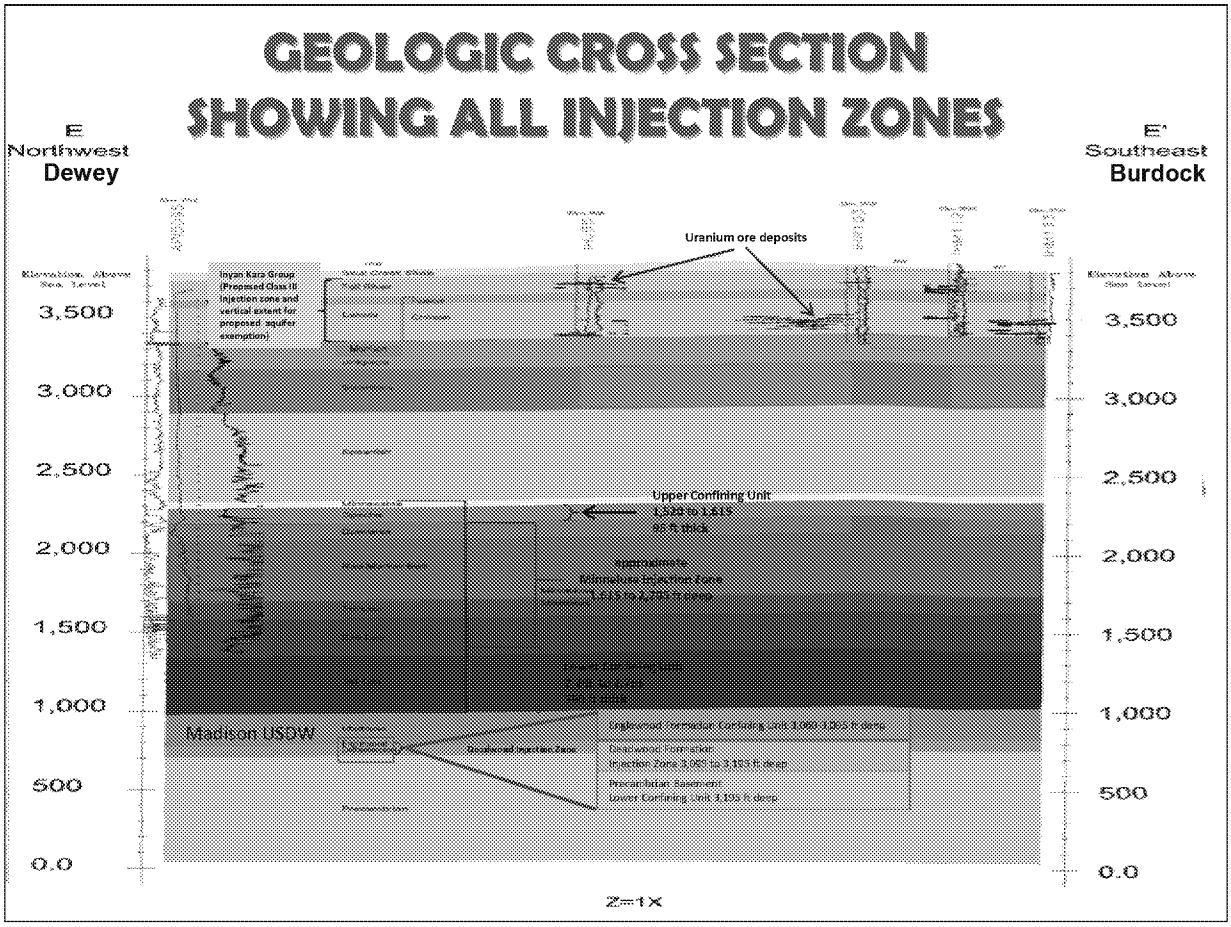


Waste fluids from the uranium recovery process will the treated in the radium settling ponds. After radium removal, the treated water will be stored in the outlet ponds and surge ponds. There will also be a spare radium treatment pond for backup. After treatment, the water will flow to the deep injection wells.



The Burdock Area central plant pond will store brine from the reverse osmosis treatment process used during groundwater restoration before the brine is treated in the radium settling ponds.

The injectate for the deep injection wells will be treated and stored in ponds located at the Dewey and Burdock areas.



This geologic cross section shows the injection zones. The Inyan Kara injection zone for the Class III wells are the near the ground surface. The injection zones for the deep wells are the Minnelusa and Deadwood Formations.

UIC Permitting Process

- After issuance of any draft permit and aquifer exemption decisions, there will be a 60 day public review and comment period.
- Other reviews required in UIC permitting process:
  - *Endangered Species Act,*
  - *National Historic Preservation Act 106 consultation,*
  - *Environmental Justice Analysis,*
  - *Cumulative effects of construction and operation of injection wells.*
- The EPA will hold at least two public hearings in South Dakota.
- The EPA will conduct additional outreach in Tribal communities upon request.

National Historic Preservation Act

- EPA's NHPA obligations:
  - Consider the effects of the undertaking on historic properties
  - Consult with tribes (and others) during our review
  - EPA has the option of designating NRC as the lead for this process, or of conducting the review ourselves.
- The EPA is reviewing the historic properties information developed in the NRC process.
- This information is available to the public at http://adams.nrc.gov/ehd.
- We welcome input from tribes on historic properties in the project area.

EPA Dewey-Burdock Permit Process: Tribal Consultation

EPA's Policy is to consult on a government-to-government basis with federally recognized tribal governments when EPA actions and decisions may affect tribal interests.

The EPA views Consultation as a process of meaningful communication and coordination between EPA and tribal officials prior to EPA taking actions or implementing decisions that may affect tribes.

