UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of POWERTECH USA (In Situ Leach, Dewey Burdock, SD)	Docket No. 40-9075-MLA March 8, 2010

CONSOLIDATED REQUEST FOR HEARING AND PETITION FOR LEAVE TO INTERVENE

Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Sir or Madam:

Pursuant to 10 CFR Section 2.309, each of the following requestor/petitioners states that he, she or it has an affected interest in this matter and desires to participate as a party and files this request for hearing and petition for leave to intervene and a specification of the contentions which should be litigated: Theodore P. Ebert, David Frankel, Gary Heckenlaible, Susan Henderson, Dayton Hyde, Lilias C. Jones Jarding, Clean Water Alliance ("CWA"), and Aligning for Responsible Mining ("ARM").

A hearing should be granted and the requestor/petitioners are entitled to participate in it if he, she or it shows standing and has proposed at least one admissible contention that meets the requirements of Section 2.309(f).

This request/petition is timely filed on March 8, 2008 based on the FRN published at 75 Fed. Reg. 467 (January 5, 2010) (the "FRN"). Capitalized terms that are not defined herein have the meanings assigned to them in the Application for a combined

source material/11e.(2) byproduct material license (the "License"), which contains the Technical Report (February 2009) ("TR") and Environmental Report (February 2009) ("ER") filed by Applicant Powertech (USA), a wholly owned subsidiary of Canadian corporation Powertech Uranium Corp. ("Applicant"), and the Supplemental Application (August 2009) ("App. Supp.") filed by Applicant after the NRC Staff's initial rejection of the February 2009 Application.

Each requestor/petitioner notes that Section 2239(a)(1)(A) of the Atomic Energy Act, as amended, provides that in any proceeding for the amending of any license, the Commission shall grant a hearing upon the request of any person whose interest may be affected by the proceeding, and shall admit any such person as a party to such proceeding.

Background:

The Black Hills of South Dakota has been known for many decades to be a uranium-rich region.[1] Open pit uranium mining from the 1970s and 1980s, has left a legacy of contamination and cancer, death and destruction, in large part due to negligent and reckless failures on the part of state and federal regulators which allowed uranium companies to 'cut-and-run', leaving thousands of radioactive tailings piles for future generations to clean up. Figure 2.9-3 shows Gamma-Ray Count Rates at the Dewey-Burdock Site with several large red spots showing >50,000 counts per minute (CPM), demonstrating that substantial radioactive contamination still exists at the proposed mine site from the last era of Uranium mining which has yet to be cleaned up.

Now, the NRC eagerly desires to allow more uranium mining, this time from the

[1] TR §1.2.

aquifers of drinking water that lie beneath the Black Hills. The negligence of past regulators and the pollution caused by past uranium mining has highly sensitized this local population to the potential catastrophic damage and deadly consequences they are facing. Yet, the NRC did not find it necessary to distribute paper copies of the 6,000 page Application in the affected communities. Accordingly, a hearing is required in order to shed the light of day on this Proposed Action near Edgemont, in Custer County and Fall River County, South Dakota. All of the requestor/petitioners live in the affected area and use water that is affected by the mining directly or through inter-connections among the underground water.

The Proposed Action uranium deposit occurs in both the Fall River and Lakota formations of the lower Cretaceous age that make up the Inyan Kara Group. The Fall River and Lakota formations consist of permeable sandstones deposited in a major sand channel system that makes up a groundwater aquifer.[2] Uranium mineralization has occurred in more than one horizon within the Inyan Kara Group resulting in multiple roll fronts.[3] The estimated mineable resource within the project boundary is 7.6 million pounds of U_3O_8 with an average grade of 0.21 percent.[4]

At the PAA, Powertech (USA) will add gaseous oxygen and gaseous carbon dioxide to the recirculated native ground water from the ore zone aquifer to solubilize and mobilize radioactive Uranium.[5] Once solubilized, the uranium bearing ground water will be pumped by submersible pumps via well field production wells to the surface where it is bonded by IX forces onto IX resins.[6] After the uranium is removed, the radioactive 'development'

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[2] TR §1.6.
[3] Id.
[4] Id.
[5] TR §1.7.
[6] Id.

groundwater will be recirculated and reinjected into the aquifer via well field injection wells.[7]

Applicant intends to maintain a constant "bleed" of water from the mined aquifer which permanently removes that amount of "bleed" water from the natural hydrological cycle.[8] The (bleed) is intended to create and maintain a cone of depression in the pressure surface of the aquifer so that the new ground water is continually flowing to the center of the production zone in the hopes of avoiding leakage of radioactive fluids outside the mining area into pathways for human ingestion.[9] Applicant does not know the amount of water that will be irretrievably removed from the hydrological cycle but estimates that it will be between a low of 0.5% and a high of 3.0% which is a range with a factor of 600% between the estimated low and estimated high.[10] Applicant expects total production under the License to be approximately 1,000,000 pounds of U_3O_8 per year.[11]

Radioactive wastewater from the Proposed Action ISL operations will consist primarily of spent CPP elution brines, production well field bleed, and restoration flows; these wastewaters will be disposed of by injection in Class I or V injection wells, or by treatment and subsequent land application.[12] As part of the wastewater management plan, there may be periodic releases of water from storage ponds for the beneficial use of crop irrigation.[13]

Land use within the proposed project boundary primarily consists of residential, agriculture related to grazing, as well as hunting and historical mining.[14] The majority of agricultural production is related to grazing.[15] Most land serves as grazing land for cattle

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[7] Id.
[8] See TR §1.7.
[9] Id.
[10] See TR §1.7.
[11] TR §1.8.
[12] TR §1.10.
[13] Id.
[14] TR §2.2.2.
[15] Id.

that are sold as food, as well as a number of horses.[16] Major attractions near the PAA include Mount Rushmore National Memorial, Wind Cave National Park, Jewel Cave National Monument, Buffalo Gap National Grassland, Custer State Park, Black Hills National Forest, Angostura State Recreation Park, Gov. George S. Mickelson Trail,[17] Crazy Horse National Monument, and the Black Hills Wild Horse Sanctuary.[18]

The nearest resident is 0.9 miles to the west south-west of the PAA. [19]

Prior to the intended operations of Applicant at the PAA, the human influence on the area has been minor with most of the area being used for grazing activities and associated facilities (e.g., fences and stock wells), recreation, and tourism.[20]

The PAA drains into the Upper Cheyenne River basin, which extends through three states - Wyoming, Nebraska, and southwestern South Dakota.[21] The PAA is drained by the Cheyenne River (Figure 2.2-1).[22] Beaver Creek and Pass Creek pass through the proposed permit area and empty into the Cheyenne River downstream of the proposed permit boundary.[23] Beaver Creek drains the southeastern portion of Weston County in Wyoming before entering Custer County in South Dakota and discharging to the Cheyenne River south of Burdock in Fall River County.[24] The Pass Creek watershed is located in Custer, Fall River, and Pennington Counties in South Dakota and a very small portion of Weston County in Wyoming.[25] The remaining surface water resources in the PAA are small intermittent stream channels and small ponds which, are used by livestock when water

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[16] Id.
[17] See TR §2.2.2.
[18] Declaration of Dayton Hyde.
[19] Id.
[20] TR §2.2.2.1.
[21] TR §2.2.3.1.
[22] Id.
[23] Id.
[24] Id.
[25] Id.

exists.[26] Applicant's testing shows that Uranium was detected in all of the fish collected at Beaver Creek from pre-existing contamination (see TR §2.8.5.6.1.2.4) and that tests also showed Polonium-210, Thorium-230, Radium-226 and Lead-210 in fish from Beaver Creek.

Four major aquifers are utilized as groundwater resources in the Black Hills.[27] These main aquifers are the, Inyan Kara, Minnelusa, Madison, and Deadwood.[28] The groundwater hydrology is influenced by distribution and variation in recharge, leakage between overlying and underlying hydrogeologic units, lateral flow within the aquifers, and discharge to pumping wells, artesian wells, and springs.[29] In the PAA, the Fall River and Lakota Formations, together forming the Inyan Kara aquifer, are the principal sources of water.[30]

Applicant has identified the two 'host' counties, Custer County and Fall River County, and the major towns within these two counties to include: in Custer County: - Buffalo Gap, Custer City, Fairburn, Hermosa, and Pringle; and in Fall River County: - Edgemont, Hot Springs, and Oelrichs; and in Pennington County: Rapid City which is the closest urban area to the project, is approximately 100 miles via road northeast of the PAA.[31] Rapid City gets its water from the Madison and Minnelusa aquifers.[32]

The PAA contains substantial cultural resources.[33] The Archaeology Laboratory, Augustana College (Augustana), Sioux Falls, South Dakota, conducted on-the-ground field

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[26] Id.
[27] TR §2.2.3.2.1.
[28] Id.
[29] Id.
[30] TR §2.2.3.2.3.
[31] TR §2.3.
[32] Declaration of Lillias Jones Jarding.
[33] See TR §2.4.1 and expert letter dated January 14 2010, from Red Feather Archaeology which was submitted with the undersigned's SUNSI request in the proceeding and is filed herewith and incorporated herein by this reference.

investigations between April 17 and August 3, 2007.[34] Augustana documented 161 previously unrecorded archaeological sites and revisited 29 previously recorded sites within the PAA during the current investigation.[35] Prehistoric sites account for approximately 87 percent of the total number of sites recorded.[36] Historic sites comprise approximately five percent of total sites recorded, while multi-component sites (pre-historic/historic) comprise the remaining eight percent.[37] The land in the PAA has a very high density of sites, specifically those of prehistoric affiliation, and strongly indicative of the intense degree to which this landscape was being exploited during prehistoric times by tribal people.[38]

All of the uranium expected to be mined by Applicant under the License is located within the Inyan Kara Group which Applicant states is 350 feet thick.[39] The Inyan Kara Group consists of the Lakota Formation underlying the Fall River Formation.[40]

The Lakota Formation consists of three (3) members (from lower to upper): Chilson Member (also known as the "Lakota Sandstone") (100 to 240 feet thick), Minnewasta Limestone Member (not in PAA) and Fuson Member (30 to 80 feet thick).[41] The overlying unit, the Fall River Formation, is between 120 and 160 feet thick and consists of dark carbonaceous siltstone interbedded with thin laminations of sandstone, at the bottom, with channel sandstones over that, and a sequence of alternating sandstone and shales over that.[42] Applicant states that the Chilson Member showed high horizontal

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[34] TR §2.4.1.
[35] Id.
[36] Id.
[37] Id.
[38] Id.
[39] TR §2.6.2.2 and TR §2.7.2.2.5.
[40] Id.
[41] Id.
[42] Id.

permeabilities.[43]

The oldest rocks in the region are Precambrian metamorphic rocks and granites. These form the core of the Black Hills Uplift and are exposed at the surfaced of this structural feature.[44] Overlying these crystalline rocks are 2000-3000 feet of Paleozoic sediments.[45] This sedimentary sequence contains several regional aquifers, to include the Deadwood Formation of Cambrian age, the Mississippian Madison Limestone and the Pennsylvanian/Permian-age Minnelusa Formation.[46] Mesozoic sediments include the Triassic age Spearfish Formation and the Sundance, Unkpapa and Morrison Formations of Jurassic age.[47]

The Early Cretaceous sediments of the Inyan Kara Group consist of the Lakota Formation and the Fall River Formation and is a transitional unit, exhibiting a change from terrestrial to marine deposition.[48] The basal Lakota Formation (Chilson Member) is a fluvial sequence, which grades upward into marginal marine sediments as the Cretaceous Seaway inundated a stable land surface.[49] Basal units of the Lakota Formation scour into clays of the underlying Morrison Formation and display the depositional nature of a large braided stream system, crossing a broad, flat coastal plain and flowing toward the northwest.[50] Younger fluvial sand units of the Lakota become progressively thinner and less continuous and are separated by thin deposits of overbank

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[43] TR §2.6.2.2.
[44] TR §2.6.1.2.
[45] Id.
[46] Id.
[47] Id.
[48] Id.
[49] Id.
[50] Id.

and flood plain silts and clays.[51]

At the top of the Lakota is the Fuson Member.[52] The Fuson consists of shale with minor beds of fine grained sandstone and siltstone.[53] The Fuson separates the underlying Lakota Formation from the overlying Fall River Formation.[54]

The Fall River consists of thick, widespread fluvial sands in the lower portion, grading to thinner, less continuous, marginal sands in the upper part.[55] The Cretaceous Lakota and Fall River Formations are the hosts of the roll front uranium mineralization in the Black Hills region and the focus of Applicant's proposed project.[56]

Mineralized sands within the project occur at depths of less than 100 feet in the outcrop area of Fall River Formation and at depths of up to 800 feet in the Lakota in the northwest part of the project.[57] This mineralization occurs in three sandstones in the Fall River Formation and within six sandstones of the Lakota Formation. The uranium mineralization occurs along a large "U" shaped trend that is five miles long and three to four miles wide. The average thickness of this mineralization has been calculated to be 6.1 feet and the average grade is 0.21 percent U308.

The PAA is in the Southern Black Hills, which includes two physiographic divisions that are characterized as the Black Hills and the Great Plains Divisions.[58] The Black Hills Division generally consists of steep formations of metamorphosed and intensely compacted sedimentary rocks, which form a perimeter around an intrusion of Precambrian igneous and

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[51] Id.
[52] Id.
[53] Id.
[54] Id.
[55] Id.
[56] Id.
[57] TR §2.6.3.
[58] TR §2.7.1.1.

crystalline rocks.[59] The sedimentary layers consist of aquifer formations that typically have high permeability, which allows for the transportation and storage of water.[60] Aquifers are usually separated by an aquitard layer that restricts the vertical transport of water from one aquifer to the next.[61] The aquifers generally receive a large amount of recharge from stream losses and infiltration.[62] The infiltration rates can vary greatly due to variations in slope and soil and can have a significant impact on the base flow of natural streams (Driscoll and others, 2002).[63] The streams generally have well-developed natural drainage areas that primarily flow from west to east (Driscoll and others, 2002).[64]

The PAA lies primarily within the Beaver Creek Basin and is drained by both Beaver Creek and Pass Creek.[65] The Pass Creek watershed is a sub-basin within the Beaver Creek basin, but the two watersheds were characterized as separate basins.[66] The Beaver Creek system flows through the northwestern section of the PAA from the northwest to the southeast.[67] The Pass Creek system flows south through the central portion of the PAA and joins Beaver Creek southwest of the PAA.[68] Three miles south of this confluence, Beaver Creek converges with the Cheyenne River (Figure 2.2-2) which eventually flows into the Missouri River.[69]

The Beaver Creek Basin is 1360 mi2, excluding the Pass Creek sub-basin.[70] It extends from a few miles northwest of Upton, WY to about eight miles southeast of

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[59] Id.
[60] Id.
[61] Id.
[62] Id.
[63] Id.
[64] Id.
[65] TR §2.7.1.3.
[66] Id.
[67] Id.
[68] Id.
[69] Id.
[70] TR §2.7.1.3.1.

Dewey, SD and lies within Weston, Niobrara and Crook Counties in Wyoming, and within Pennington, Custer and Fall River Counties in South Dakota. Beaver Creek is a perennial stream with ephemeral tributaries.[71]

The Pass Creek watershed, characterized as a subbasin of the larger Beaver Creek Basin, comprises most of the east-southeast portion of the Beaver Creek Basin and is almost fully contained in South Dakota.[72] The Pass Creek watershed is 230 mi2 and is located in Custer, Fall River, and Pennington Counties in South Dakota and a very small portion of Weston County in Wyoming. Pass Creek is dry except for brief periods of runoff following major storms.[73]

The northwestern section of the PAA drains to Beaver Creek via an intermittent tributary.[74] The north-central and east-central section of the PAA is drained via Pass Creek and smaller, ephemeral tributaries.[75] The southeast portion of the PAA is also part of the Cheyenne River Basin that drains into the Cheyenne River through East Bennett Canyon.[76] The PAA contains many intermittent streams and drainage channels, particularly in the eastern extent, that are consistently dry throughout the year.[77] Stream flow only occurs in these channels after significant precipitation or snowmelt events and even then may not be of considerable amounts.[78] Three small ephemeral stream channels cut through the primary facility zone in the eastern section of the PAA.[79] Most of the

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[71] Id.
[72] TR §2.7.1.3.2.
[73] Id.
[74] TR §2.7.1.3.3.
[75] Id.
[76] Id.
[77] Id.
[78] Id.
[79] Id.

small impoundments that exist within the PAA are dry during most of the year (Plate 2.5-1).[80] Many of these existing impoundments are found along ephemeral streams and tributaries, particularly in the eastern section of the PAA.[81]

Beaver Creek is the primary surface water resource in the PAA.[82] Applicant states that there will be no ISL operations within 0.4 miles of the Beaver Creek channel, with the exception of two very small areas of known ore bodies that may involve in situ leach well installations and associated piping (Figure 2.7-1).[83] Pass Creek is a secondary surface water resource in the PAA, although the channel is almost always dry.[84] There will be no in situ leach operations within 0.5 miles of the Pass Creek channel, with the exception of one small orebody that may involve in situ leach well installations and associated piping.[85] The remaining surface water resources in the PAA are small intermittent stream channels and small ponds which are used by livestock when water exists.[86]

The groundwater hydrology is influenced by distribution and variation in recharge, leakage between overlying and underlying hydrogeologic units, lateral flow within the aquifers, and discharge to pumping wells, artesian wells, and springs.[87] Regionally, the general direction of groundwater flow is downdip or radially away from the central part of the Black Hills where the aquifers are recharged via infiltration from local rainfall.[88] The aquifers transition from unconfined at the outcrop areas to confined away from the central highlands.[89] At some distance away from the highlands the groundwater often is under

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[80] Id.
[81] Id.
[82] TR §2.7.1.3.4.
[83] Id.
[84] Id.
[85] Id.
[86] Id.
[87] TR §2.7.2.1.
[88] Id.
[89] Id.

sufficient pressures for artesian conditions and flowing artesian wells to exist.[90] Table 2.7-13 shows hydraulic conductivity, transmissivity, and porosity between the affected aquifers.

The Inyan Kara Group is a very heterogeneous formation, which results in the two (2) aquifers exhibiting a large variation in local characteristics.[91] Regionally, the Inyan Kara exhibits a large effective porosity (0.17) and the aquifer can yield considerable water from storage (Driscoll et al., 2002).[92] Within the Black Hills, transmissivity of the Inyan Kara ranges from 1 to 6,000 ft2/day.[93] This high variability is an indication of the complex heterogeneity of the Inyan Kara formation.[94] The Inyan Kara is confined below by the Morrison Formation (50-100 ft thick) and above by Cretaceous Graneros Group shale.[95]

Because of the geologic variability across the Black Hills, it is extremely difficult to ascertain hydraulic connection between aquifers.[96] Interconnection between aquifers results from the thinning or absence of confining units between aquifers, which has been documented in local and regional geologic studies (Miller, 2005).[97] Analyses of regional aquifer tests conducted around the Black Hills provide direct evidence of aquifer interconnection.[98]

Applicant admits that breccia pipes serve as a path between the Minnelusa

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[90] Id.
[91] TR §2.7.2.1.2.
[92] Id.
[93] Id.
[94] Id.
[95] Id.
[96] See TR §2.7.2.1.7.
[97] TR §2.7.2.1.7.
[98] Id.

Formation and the Inyan Kara Group.[99] These breccia pipes are the result of dissolution of significant thicknesses of anhydrite from the upper Minnelusa and subsequent collapse.[100] The greatest concentration of these breccia pipes has been noted within a few miles of the outcrop, although groups of pipes can be concentrated along joints and may extend as "high in the stratigraphic section as the Lakota Formation" (Braddock, 1963).[101] Applicant states that researchers Gott, Wolcott, and Bowles (1974) believed that these breccia pipes allowed large quantities of water to migrate between the Minnelusa and Inyan Kara.[102] Applicant further states that it knows that the aquifers are unconfined near outcrops and that groundwater flow is radially outward from the central highlands towards the plains.[103]

The Black Hills are relatively arid with rainfall ranging from 12 to 28 inches per year in the area. Most precipitation can be accounted for as surface runoff or evapotranspiration.[104] Regionally, the percentage of precipitation that recharges the aquifers varies from 30 percent in the northwestern Black Hills to approximately 2 percent in the drier southwestern Black Hills.[105] Streamflow losses can contribute to aquifer recharge if connection between the stream and underlying aquifer exists.[106] Generally, surface water recharge to groundwater is limited to relatively shallow alluvial aquifers in relatively close proximity to the streams.[107] The exception to this rule occurs

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[99] Id.
[100] Id.
[101] Id.
[102] Id.
[103] TR §2.7.2.1.8.
[104] TR §2.7.2.1.9.
[105] Id.
[106] Id.
[107] Id.

in areas where karstic features provide preferential pathways for recharge into the subsurface.[108] Other sources of recharge to individual units can occur from leakage between units. Regionally, water elevations increase with depth, which provides an upward potential for ground-water flow.[109] This limits the potential for downward recharge.[110] Locally these flow head relationships can be reversed due to pumping of wells, thus creating localized zones where the potential for downward leakage exists.[111]

There are numerous springs throughout the Black Hills, including in the Madison and Minnelusa formations.[112] Where these streams cross aquifer outcrops along the eastern Black Hills they lose flow into the subsurface through sinkholes and re-emerge downstream in springs and wells (Rahn, 1971 and Long and Putnam, 2002).[113] In alluvial aquifers, flow is often exchanged between subsurface and surface water.[114] Many of the streams in the Black Hills are losing streams from which stream water infiltrates into the alluvial aquifers.[115] Streams also can be gaining streams, in which they have increased discharge due to inflow from an alluvial aquifer.[116]

In general, the Inyan Kara consists of interbedded sandstone, siltstone, and shale.[117] Applicant states that the Inyan Kara Group averages 350 feet thick.[118] The Fuson member of the Lakota, underlying the Fall River, varies in thickness from 40 to 70 feet.[119] Applicant expects (without reliable evidence) that the Fuson will be an effective interaquifer confining