Current EPA Tribal Consultation Actions to Date and Plan for next steps:

- Informational meetings with all Tribes with possible interest in site.
- "Inform & Educate" sessions to provide background information and opportunity for questions and discussion.
- Letters mailed November 25, 2015 providing notification of opportunity for formal consultation with EPA
- Receive back from Tribes notification of interest in formal government to government consultation with the EPA about the site.
- Formal Consultation opportunities before issuance of any draft permit decisions.
- Continuing consultation throughout the permitting process.

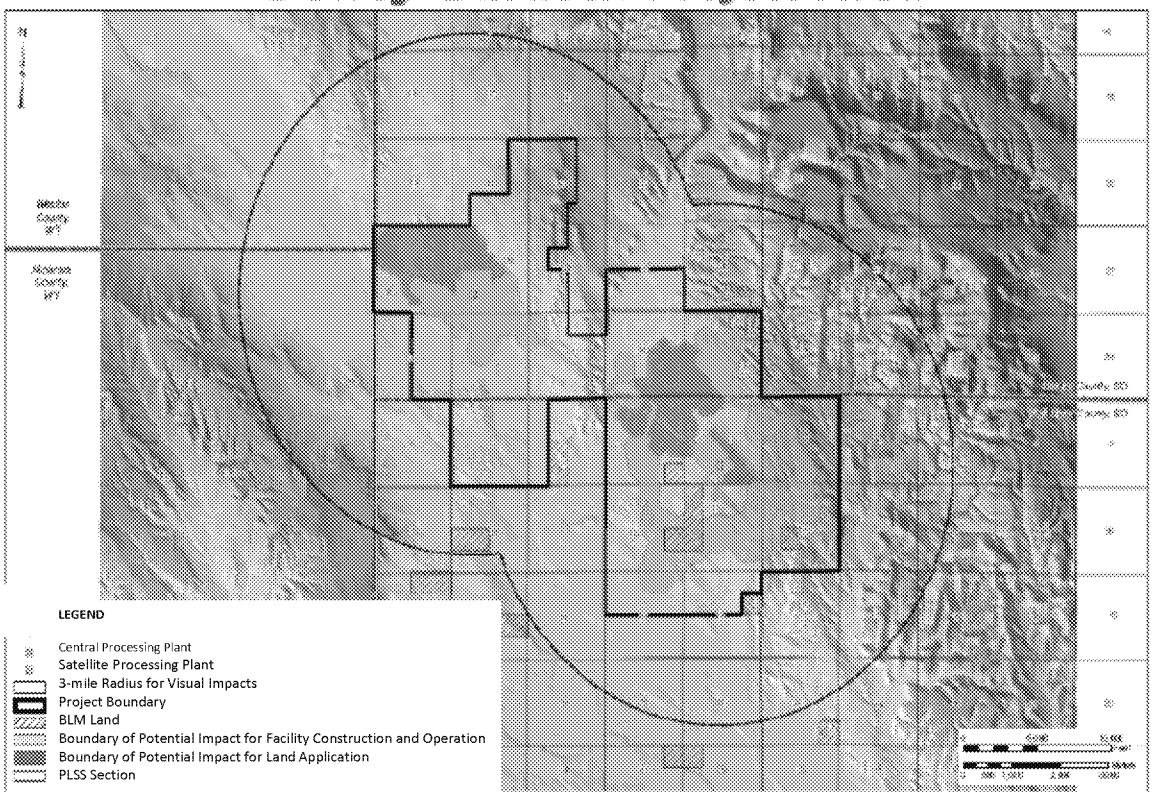
September 10, 2015, Bismarck meeting included THPOs from SD, ND and MT
Oklahoma Tribes include 1) Ponca, 2) Kiowa, 3) Apache, 4) Cheyenne & Arapaho.

Opportunities for Tribal Participation

Informal and Formal Government-to-Government Consultation

- Informal Opportunities:
  - Conference Calls or Web Conferences upon request
- Formal Opportunities:
  - Tribe may respond and request formal consultation.
- Participate in reviewing proposed permit and aquifer exemption decisions.
- Attend Public Hearings.
- Request additional informational web conferences.
- Request additional informal and formal consultation.

Area of Potential Effect within the Dewey-Burdock Project Area



Summary of Archaeological Surveys

- Augustana University Archaeological Department performed a series of Class III Archaeological surveys for Powertech during 2007 and 2008 and evaluative testing reports.
- Tribal surveys were performed during April and May 2013.
- Seven Tribes participated in the field survey at the proposed Dewey-Burdock site:
  1. The Santee Sioux Tribe,
  2. The Northern Cheyenne Tribe,
  3. The Turtle Mountain Band of Chippewa Indians,
  4. The Crow Creek Sioux Tribe,
  5. The Cheyenne and Arapaho Tribes of Oklahoma,
  6. The Crow Nation, and
  7. The Northern Arapaho Tribe

- The tribal survey teams identified new artifact discoveries or cultural features of interest to Tribes at 24 previously reported archaeological sites, as well as 47 additional locations.
- In total, the tribal survey teams identified and investigated 71 tribal sites.
- These features include isolated artifact finds, animal bone concentrations, stone circles, cairns, and possible fasting sites.
- 5 features were identified during the field survey as possible gravesites.
- NRC reviewed site data on over 200 archaeological sites recorded within the proposed project area.

Ways in which Tribal Officials Can Be Involved in the UIC Permitting Process

- Participate in informal and formal government to government consultation.
- Request informational web conferences on topics of concern.
- Participate in the review of the proposed permit and aquifer exemption decisions.
- Attend public hearings.

Provide info about requested web conferences to date, those conducted & those planned.

Questions & Discussion

Contact Information

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