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[108] Id.
[109] Id.
[110] Id.
[111] Id.
[112] TR §2.7.2.1.10.
[113] Id.
[114] Id.
[115] Id.
[116] Id.
[117] TR §2.7.2.2.5.
[118] Id.
[119] Id.

unit.[120] Applicant admits that results of aquifer tests at the PAA indicate that the Fuson Shale is not an effective barrier in some locations.[121] Applicant admits that it is possible that, "interaquifer connection here could result from as-yet-unidentified structural features or old open exploration holes".[122] Applicant states that the Inyan Kara is confined above by the Graneros Group, a thick sequence of dark shale that varies in thickness from zero (0) feet where the Inyan Kara crops out to more than 500 feet thick in the plains.[123] Applicant expects that the Graneros Group confining unit will prevent the vertical migration of water between the Inyan Kara and alluvial aquifers.[124] Applicant states that the Graneros Group is composed of several geologic formations including the Skull Creek, Newcastle, Mowry, and Belle Fourche but that Applicant expects the group acts as a single unit that confines the Inyan Kara aquifer.[125] In the PAA, the thickness of the Graneros is zero (0) at the outcrop but increases westward to more than 500 feet thick.[126]

Applicant states that alluvial aquifers in the vicinity of the project site consist of any saturated alluvial material along Pass Creek, Beaver Creek, and the Cheyenne River.[127] In general, the thickness of the alluvial material varies from zero (0) to 25 feet, although it can reach 40 feet.[128] The alluvial material is typically unconfined although localized areas of confinement may exist where weathered shale and other material has slumped on top of the alluvium.[129] Applicant states that the general pattern of groundwater flow is away from the highlands generally, but not exclusively,

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[120] See TR §2.7.2.2.5.
[121] Id.
[122] TR §2.7.2.2.5.
[123] Id.
[124] Id.
[125] TR §2.7.2.2.6.
[126] Id.
[127] TR §2.7.2.2.7.
[128] Id.
[129] Id.

southwestward.[130]

A major avenue for interchange is along the alluvium where Pass Creek crosses the Inyan Kara outcrop.[131] It is unknown to Applicant whether the alluvium may gain or lose flow to the underlying aquifer.[132] Applicant admits that there is currently no stream loss data for Pass Creek to quantify this interaction so it remains an unknown.[133]

Applicant also admits that it is unknown the extent and continuity of the shale interbeds in the Fall River Aquifer or whether they are sufficiently thick and continuous to serve as vertical confinement for ISL operations will need to be evaluated by analyzing cores from borings as well fields are drilled.[134]

Although the exact relationships between the breccia pipes and the Inyan Kara remains unknown, Applicant has stated that a a minor amount of communication between the Inyan Kara and underlying aquifers (including the Unkpapa, Sundance, and Minnelusa) may occur in yet undiscovered areas where the Morrison is thin or absent or along undiscovered breccia pipes.[135]

Applicant assumes that the Fuson member of the Lakota Formation will act as an effective interaquifer confining unit for the mined Inyan Kara Group.[136] Results of aquifer tests at the PAA indicate that the Fuson Shale is not an effective barrier in some locations (Boggs and Jenkins, 1980).[137] Locally unidentified structural features and/or old, unplugged exploration holes exacerbate this interaquifer connection.[138] The exact location

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[130] TR §2.7.2.2.8.
[131] TR §2.7.2.2.10.
[132] Id.
[133] Id.
[134] TR §2.7.2.2.15.2.
[135] TR §2.7.2.2.16.
[136] Id.
[137] Id.
[138] Id.

of these potentially unplugged holes is undeterminable.[139] Applicant states that flow from these open holes could potentially reach the ground surface.[140]

Applicant proposes to take its large requirement of water for its operations from a water supply well in the Madison formation.[141] Applicant states that it may need up to 500 gallons per minute (gpm) from the Madison Aquifer (500 x 60 x 24 x 365 = 262 million gallons drinking water per year).[142]

Applicant states that the PAA is within the Cheyenne River watershed.[143] Two main stream channels pass through the PAA: Beaver Creek (perennial) and Pass Creek (intermittent).[144] Both flow south into the Cheyenne River, which runs from west to east approximately 2.5 miles south of the PAA boundary.[145]

Pronghorn *(Antilocapra americana)* and mule deer *(Odocoileus hemionus)* are the only two big game species that regularly occur in the PAA, and both are considered year-round residents.[146] Elk *(Cervus elaphus)* and white-tailed deer ***(0. virginianus)*** are also present in the survey area, but only in small herds.[147] The latter two species can also be seen in the survey area year-round, but may be more common during different times of the year.[148] The pronghorn is the most common big game species in the project survey area, though no species is prevalent.[149] The pronghorn is a browse species and

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[139] Id.
[140] Id.
[141] TR §2.7.2.2.20.
[142] TR §2.7.2.2.21.
[143] TR §2.8.2.
[144] Id.
[145] Id.
[146] TR §2.8.5.4.2.
[147] Id.
[148] Id.
[149] Id.

sagebrush-obligate, using shrubs for both forage and cover (Fitzgerald et al. 1994).[150] Pronghorn herds were most often observed in sagebrush stands just beyond the north-central boundary of the PAA during winter 2007-2008.[151] Conversely, herds were widely distributed throughout grassland habitats in the northwestern and southeastern portions of the survey area during spring, summer, and early fall 2008.[152] In June, after the ground and water pools had dried up, water availability became a limiting factor and pronghorn began to move to, and concentrate around, more dependable water sources such as Beaver Creek and livestock tanks, and to draws with more succulent forage.[153]

Applicant states that radionuclide concentrations in sediment at downstream locations of Pass Creek (PSC02) and the Cheyenne River (CHR05) are elevated compared to upstream locations for the same surface water bodies indicating potential impacts from mineralized areas of the on and adjacent to the site.[154] Applicant also states that the measured values of Radon-222 at the PAA exceed the limits set in 10 CFR 20 for Radon-222 with daughters present.[155]

Applicant states that the groundwater contained within the ore zones of the Inyan Kara Group has concentrations of radionuclides that exceed EPA MCL concentrations.[156] Applicant also states that the aquifer does not presently and will not in the future serve as a source of drinking water.[157]

The License Application includes a byproduct 11e.(2) license for liquid process

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[150] Id.
[151] Id.
[152] Id.
[153] Id.
[154] TR §2.9.4.3.
[155] TR §2.9.5.3.
[156] TR §2.9.8.3.
[157] Id.

wastes, groundwater generated during aquifer restoration and affected groundwater generated during well development.[158]

Applicant states that consumption of groundwater and short-and long-term changes to groundwater are some of the groundwater impacts related to proposed project.[159] As for consumption, Applicant estimates that the drawdown of the Fall River Aquifer at the nearest domestic well will be between a low of 9.9 feet and a high of 42.8 feet during the first eight years under the ten-year License (if it is granted).[160] Applicant further estimates that the drawdown of the Lakota Formation at the nearest domestic well will be between a low of 4.9 feet and a high of 12.6 feet during such eight year period.[161] Applicant states in ER §7.4.3 that the use of groundwater supply for operations will be a temporary commitment of water resources.

Applicant has stated that it expects that the groundwater will be degraded in the Inyan Kara.[162] Applciant proposes to use gaseous oxygen and carbon dioxide lixiviant.[163] The interaction of the lixiviant with the mineral and chemical constituents of the aquifer results in an increase in trace elements (including toxic elements).[164] There is no conveyance of new constituent species from the recovery process into the groundwater.[165] The recovery process may however raise levels of specific constituents that are present within the ore bearing zone and host aquifer pre-operations.[166] The reduced, insoluble form of uranium present in the ore zone pre-operations is solubilized as a direct result of

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[158] TR §4.2.1.
[159] TR §7.2.5.
[160] TR §7.2.5.1.1.
[161] TR §7.2.5.1.2.
[162] TR §7.2.5.2.
[163] Id.
[164] See §7.2.5.2.
[165] Id.
[166] Id.

oxidation via the ISL process when oxidized uranium is introduced to bicarbonate anions and become mobile for extraction.[167] This is the most noticeable impact to the groundwater as a direct result of the ISL process.[168] Although other trace constituents are mobilized during the ISL process, the concentrations of these constituents are dependent upon the specific mineralogy.[169] Applicant states at ER §4.6.2.2 that the interaction of the lixiviant with the mineral constituents of the ore zone results in an a measurable increase in trace elements and primary constituents of sulfate, chloride, cations and TDS above pre production levels.

Leach fluid excursions have the potential to contaminate adjacent aquifers with radioactive and trace elements that have been mobilized during the ISL process.[170] There are two types of excursions: vertical and horizontal.[171] A vertical excursion is movement of solution into overlying or underlying aquifers.[172] A horizontal excursion is a lateral movement of leach fluids outside the production zone of the orebody aquifer.[173] Horizontal and vertical lixiviant excursions have the potential to contaminate the groundwater in the production aquifer or the overlying or underlying aquifers.[174] Applicant admits that the potential impacts of horizontal and vertical excursion could be significant.[175]

Applicant states in the Environmental Report that it is aware of at least 73 private wells near the PAA.[176] Wells within 2 km of the PAA include 24 wells known to obtain water from the Fall River Formation (part of the host Inyan Kara), with 12 of these wells

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[167] Id.
[168] Id.
[169] Id.
[170] TR §7.2.5.3.
[171] Id.
[172] Id.
[173] Id.
[174] TR §7.5.2.
[175] Id.
[176] See ER §3.4.1.2.

being flowing artesian wells.[177] Within this same 2 km radius, there are 39 wells currently obtaining water from the Lakota Formation (part of the host Inyan Kara), 14 of which are flowing artesian.[178] Additionally, 10 wells are completed within an unknown formation of the Inyan Kara aquifer (Fall River, Lakota, or both).[179] The total estimated flow from the Inyan Kara (including wells screened within the Fall River, Lakota, or both) within 2 km of the PAA is approximately 70 gpm.[180]

Applicant is aware of the cumulative impacts of other uranium projects in the same area.[181] Applicant states that uranium was first discovered near Edgemont in 1951 and subsequently was mined for a number of years using conventional surface mining methods.[182] ER Figure 6.1-4 shows Gamma-Ray Count Rates for the PAA including very high rates of more than 50,000 CPM in areas of old open pit uranium mining.[183] Applicant states that gamma-ray count rates reached a high of 460,485 CPM in un-reclaimed open pit uranium mines in the PAA.[184] Applicant further states that it is clear that the surface mine area in the eastern quarter of the site exhibits radiological impacts from historic and/or current anthropogenic activities within the area.[185] Applicant states that the potential radiological impacts due to the project during operation are small.[186]

Applicants states that the project should present Custer and Fall River counties with

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[177] ER §3.4.1.2.
[178] Id.
[179] Id.
[180] Id.
[181] See ER §4.16.1.
[182] Id.
[183] ER §6.1.2.2.1
[184] Id.
[185] Id.
[186] ER §7.4.4.

net positive gain when compared to the no action alternative.[187] Applicant estimates $186 million in value added and states but does not quantify in dollar terms the estimated costs.[188] ER Table 8.1-1 describes the impact to groundwater due to degradation as a "slight alteration of ore zone groundwater" and estimates net consumption of 320 gpm (320 x 60 x 24 x 365 = 168 million gallons per year) without counting the 500 gpm that might be taken from the Madison Aquifer as discussed above.

Intervention Requested

Intervention is requested in addition to a request for a hearing. If the petition for leave to intervene as a matter of right is denied, then this request includes a request to be allowed discretionary intervention under Section 2.309(d).

Description of Each Requestor/Petitioner[189]

A. Individuals

Theodore P. Ebert: Hot Springs, South Dakota. Mr. Ebert is a member of Aligning for Responsible Mining. He uses water for personal, household, domestic purposes, including gardening, bathing, and drinking. His water is Hot Springs tap water which comes from the Madison Aquifer. He has lived in Fall River County for nine years and during that time, the water in Edgemont has worsened in terms of cloudiness and order. Mr. Ebert's Declaration states his address and is filed herewith.

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[187] ER §7.5.
[188] ER Table 7.5-1.
[189] The address and phone number of each requestor/petitioner is set forth on his, her or its Declaration, filed with this Petition, and incorporated herein by this reference as if fully set forth at length herein.

David Frankel: Buffalo Gap, South Dakota. Mr. Frankel is a member of Aligning for Responsible Mining. He uses water for personal, household, domestic purposes, including gardening, bathing, and drinking. He uses water from the well at his residence at 101 Walnut Street, Buffalo Gap, SD, for gardening. He also uses tap water which comes from the Fall River Water District and which comes from the Madison Aquifer. He has lived in Custer County for two years. Mr. Frankel's Declaration states his address and is filed herewith.

Gary Heckenlaible: Rapid City, South Dakota. Mr. Heckenlaible is a member of Aligning for Responsible Mining. He uses water for personal, household, domestic purposes, including gardening, bathing, and drinking. His water is Rapid City tap water which comes from the Madison Aquifer. Mr. Heckenlaible's Declaration states his address and is filed herewith.

Susan Henderson: Edgemont, South Dakota. Ms. Henderson is a member of the Clean Water Alliance. Ms. Henderson owns and operates a 8,160 acre deeded Dora R. Henderson Ranch (Estate) in the western part of Fall River County, South Dakota. Ms. Henderson uses well water from the Lakota Sandstone aquifer for her residence and her cattle operation. Ms. Henderson also buys water for livestock use which comes from the Madison Aquifer. Ms. Henderson also has a deep-sourced spring on her Ranch. Ms. Henderson states that she will be put out of business and deprived of her livelihood in the event that any of the above-referenced water resources on which she and her Ranch rely were to become contaminated due to Applicant's proposed

operations. Ms. Henderson states that a portion of the Inyan Kara formation proposed to be mined flows first southwest from the PAA and then flows eastward around the southern boundary of the Black Hills which would include her residence and her Ranch. Ms. Henderson is also concerned about potential natural inter-mixing of aquifers from the minding areas due to fracturing in the rock as well as potential contamination from old abandoned uranium mines that might be mobilized by Applicant's proposed mining. Ms. Henderson is concerned that the older uranium mining projects and open pits together with the fractured nature of the rock in the area are causing intermixing and contamination of the aquifers. Ms. Henderson states that the harm to the communities surrounding the PAA would be catastrophic if the water supplies are contaminated which would include harms to tourism and ranching businesses. Ms. Henderson's Declaration states her address and is filed herewith.

Dayton Hyde: Hot Springs, South Dakota. Mr. Hyde is a member of the Clean Water Alliance. Mr. Hyde is a cowboy author, World War II combat veteran and founder of the Black Hills Wild Horse Sanctuary which consists of several thousand acres and is home to America's largest wild horse herd with over 500 wild horses including American Spanish Mustangs, Sulphur and Kiger Mustangs, herds from State Governments, Bureau of Land Management, and the US Forest Service. Mr. Hyde's personal website is: www.daytonohyde.com and the Black Hills Wild Horse Sanctuary website is www.wildmustangs.com. Mr. Hyde has lived on the Sanctuary property for 22 years and uses water for personal, household, irrigation, ranching and gardening purposes. At that time, Mr. Hyde was recruited by then Governor George Mickelson to

take over stewardship of the land and create the Wild Horse Sanctuary. The Sanctuary is a major tourist attraction and Hollywood movie set (used for *Hidalgo* which brought over $2,000,000 to the community). The Sanctuary land is protected by a Conservation Easement (in favor of The Nature Conservancy) which forbids environmentally harmful activities on the land. The Cheyenne River flows through the Sanctuary and is the primary water source for the wild horses, domestic horses, cattle and wildlife on the Sanctuary's land. The Sanctuary's 11,000 acres are also watered by five (5) wells in the Inyan Kara aquifer. If the water becomes contaminated, the Sanctuary will have no way of watering the horses. The Sanctuary land is downstream from Beaver Creek and Pass Creek; therefore it is subject to contamination in the event of any spills, leaks or excursions. Mr. Hyde's Declaration states his address and is filed herewith.

Lilias C. Jones Jarding, Ph.D.: Rapid City, South Dakota. Ms. Jarding is a member of the Clean Water Alliance. She uses water for personal, household, domestic purposes, including gardening, bathing, and drinking. Her water is Rapid City tap water which comes from the Madison Aquifer. Ms. Jarding is concerned that Applicant will consume 2,243 million gallons of water from the Madison Aquifer which represents a substantial withdrawal from the aquifer upon which she relies. She also notes that her water also comes from the Mennelusa which is hydrologically connected to the Madison. Ms. Jarding is concerned that a drawdown on the Madison would also lead to a drawdown on the Minnelusa. She is concerned that the well-being of her family, property, animals and herself would be negatively impacted by Applicant's proposed operation. Ms. Jarding also submits the summary "Geology and Hydrology in Uranium

Areas in the Southern Black Hills" (January 2010) ("Black Hills Geology Summary"), which is filed herewith and incorporated herein by this reference as if fully set forth at length. Ms. Jarding's Declaration states her address and is filed herewith.

B. Organizations

Aligning for Responsible Mining ("ARM"), by David Frankel, Legal Director: Aligning for Responsible Mining is an NGO based at Pine Ridge Indian Reservation founded to prevent abusive mining which is mining that does not comply with the International Precautionary Principle. ARM members Mr. Ebert, Mr. Frankel and Mr. Heckenlaible are individual petitioners in this proceeding. Mr. Frankel's Declaration on behalf of ARM states ARM's address and is filed herewith.

Clean Water Alliance, by Lilias Jarding, Ph.D, Executive Director: Clean Water Alliance ("CWA"), is a South Dakota nonprofit which was formed in 2009 to protect the natural resources of the Black Hills of South Dakota with a focus on groundwater contamination from uranium mining. CWA members Dayton Hyde and Susan Henderson live very close to the proposed mine operations and CWA member Lilias Jarding each expect direct negative impacts on their respective water supplies from the proposed operation. Ms. Jarding's Declaration on behalf of CWA states its address and is filed herewith.

EXPERTS, SUPPORTING DOCUMENTS AND REFERENCES

The following documents, articles and information are hereby incorporated by reference as if set forth at length herein:

1. Expert Opinions.

(a) Opinion of Dr. Hannan LaGarry, March 8, 2010 ("LaGarry Opinion"), which is incorporated herein by this reference as if fully set forth at length

herein.

(b) Opinion of Dr. Robert Moran, February 23, 2010 ("Moran Opinion"), which is incorporated herein by this reference as if fully set forth at length herein.

2. References.

Torrell, L., et. al., The Market Value of Water in the Ogallala Aquifer, 66 Land Economics 2d 163 (1990) ADAMS ML080080390, incorporated herein by this reference as if fully set forth at length hereat.

APPLICABLE LAW

The Atomic Energy Act of 1954, as amended ("AEA") expressly provides that "the Congress of the United States hereby makes the following findings concerning the development, use and control of atomic energy:….[t]he development, utilization, and control of atomic energy for military and for all other purposes are vital to the common defense and security, [t]he processing and utilization of source material must be regulated in the national interest and in order to provide for the common defense and security and to protect the health and safety of the public, and [s]ource and special nuclear material, production facilities, and utilization facilities are affected with the public interest, and regulation by the United States of the production and utilization of atomic energy and of the facilities used in connection therewith is necessary in the national interest to assure the common defense and security and to protect the health and safety of the public. AEA Section 2012(a), (c)(d)(e); 42 USC §2012.

Significantly, the national interest and common defense aspects include protecting the health and safety of the public, including the environment and water resources. "The Atomic Energy Act was passed years before broader environmental concerns prompted

enactment of the National Environmental Protection Act ("NEPA"). Yet many of those same concerns permeated provisions of the first-mentioned legislation and the regulations promulgated in accordance with its mandate. To say that these must be regarded independently of the constantly increasing consciousness of environmental risks reflected in proceedings with reference to NEPA, would make for neither practicality nor sense. Nor can AEA requirements be viewed separate and apart from NEPA considerations. Especially in view of NEPA, it also is unreasonable to suppose that risks are automatically acceptable, and may be imposed upon the public by virtue of AEA, merely because operation of a facility will conform to the Commission's basic health and safety standards. The weighing of risks against benefits in view of the circumstances of particular projects is required by NEPA in view of AEA. The two statutes and the regulations promulgated under each must be viewed in *para material.* Citizens for Safe Power, Inc. v. NRC, 524 F.2d 1291, 1299 (DC Cir. 1975).

AEA Section 61 provides that the Commission may make certain determinations concerning source material provided that before making such determination, the Commission must "find that the determination that such material is source material is in the interest of the common defense and security. 42 USC 2091. AEA Section 62 provides that "no person may transfer or receive in interstate commerce, transfer, deliver, receive possession of or title to, or import into or export from the United States any source material after removal from its place of deposit in nature. 42 USC 2092. AEA Section 69 provides that **"[t]he Commission shall not license any person to transfer or deliver, receive possession of or title to, or import into or export from the United**

States any source material if, in the opinion of the Commission, the issuance of a license to such person for such purpose would be inimical to the common defense and security or the health and safety of the public. 42 USC 2099 (emphasis added).

In order to obtain a source materials license from the NRC, an applicant must file a license application under AEA Section 182. 42 USC 2232. Each application shall be in writing and "shall specifically state such information as the Commission, by rule or regulation, may determine to be necessary to decide such of the technical and financial qualifications of the applicant, the character of the applicant, **the citizenship of the applicant**, or any other qualifications of the applicant as the Commission may deem appropriate for the license. Id. (emphasis added.)

NRC Regulation Section 40.9 provides that all information provided to the Commission by Applicant shall be complete and accurate in "all material respects" which can be read to mean that the Applicant has disclosed all information that a reasonably prudent regulator would consider important in making a licensing decision.[190] Further, Section 40.9(b) requires Applicant to notify the Commission if Applicant has identified information having a significant implication for public health and safety or common defense and security.

[190] Rules for establishing materiality under federal law are well-established by the Supreme Court under the securities laws, see TSC Industries, Inc. v. Northway, Inc., 426 U.S. 438 (1976), concluding in the proxy-solicitation context that "[a]n omitted fact is material if there is a substantial likelihood that a reasonable shareholder would consider it important in deciding how to vote." Id., at 449. Acknowledging that certain information concerning corporate developments could well be of "dubious significance," id., at 448, 96, the Court was careful not to set too low a standard of materiality; it was concerned that a minimal standard might bring an overabundance of information within its reach, and lead management "simply to bury the shareholders in an avalanche of trivial information-a result that is hardly conducive to informed decisionmaking." Id., at 448-449. It further explained that to fulfill the materiality requirement "there must be a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the 'total mix' of information made available." *Id.*, at 449. We now expressly adopt the TSC Industries standard of materiality for the § 10(b) and Rule 10b-5 context. Basic Inc. v. Levinson, 485 US 224, 231-232 (1988).

Once the Commission has received full disclosure in an application, it may approve the sought after source materials license in accordance with Section 40.32 if: (a) The application is for a purpose authorized by the Act; (b) The applicant is qualified by reason of training and experience to use the source material for the purpose requested in such manner as to protect health and minimize danger to life or property; (c) The applicant's proposed equipment, facilities and procedures are adequate to protect health and minimize danger to life or property; and (d) **The issuance of the license will not be inimical to the common defense and security or to the health and safety of the public.** 10 CFR 40.32 (emphasis added.)

NRC Regulations Section 51.60 requires that Applicant prepare and submit an environmental report which contains the information specified in NRC Regulations Section 51.45:

> 51.45 – (b) *Environmental considerations*. The environmental report shall contain a description of the proposed action, a statement of its purposes, a description of the environment affected, and discuss the following considerations:
>
> (1) The impact of the proposed action on the environment. Impacts shall be discussed in proportion to their significance;
>
> (2) Any adverse environmental effects which cannot be avoided should the proposal be implemented;
>
> (3) Alternatives to the proposed action. The discussion of alternatives shall be sufficiently complete to aid the Commission in developing and exploring, pursuant to section 102(2)(E) of NEPA, "appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." To the extent practicable, the environmental impacts of the proposal and the alternatives should be presented in comparative form;
>
> (4) The relationship between local short-term uses of man's environment

and the maintenance and enhancement of long-term productivity; and

(5) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

(c) *Analysis*. The environmental report must include an analysis that considers and balances the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse environmental effects…. The analyses for environmental reports shall, to the fullest extent practicable, quantify the various factors considered. To the extent that there are important qualitative considerations or factors that cannot be quantified, those considerations or factors shall be discussed in qualitative terms. The environmental report should contain sufficient data to aid the Commission in its development of an independent analysis.

***

(e) *Adverse information*. The information submitted pursuant to paragraphs (b) through (d) of this section should not be confined to information supporting the proposed action but should also include adverse information.

Further, in order for the Application to be complete, it must comply with Part 40, Appendix A which provides, among other things, that:

10 CFR Part 40 Appendix A, Criterion 5(B)(3)(a)(iii) – quantity of ground water and direction of ground-water flow; (iv) proximity and withdrawal rates of ground-water users; (vi) existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality; and (ix) The persistence and permanence of the potential adverse effects.

***

Criterion 5(B)(3)(b)(iii) The quantity and quality of ground water, and the direction of ground-water flow;

(iv) The patterns of rainfall in the region;

(v) The proximity of the licensed site to surface waters;

(vi) The current and future uses of surface waters in the area and any water

quality standards established for those surface waters;

(vii) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality;

(viii) The potential for health risks caused by human exposure to waste constituents;

(ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and

(x) The persistence and permanence of the potential adverse effects.

Criterion 5B(6)(a) Potential adverse effects on ground-water quality, considering--

(i) The physical and chemical characteristics of the waste in the licensed site including its potential for migration;

(ii) The hydrogeological characteristics of the facility and surrounding land;

(iii) The quantity of ground water and the direction of ground-water flow;

(iv) The proximity and withdrawal rates of ground-water users;

(v) The current and future uses of ground water in the area;

(vi) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;

(vii) The potential for health risks caused by human exposure to waste constituents;

(viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;

(ix) The persistence and permanence of the potential adverse effects.

(b) Potential adverse effects on hydraulically-connected surface water quality, considering--

(i) The volume and physical and chemical characteristics of the waste in the licensed site;

(ii) The hydrogeological characteristics of the facility and surrounding land;

(iii) The quantity and quality of ground water, and the direction of ground-water flow;

(iv) The patterns of rainfall in the region;

(v) The proximity of the licensed site to surface waters; (vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;

(vii) The existing quality of surface water including other sources of contamination and the cumulative impact on surface water quality;

(viii) The potential for health risks caused by human exposure to waste constituents;

(ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and

(x) The persistence and permanence of the potential adverse effects.

CONTENTIONS

Contention A: The Application does not accurately describe the environment affected by its proposed mining operations or the extent of its impact on the environment as a result of its use and potential contamination of water resources, through mixing of contaminated groundwater in the mined aquifer with water in surrounding aquifers and drainage of contaminated water into the Cheyenne River.

Contention B: Applicant's proposed mining operations will use and contaminate water resources, resulting in harm to public health and safety, through mixing of contaminated groundwater in the mined aquifer with water in surrounding aquifers and drainage of contaminated water into the Cheyenne River.

Contention C: Cost Benefits as discussed in the Application fail to include economic value of environmental benefits. Section 51.45(c) requires "to the extent that there are important qualitative considerations or factors that cannot be quantified, those considerations or factors shall be discussed in qualitative terms." The Application does not contain any quantification of the negative impacts predicted and estimated by Applicant and mentioned in the Application such as the value of the millions of gallons of water that will be taken from the Inyan Kara and Madison Aquifers; and the loss in real property values from aquifer drawdowns (see Torrell, infra). A University of Adelaide study has put an economic value on the wetlands of the River Murray, highlighting the ramifications of cutting off water flows in times of drought. The study has concluded that every hectare of permanent wetland provides more than $7,000 worth of water purification each year.

http://www.adelaide.edu.au/adelaidean/issues/23221/news23241.html

According to one assessment of natural ecosystems, the dollar value of wetlands worldwide was estimated to be $14.9 trillion. (Source: Costanza et al. 1997). See also Economic Benefits of Wetlands, EPA 843-F-06-004, Office of Water (May 2006), and Economic Reasons for Conserving Wild Nature, Science Vol. 297 (August 9, 2002), www.sciencemag.org. Therefore, it is possible to quantify the qualitative considerations involved with negative impacts to the groundwater, surface water, Beaver Creek, Pass Creek and Cheyenne River and the Application fails to conform to that requirement of Section 51.45(c).

Contention D: Section 51.45(e) requires disclosure of adverse information.

Section 40.9 requires disclosure of all material facts and that the Application be complete. As described in the LaGarry Opinion and the Moran Opinion, the Application fails to disclose all required information in a comprehensible manner.

As the Moran Opinion states:

> After reviewing a large portion of the approximately 6000 pages of relevant documents [Technical Report is 3103 pg.; Environmental Report is 2615 pg.; Supplement is 66 pg.], ***I find it is not possible to provide a meaningful expert review and technical comment on the adequacy of the documents within the time provided because they are quite disorganized, often with little consistency between the various documents, and frequently presenting information and interpretations in a technically inadequate manner.*** More importantly, the reports fail to provide the most important information necessary to commenting intelligently on these matters. Further details are presented below.

Therefore, the Application violates Section 40.9 by being disorganized, and violates Section 51.45(c)'s requirement concerning analytical content as Dr. Moran opines that the Application presents information and interpretations in a technically inadequate manner. Dr. Moran continues in his Opinion that:

> With respect to details as to the difficulty in review caused by the manner in which the application materials have been prepared, Tables 2.7-27, 28 and 29 of TR (pg. 2-198-199) serve as representative examples of the poorly-written, confusing nature of these documents. Because their titles are so inadequate, [i.e.,Table 2.7-27: Quarterly Sampled Groundwater Quality Well Data; Table 2.7-29: Additional Well Data] the reader has no way of knowing what sampling dates are represented. The total depths and screened intervals for many of the wells listed in Table 2.7-27 are not known. Hence, how can the reader reasonably interpret their usefulness?
>
> Frequently the text will refer to a specific table or figure, but when the reader goes to that table or figure, it is not the one referred to. A typical example can be found on pg. 2-199 of the TR, where the text refers to Table 2.7-29, when in fact it is discussing Table 2.7-30. Such mistakes are common in these Application documents and are quite confusing to the reader.

No coordinated, statistically-sound data set for **all** Baseline Water Quality (both surface and ground water) is presented in these documents—as is required in NURGEG--1569. For example, on pg. 2-14 and 2-15 of the Technical Report (TR), Sect. 2.2.3.2.2., Powertech states: "At the project site, baseline groundwater sampling was conducted in general (sic) accordance with NRC Regulatory Guide 4.14 (NRC, 1980). … A summary of the results and methods for the groundwater quality monitoring program, as well as the historical TVA data, is presented in Section 2.7." However, when the reader goes to Section 2.7, there are no tables that actually summarize, statistically, complete baseline field and lab water quality data for the complete data sets—both historic and recent. Instead, for ground waters, Powertech presents statistics for field data from individual wells or selected aquifers, but fails to statistically-summarize the laboratory data and leaves out the historic TVA data. Powertech then states (TR, pg. 2-203): "Complete groundwater quality data results are available in Appendix 2.7-G." However, on pg. 2-205 (Sect. 2.7.3.2.2.2, Results for Laboratory Parameters) Powertech then states: "Summary statistics for baseline monitoring program laboratory samples are contained in Appendices 2.7-H and 2.7-I. Appendix 2.7-H **gives statistics for all groundwater constituents detected at or above PQL by constituent.** " Thus, it appears that Powertech has not included "qualified values," that is data reported as "less than" some concentration. By deleting the "less than" values, Powertech has severely biased the data set, rendering it useless as a reliable source for evaluating baseline conditions.

Furthermore, Powertech states (TR, pg. 2-217-218) that they have arbitrarily selected some analyses from the voluminous, historic TVA data, but the reviewer is never allowed to see a statistical summary of the total original data set. Portions of the relevant data are scattered throughout the Appendices of the various documents, and disingenuously organized to leave out all baseline data that had concentrations reported below the detection limits (i.e. "less than" values). Obviously, this approach biases the data. Powertech must statistically summarize all historic water quality data and all recently collected data in separate tables, including all "less than values." Both historic and recent baseline data should be segregated by water-bearing unit.

To further confuse the baseline issues, Powertech's Supplement to the Application (August 2009) states on pg. 3-3: "A minimum of eight baseline water quality wells will be installed in the ore zone in the planned well field area." Thus the massive amounts of water quality data (historic and recent) presented in both the TR and ER (Environmental Report) will not actually be used to determine baseline. More importantly, it is unclear

whether Powertech has baseline (pre-operational) ground water quality data that describes the **non-ore zone regions of the relevant aquifers.**

Dr. LaGarry's Opinion indicates a violation of Section 51.45 and also of Criterion 5B of Appendix A of Part 40 by failing to adequately describe confinement of the host aquifer, fails to analyze properly secondary porosity in the form of faults and joints, artesian flow, and horizontal flow of water within the uranium-bearing strata. Dr. LaGarry found the Environmental Report to be poorly referenced, especially concerning the geology – in violation of Appendix A. Dr. LaGarry opines:

> **The problem of artesian flow**
>
> Artesian flow occurs when there is a hydrologic connection, through faults or highly permeable strata, between groundwater sources and the land surface. The weight of water in overlying strata exerts pressure downward into water within the uranium-bearing strata, which can then be released as artesian water flow where the topographically lower uranium-bearing strata is exposed at the surface, or where it is punctured by drilling. Artesian flow was observed or predicted by Powertech in their Dewey-Burdock Project proposal (sections 3.4.1.2, 3.4.3.1, and 3.4.3.1.7). Artesian flow is most likely where the upper confining layer is perforated by secondary porosity (section 3.3.2.1), poorly constructed or improperly sealed exploration wells (sections 3.3.2 and 3.4.1.2), or thinning or absence of upper confining layers (section 3.4.3.1.7). Artesian flow could transmit lixiviant, the most toxic mineral-laden of waters, onto the land surface (and into Cheyenne River, White River, or Hat Creek alluvium) and discharge large amounts of contaminants into aquifers or faults in a very short time.
>
> **The problem of horizontal flow**
>
> Confining layers adjacent to uranium-bearing strata limit the unwanted spread of contaminants from an ISL site. However, horizontal flows within the uranium-bearing strata are also of concern. Such flow can rapidly redirect lixiviant or mine waste away from the mine site and into unexpected breaches in the confining layers. In their application to the NRC, Powertech reports horizontal flows within the uranium-bearing strata (the Inyan Kara Group) of up to 35.5 meters/day (Chilson Member, section 3.3.2.2) based on local conditions, and of up to 6,000 ft^2/day (section 3.4.3.1.2) elsewhere in the Black Hills region. Even if secondary

> porosity, artesian flow, or lack of confinement did not contaminate nearby water supplies, down gradient flow along the Cascade and Chilson anticlines (Rothrock 1931a, 1931b, 1948) would transmit contaminants to the major, mapped faults north of the Pine Ridge in Nebraska in less than 5 years (using the smaller value).

Failure to include these analyses violates Section 51.45, especially subsection (c) and (e) thereof.

Contention E: The License may not be granted because it would violate Section 40.32(d) because of lack of adequate confinement of the host Inyan Kara aquifer, the proposed operation would be inimical to public health and safety in violation of the AEA and NRC Regulations cited above in the "Applicable Law" section. Dr. LaGarry opnions that:

> **The problem of lack of confinement**
>
> In order for ISL mining to be considered safe, the uranium-bearing, mined strata must be isolated from rocks above and below by confining layers. There are three principal pathways through which contaminated water could migrate away from the uranium-bearing strata through adjacent confining layers. The first, and most common, are along joints and faults (see above). Where present, joints and faults penetrate confining layers above and below. The second is through thinning or pinching out of confining layers. In their application to the NRC, Powertech concedes that the upper confining layers thin and there are breaches in the upper confining layers (sections 3.3.2.2, 3.4.3.1.7, 3.4.3.1.10, and 3.4.3.2). The third pathway for mine fluids to breach containment is through perforations made by wells. In Powertech's application, they repeatedly mention "thousands of exploratory wells," along with wells that supply drinking water (the uranium-bearing strata are a local drinking water supply) and water for livestock. In addition, many of these wells are abandoned and most likely improperly plugged (section 3.4.1.2). Once mining begins, and minerals are being extracted, flow pathways within the uranium-bearing rocks will change, potentially creating circumstances in which any one of these wells could allow lixiviant to breach confinement. Once into adjacent water-bearing strata or the land surface, contaminants can enter rivers and flow downstream with each successive rain event, or flow downgradient into other water supplies.

As described in the LaGarry Opinion, the Application states that the upper confining layers are thin and there are breaches in the upper confining layers. Also, the Application states that so much is unknown about the area and its hydrology, and the inter-connection between the aquifers that it is not possible to provide assurance that the confinement will be adequate to protect public health and safety. Therefore, the License may not be issued and must be denied under Section 40.32(d).

Contention F: The Application violates Section 51.45(c), (e) and 51.45(b)(5) by failure to describe irretrievable commitment of resources in the form of water resources taken from the Inyan Kara and Madison Aquifers in the form of the 'bleed' and in connection with restoration which involves 320 gpm from the Inyan Kara and up to 500 gpm from the Madison, as described in the Application and referenced in this Petition above.

Contention G: The Application violates Section 51.45(c) and (e) by failing in ER Section 1.3 to explain the details involved and exposures related to Applicant's proposal to "receive and process uranium loaded resins from other Proposed Projects such as Powertech's nearby Aladdin and Dewey Terrace Proposed Satellite Facility Projects planned in Wyoming or from other licensed ISL operators or other licensed facilities generating uranium-loaded resins." This has obvious ramifications for the entire proposal. The rest of the ER and Supplement talk only about the impacts of transporting and processing uranium from the Dewey-Burdock sites. If resins are to be accepted from an unknown number of other mines, then Applicant must provide all plans and information for those ores and for their processing before a permit is issued. How

much nuclear material will be handled at the Dewey-Burdock site? How much water will be used? How will wastes be disposed – apparently wastes many times larger than those considered in the Application? Will additional ponds, wells, land for application, or processing facilities be needed? What will be the impacts of the additional traffic? And so forth. Clearly, new Technical and Environmental Applications are needed. Regulators must address these questions before any further action is taken on this Application.

Contention H: Section 51.45(c) and (e) is violated because in the Application Section 3.4.3.1.7 ER on hydraulic connection of aquifers, the Applicant provides information that is not local and fails to include studies that are closer to the proposed project area.

Contention I: Section 51.45(c) and (e), Appendix A of Part 40 are violated because Applicant failed to provide:

(1) a coordinated, statistically-sound data set for **all** Baseline Water Quality (both surface and ground water) is presented in these documents—as is required in NURGEG--1569. Powertech states that they have arbitrarily selected some analyses from the voluminous, historic TVA data, but the reviewer is never allowed to see a statistical summary of the total original data set. Portions of the relevant data are scattered throughout the Appendices of the various documents, and disingenuously organized to leave out all baseline data that had concentrations reported below the detection limits (i.e. "less than" values). Obviously, this approach biases the data. *Powertech must statistically summarize*

all historic water quality data and all recently collected data in separate tables, including all "less than values". Both historic and recent baseline data should be segregated by water-bearing unit. Failure to do so violates the above-referenced NRC Regulations. The Dewey-Burdock project area has been historically mined and thousands of exploration holes have been drilled within the properties. Hence, it is imperative that high-quality baseline data be supplied to evaluate the actual extent of impacts to water resources, and the success of containment or aquifer restoration.

(2) detailed data on the chemical composition of pregnant solutions (ore reacted with lixiviant) and detailed analyses of these waters following ion exchange. Mining projects that have progressed to this stage routinely conduct Feasibility Studies and release Feasibility Reports that contain such chemical data. For example, a review of the D-B properties by Smith & Assoc. (2005) mentions that such a Feasibility study was performed for TVA. Leaching of such ores traditionally mobilizes elevated concentrations of many metals and metalloids, plus other constituents: i.e. arsenic, antimony, molybdenum, vanadium, uranium, strontium, iron, manganese, lead, lithium, nickel, chromium, sulfate, chloride, etc. Reliable, complete baseline data are crucial for understanding the chemistry of potential releases to the environment.

(3) detailed data on the chemical composition of liquid wastes that may undergo deep well injection and / or land application. Such data should also be available in Feasibility

Studies.

(4) a realistic description and evaluation of possible water-related impacts, as contemplated by Criterion 5B of Appendix A of Part 40. It is unlikely that the process waters can be contained within the project boundaries given all of the evidence of:

-- thousands of exploration boreholes drilled since the 1950's, many of which were not correctly abandoned;

--hydrogeologic leakage between the ore-bearing formations;

--faults / fractures acting as potential pathways;

--geologic facies inter-connections;

--vertical "breccia pipes" and collapse structures;

--diapir structures?

--historic mine workings as flow pathways.

(5) a rational and analytic discussion of site fluid containment using current research literature.

(6) realistic estimates of water resources to be irretrievably committed as required by Section 51.45(b)(5); rather, the Environmental Report unreasonably minimizes the potential project water impacts [p.8-2], where they estimate that net ground water consumption will be 320 gpm, which is **168.2 gals. per year**. After the anticipated life-of-mine, 17 years, net ground water consumption would equal roughly **2.86 Billion gallons**. (Emphasis added.)

(7) The discussion of geological "formations of interest" at the Dewey-Burdock site

excludes the Madison and Minnelusa Aquifers, which would be used for large amounts of project water (Section 3.3.2.2 ER).

(8) The potential impacts of the presence of 26 flowing artesian wells on the proposed project or the environment are not discussed (Section 3.4.1.2 ER).

(9) In Section 3.4.2.2 ER, the applicant discusses surface water quality. This discussion includes only the State of South Dakota's Beneficial Use Numeric Criteria. It neglects to discuss known contamination from past uranium activities in the area, including radioactive contamination of the Cheyenne River.

(10) Section 3.4.3.1.3 ER provides a limited discussion of porosity in the Minnelusa Aquifer. The sources provided in Table 3.4-3 include only one local piece of research. Sources are available that discuss this issue closer to the project area.

(11) In Section 3.4.3.1.7 ER on hydraulic connection of aquifers, the Applicant provides information that is not local and fails to include studies that are closer to the proposed project area.

(12) The Applicant assumes that its workforce will be local, thus minimizing housing impacts (Section 4.12.3 ER). To be valid, this assumption should be tied to some sort of research. Is a population that is generally older, majority 12^{th} grade education, and characterized by government employment suited to mining?

(13) The Applicant ignores critical environmental justice issues in Section 4.13 ER. The Black Hills region is home to the Lakota (western Sioux) people, who have ongoing treaty rights and cultural/historical interests in the area. To the Lakota, the Black Hills are sacred, and mining activity a sacrilege. Mining in the Hills is tantamount to digging

up the Vatican or Jerusalem. The Pine Ridge Reservation, home to the Oglala Lakota, is downstream along the Cheyenne River and is already plagued by radioactive water. This is one of the largest reservation populations within the United States. These factors need to be carefully researched and made a critical aspect of the consideration of mining impacts.

(14) Mitigation of damage to historical and cultural impacts is not discussed in Section 5.8 ER.

(15) Section 5.8 ER mentions a Memorandum of Agreement with the State of South Dakota. Agreements should also be completed with the seven bands of the Lakota people.

(16) Section 5.6 ER, which discusses potential air quality impacts, mentions only non-radioactive particulate emissions and fugitive dust. These emissions and dust may also carry radioactivity.

(17) The Applicant does not mention local first responders in its emergency training plans (Section 5.12 ER).

(18) Applicant discusses weather without mentioning the presence of dust devils and tornados in the area, which could cause the release of radioactive materials and heavy metals into the environment (Sections 3.5.2 and 3.5.3. ER, which repeat information, and Section 3.6.2.4 ER). The company also fails to mention heavy snow events, which can impact building integrity.

(19) Discussion of precipitation does not include a 100- or 500-year rain event (Section 3.6.2.3 ER). A single rain event in one of the study years is used to characterize

a heavy rainfall, and the Applicant does not discuss what the impacts of such a storm would be on its operations (Section 3.6.3.4 ER). In the Black Hills area, rain often comes in heavy downpours. As an example, in 1972 a flash flood killed more than 200 people on the eastern side of the Black Hills. The Applicant should discuss the impacts of flash flooding and what would be done if a flood moves radioactive and/or toxic materials off the proposed project site or overtops ponds.

(20) There is a similar problem with the discussion of land application in Section 4.4.2 Supplement. Applicant says that precipitation will not wash materials off those areas, but gives no back-up information.

(21) Oglala Lakota College, which has a campus in Rapid City and 10 other campuses on the Pine Ridge Reservation, is not mentioned in the discussion of post-secondary schools (Section 3.10.2.2 ER).

(22) The Applicant's discussion of the area labor force is incomplete. The implications of an older population, the majority of whom have 12 years of education, is not discussed as far as how it relates to the company's labor needs (Section 3.10.3.1).

(23) There is no consideration of the impacts of wildfire or how this danger will be mitigated. A wildfire threatened the Crow Butte ISL facility, and these fires are common in the area.

(24) Food sampling was done on one cow on one date. It is not clear if that "locally grazing cow" was anywhere near the proposed mine site (Section 6.1.11 ER).

(25) The Applicant appears to suggest that it might do deep well disposal into the Minnelusa Aquifer, an important aquifer that is hydrologically linked to the Madison

Aquifer, which is the most important aquifer in the region (Section 4.2 Supplement). This information and its ramifications are not included in the Application.

(26) The wastewater to be land applied is characterized as "non hazardous" in Section 4.3 Supplement. This is contrary to research that indicates that land application of uranium mine wastewater may create zones that are highly toxic.

(27) In its supposed discussion of nonradiological impacts (Section 4.14.1 ER), the Applicant doesn't talk about nonradiological impacts. As arsenic and selenium are typically found with uranium in this region, these impacts need to be discussed.

(28) The Applicant repeatedly refers to "standard operating procedures" or "best management practices" in a safety context (Sections 4.14.11, 5.2.2, 5.12 ER). Critical protections to the public and the environment should not be glossed over in this manner and need to be detailed.

(29) Applicant says that it will keep runoff from disturbed areas from entering local waterways. It refers to documents that "provide confidence" that this will be the case, as well as to unspecified Best Management Practices (Section 4.15.2.3 ER). Given the importance of preventing deterioration of surface water resources in the area, this information should be presented in detail.

(30) The information provided gives no reason to expect that the proposed land application areas are adequate to the proposed rate of application (Section 4.15.2.4.2 ER).

(31) Estimated land application water quality (Table 4.15-1) is based, among other things, on unspecified, undated historical data from Wyoming and Nebraska. This is vague. It is also unclear whether conditions at the other sites are comparable to

conditions at the Dewey-Burdock site.

(32) The Applicant repeatedly omits or underestimates the impacts of the approximately 4000 old exploration drill holes located in the proposed mining area. This goes to a basic issue, the ability of surrounding rock layers to contain the in situ leach mining operation. Examples include:

a. Section 3.3.2.2 ER on the Fuson Member, characterizing it as having "low vertical permeability."
b. In the same section, the Skull Creek Shale is similarly characterized.
c. In its characterization of regional hydrostratigraphic units (Section 3.4.3.1.1 ER et seq.), the Applicant fails to mention the drill holes.
d. The Applicant fails to mention old drill holes in its discussion of regional hydraulic connection of aquifers (Section 3.4.3.1.7 ER).
e. In its discussion of the Morrison formation as a confining unit in Section 3.4.3.2 ER, the Applicant states that the formation is a barrier to all deeper aquifers.
f. The Applicant concludes that the impacts of deep well injection will be "SMALL" [*sic*] "if" aquifers are confined (Section 4.6.2.4 ER). This is a very broad assumption.
g. In Section 6.2.2.4.1 ER, the Applicant says "vertical excursions are not a primary concern."
h. Section 5.2.4 suggests that overlying monitor wells "may be installed." In Section 5.2.5, it says it "prefers not to use underlying aquifer monitor wells." The number of old drill holes suggests that monitor wells must be installed in both overlying and underlying aquifers.

(33) The Applicant minimizes the disturbance to land at all stages of the analysis. The applicant states that only 108 acres out of a total proposed action area (PAA) of 10,580 acres would be impacted by mining, facilities, and roads (1.2.3 ER; see also Table 2.11-1 and Section 4.3.1 ER). Their basis for this number is not provided, but it apparently includes only part of the *initial* mine units, which appear to take up most of a section, or 640 acres (Supplemental Exhibit 3.2-1).

(34) The Applicant also minimizes the disturbance created by its proposed land application of wastewater. It states that a maximum of 355 acres would be used for this purpose (Section 1.2.3 ER). However, maps of the proposed land application area show that application would be done over most of two sections (1,280 acres). This does not include the additional storage, settling, or spare ponds required by this process (Supplemental "Land Application and Irrigation Site Investigation-Test Pit Locations" Map).

(35) In section 3.1.1 ER, the Applicant says both that "there are no recreational

lands present" in or within 2 km of the proposed project site *and* that a "recreational use" of the proposed project area is large game hunting – in contiguous sentences.

(36) Table 3.4-3 ER and Section 3.4.3.1.4 ER provide information on the Madison Aquifer that is not site-specific. There is a lot of research on the aquifer that provides relevant information. This is not corrected in the Supplement.

(37) The Applicant mentions exchange between subsurface and surface water in Section 3.4.3.1.10 ER. This is not discussed in the rest of the Application, despite high uranium readings in alluvial aquifers (Section 3.4.3.3.3.2 ER), and it is unclear whether this type of exchange occurs in the relevant alluvial aquifers. This is important information.

(38) The Applicant took water quality samples directly from uranium ore bodies (Sections 3.4.3.3.2.2 and 3.4.3.3.3.3 ER). This does not provide representative information on water quality in the proposed project area. We are also asked to accept the Applicant's word that sampling results are representative in Section 6.1.8.4 ER.

(39) Information on area vegetation and stream flows was gathered soon after an extended period of drought. While this is mentioned (Section 3.5.5.1.1 ER, quoting Powertech's Project Manager), the implications are not considered in the ER.

(40) The applicant relies on a survey for black-footed ferrets that was completed in 1977. This was during a period of time when the ferret was believed to be extinct in South Dakota (Section 3.5.5.4.1 ER). Since that time, populations have rebounded.

(41) The representativeness of meteorological information taken on the site was determined using data from Chadron, NE, a site that is 53 miles away and has very different topography (Section 3.6.1 ER).

(42) The Applicant also uses information from Oral, SD, in its weather analysis. Predominant wind directions on the Oral site are different from the directions measured on the proposed project site (Sections 3.6.3.2 and 3.6.2.4 ER).

(43) It is unclear how a continental measure of the radiation impacts is relevant to a local measure of radiation exposure. The numbers shown in Table 3.11-1 ER are suspect, as the project area is higher altitude than where most of the continent's population is located and contains over 100 old uranium mines.

(44) In Section 4.4.3.3 ER, the Applicant notes that the Nuclear Regulatory Commission concludes that a transportation accident involving a truck carrying yellowcake is 11% per year per uranium extraction facility. This means that the probability is 100% over ten years. The Applicant fails to discuss the implications of this probable accident.

(45) The Applicant uses the National Mining Association, a trade group that promotes mining, as the source for sections of its ER. These include Sections 4.5.2 – 4.5.5, 4.6.2.2, and 4.6.2.8.1 ER, which include the applicant's discussion of excursions, a critical risk factor from ISL mines. These sections are overly vague, as they are designed as a general description of a mining operation.

(46) The Applicant analyzes (vaguely) the potential impacts of sedimentation from its proposed project in the context of the watershed of the Angostura Reservoir (Section 4.6.1.1 ER). This is not the appropriate unit of analysis. The analysis needs to be specific to the area of its project.

(47) Because the Applicant says that its tests showed no percolation beyond the base of the soil profile, it "assumes" that there will be no lateral or vertical movement of water that could impact groundwater under the land application sites (Section 4.6.2.3 ER). This ignores the presence of alluvial aquifers, as well as being poor science.

(48) It is unclear how a phased approach to well field construction will minimize groundwater impacts, as the company states in Section 4.6.2.5 ER.

(49) In Section 4.6.2.6.1 ER, which discusses drawdown, the Applicant makes at least three assumptions that are not appropriate for the proposed project area: that the aquifer is homogeneous, that the aquifer is confined; and that there is no recharge (Section 4.6.2.6.1 ER).

(50) The Applicant opines that the Dewey Fault Zone contains the project area's aquifers (Section 4.6.2.6.1 ER). Fault Zones are fractures in the earth that may conduct fluids among aquifers or may move either horizontally or vertically.

(51) Drawdown impact estimates are based on only a few test wells (Sections 4.6.2.6.2 and 4.6.2.6.3 ER). It is unclear whether these tests are representative of the entire proposed project area.

(52) The Applicant assumes that there will no physical impacts on Cottonwood Gallery and Ponderosa Pine vegetative communities (Section 4.7 ER). This is impossible, given the extensive disturbance of project operations, as well as the certainty of above-ground spills and leaks.

(53) The Applicant speculates that land application will actually "enhance" habitat (Section 4.7 ER). This contradicts research indicating that land application from in situ mines can concentrate contaminants to toxic levels.

(54) In Section 4.12, the Applicant makes a number of assumptions about local socioeconomic impacts of the project that are not supported by any evidence, and that there is reason to believe are untrue. Its data about local socioeconomic impacts should be calculated to reflect the situation on the ground. These include: (a) "[N]ew workers living within Custer and Fall River Counties would spend their income locally." People from rural counties in the area do substantial shopping and other economic activity in Rapid City. (b) There would be $45.8 million in non-payroll capital expenditures. The nature of these expenditures is unclear. For example, contractors Knight Piésold are from Denver. Most equipment, including expensive items like drill rigs and mining and transportation equipment, are not manufactured locally, so the financial benefits of these purchases would not be local.

(55) In calculating production releases of radon, the Applicant includes "small unavoidable leaks in well field and ion exchange equipment" (Section 4.14.2.3.4 ER). The definition of "small" is open to interpretation. However, most in situ operations include larger spills. This is well-known and should be

included in this analysis.

(56) Atmospheric releases of radon are calculated using 1978 data from Casper, WY, which may not be representative of current or local conditions (Section 4.14.2.3.12 ER).

(57) The Applicant assumes that radionuclide concentrations in *soil* will be "the most important pathways to flora and fauna exposure" (Section 4.14.2.4 ER). It is not clear whether this includes land application, which can concentrate contaminants in both flora and fauna.

(58) There is contradictory information on the Applicant's plan for deep well disposal. It both shows on-site options and says that there are suitable zones for disposal in Wyoming and Nebraska. This section is also very vague in its discussion of impacts from deep well disposal (Section 4.15.2.4.1 ER),

(59) The Applicant states "Considering the distance between the existing projects and the proposed project and the almost half a century since the previous uranium development in the area, cumulative environmental impacts are considered to be small to negligible" (Section 4.16.1 ER). This statement fails to consider the 169 known old uranium mines and prospects in the southern Black Hills. There are also old surface and underground mines directly on the proposed project area.

(60) In its calculations of existing gamma count rates in the proposed mining area, the Applicant removes what it determines to be "outliers," including 9% of the readings in the old surface mine areas (Section 6.1.2.2.1 ER). Similarly, 16% of the first 80 readings on Radium-226 and 20% of those done in the surface mine area were rejected as "outliers." This depresses the area's readings and minimizes the existing disturbance. If all readings were included, it might become clear that the area should not be disturbed further.

(61) The applicant sampled stream sediments in the upstream side of dry surface impoundments (Section 6.1.4.1.2 ER). Stream sediments normally collect at the downstream side of an impoundment and should also be sampled there.

(62) The criteria for selection of groundwater wells for water sampling are listed, but not operationalized. The Applicant says the sites were "representative" (Section 6.1.8 ER), but that cannot be determined without further information.

(63) The comparison of historic and recent groundwater quality does not include radionuclides (Section 6.1.8.3 ER). This is important, given the fact that these are major criteria of concern. Increased radionuclide contamination in wells could indicate vertical contamination through old drill holes. The Applicant then extends these few samples (that do not include criteria of concern) to say that the water parameters in the tested wells have been consistent over time. And then it goes farther to say that the area's water chemistry is stable (Page 6-82 ER). There are a lot of assumptions in these leaps of faith. This research should be re-done before a permit is considered further.

(64) Many aspects of the geology of the proposed project area are stated by Applicant to be UNKNOWNs. Their discussion on this topic repeatedly slants the information in the direction of simplicity and safety, while a number of authors point out the complexity of the geology of the Black Hills. As

noted above, the presence of over 4,000 old drill holes is often ignored. The discussion of breccia pipes talks about the unlikely development of "caverns" – which are different from "breccia pipes" (Section 2.3.1 Supplement).

(65) Breccia pipes in this region are known to be as much as 1300 feet high and several hundred feet across. If they are associated with the Dewey Fault Zone, as the Applicant states (Section 2.3.1 Supplement), then they are very close to the proposed project area. The maps submitted with the Application do not show any drilling that may have identified (or created) problems in the area between the proposed project and the Dewey Fault Zone.

(66) Section 3.2 Supplement raises a new issue that is not analyzed in other parts of the Application. This is the Applicant's intention to disturb the old open pit uranium mines on its proposed mining site. It first says that it doesn't plan to operate through the mine wastes, then says that it plans to place well fields in that area. The full implications of mining in the same location as the old uranium mines need to be discussed, including air and water quality, human exposure, waste issues, cumulative impacts, and so forth.

(67) In Section 6.2 Supplement, the company begins by saying that vehicular traffic is a "potential source of dust." This reflects ignorance, a failure to analyze and describe the nature of Western South Dakota's unpaved roads or unimproved tracks in the summer. There will be dust.

(68) The "potential source[s] of dust" include 107 vehicles during initial construction, 109 during operations, and 41 during decommissioning. Clearly, there will be a lot of dust. A photo of another ISL mine in the area shows barren ground, stripped of vegetation. This suggests that there will be a lot of dust from operating areas. Due to the spacing of wellheads, it is questionable whether "heavy duty watering trucks" will be able to adequately wet down well fields.

<u>MISREPRESENTATION in violation of Section 40.9(a),(b)</u>

The following are examples of misrepresentation of information:

(69) In Section 1.1 ER, the Applicant provides misleading information by focusing on the greenhouse gases emitted by nuclear power plants, without considering the entire nuclear chain. All stages of that chain *other than* power plants emit greenhouses gases, including exploration, mining, milling, enrichment, construction, decommissioning, transportation, and waste disposal. The failure to clearly enunciate the full impact of nuclear activities in this context is misleading.

(70) Table 2.11-1 purports to compare project alternatives. It states that the proposed action would have no surface water impacts and "slight consumption of ore zone groundwater." Thousands of millions of gallons of ground water would not be considered "slight consumption" by most people. Saying there will be no surface water impacts ignores construction and transportation impacts, as well as the history of above-ground spills and leaks from in situ

leach operations.

(71) Table 2.11-1 says that there will be no historical and cultural impacts. Section 5.8 says that there "may be" archeological sites present. These statements are contradicted by the company's statement that there are at least 190 archeological sites in the proposed project area, or one site per 8.1 acres – and that Applicant notes that "the sheer volume of sites documented in the area is noteworthy" (Sections 3.8.1 and 4.10 ER). This implies that the Applicant is not adequately prepared to deal with these sites, as it is apparently not fully in a mindset that accepts and expects their presence.

(72) Under "Socioeconomic Impacts," Table 2.11-1 lists only positive impacts – and only economic impacts – for the proposed project. It lists only negative – and only economic impacts for the no-action alternative. There is a similar problem in Section 4.1. *Socio*economic impacts are not just economic. Mining projects have a history of both positive and negative social and economic impacts, known as the boom-and-bust cycle.

(73) In section 3.1.1.1 ER, the Applicant says, "The human influence on the area is minor." Some would consider the presence of 340 acres of unreclaimed open pit uranium mines (Table 3.3-1) to be more than a "minor" influence. The presence of grazing, wells, roads, and a railroad are also a result of human activity and changed the character of the area.

(74) In Section 3.6.4 ER, the Applicant asserts "ISL facilities do not significantly affect air quality." It provides no support for this assertion. In fact, in the Supplement (Section 6.2), it says that 107 vehicles will be involved in initial construction (not counting ongoing construction), 109 will be involved in operations, and 41 will be involved in decommissioning. It does not mention the air quality impacts of blowing dust that may be contaminated with materials generated by the mining.

(75) The Applicant says that large mammals will be disturbed by in situ leach mining in a manner "similar" to that already existing in the area (Section 4.7.2.1 ER). This minimizes the fact that the proposed operation is a major industrial operation that would be added to a relatively quiet and open landscape.

(76) In Section 4.7.5.2 ER, the Applicant suggests that the intrusion of an industrial operation about half a mile from an active bald eagle nest will not disturb the nest. It implies that burying pipelines, which involves heavy equipment operation, will minimize impacts to the birds. It says that center-pivot irrigation -- which disturbs the landscape, involves human activity and noise, and may contaminate eagles' food sources -- can be minimized so as to not disturb nesting birds. These statements are not credible.

(77) The Applicant also states that the bald eagle nest site is "at least 1.0 mile from the nearest planned facility" (Section 4.7.3.2 ER). This is contradicted by Plate 2.8-3.

(78) In its discussion of the cumulative impacts of other uranium projects, the Applicant mentions only surface mining (Section 4.16.1 ER). The immediate area of the proposed mine also has a history of underground mining. The

discussion mentions Wyoming and Nebraska, which have a history of in situ leach mining. The company's principals are clearly familiar with this due to other mentions of the Crow Butte Mine in Nebraska and due to their employment at ISL mines in Wyoming. The failure to provide this information minimizes the cumulative impacts of uranium activities in the region, which are substantial.

(79) In Section 5.1.1 Supplement, the company begins by stating that it will replace existing water wells or secure other water if a well's use is diminished. As proof, it provides a copy of its lease. This lease only protects lessors from problems with water quality and availability, not others who might be impacted.

(80) The failure to fully consider the No Action Alternative is part of a larger pattern. This pattern begins when the Applicant states that this Alternative is simply "a baseline from which to compare the potential impacts of the other action alternatives." (Section 2.1 ER). It is, in other words, given no real consideration. Real consideration is required.

(81) Other problems with the Cost-Benefit Analysis include that the Applicant assumes that the project will include "limited surface disturbance, negligible radiological impacts" and "insignificant changes in the overall groundwater quality" *before* it begins its cost-benefit analysis (Section 7.2.1.2 ER). This is contrary to proper analytical methods, in which one begins without major assumptions that bias the analysis.

(82) The project is considered as one unit of analysis (Section 7.2.2.1 ER). This is inappropriate. There will be distinct costs and benefits from each aspect of the project. A processing facility has different impacts than a well field. A road has different impacts than a pipeline. Center-pivot irrigation has different costs and benefits than deep well disposal. And so forth.

(83) In the Cost-Benefit Analysis Section, the Applicant states that the project will last 7 years, rather than the 8 years used elsewhere. And, of course, restoration times have been under-estimated at other ISL mines. So, based on that experience, it is optimistic to expect project completion in either 7 or 8 years. A longer project lifetime would expand both the costs and the benefits of the proposed project.

(84) In the consideration of potential socioeconomic impacts (Section 4.12 ER), the Applicant says that its project will employ as many as 200 people in one year. In the Cost-Benefit Analysis, this number is 86 (Section 7.3.2 ER). There is a substantial difference in both the costs and benefits of 200 employees and 86 employees. The analysis should provide a realistic number based on solid data, rather than wildly different numbers.

(85) The Applicant excludes federal taxes from its consideration of costs and benefits (Section 7.3.3 ER). It does not explain how it calculates the figures for its tax contributions in Table 7.3-3. Given the fact that the Applicant reports only the economic benefits of the proposed project, it is possible that the tax contribution numbers are inflated.

(86) The consideration of potential value-added benefits does not tell what those

benefits might be – or what the *costs* of achieving them might be (Section 7.3.4 ER). It is likely that most value-added benefits of operation will accrue to the Applicant in the form of revenue from yellowcake production. This should be clarified.

(87) The section on housing shortages does not discuss housing shortages (Section 7.4.1 ER). Housing shortages have been a critical problem in boom-and-bust economies.

(88) The information on school impacts shows no understanding of the impacts of an increased number of students on a school district (Section 7.4.1.2 ER). While student-teacher ratios may be low in area schools, that does not mean that classrooms have excess capacity, administrators are under-worked, there is excess water and sewer capacity, gyms are large enough, or there are enough janitors or buses. The Applicant should research and consider all factors related to school growth.

(89) In the groundwater impacts section, the Applicant states that its mining would represent a "temporary commitment of water resources." This could not be further from the truth. The applicant says that its operations will consume (i.e., use up) as many as 4,654 Million gallons of water (Table 4.6-2 and Section 4.2.1.1 Supplement). The benefits of this water to the Applicant should be monetized. Water for the proposed project should also be monetized not only in terms of current use, but also of opportunity costs.

(90) Table 7.5-1 does not reflect a realistic Cost-Benefit Analysis, all likely variables related to all alternatives must be considered. To the extent possible, they must be monetized to allow direct comparison of costs and benefits.

<u>UNACCEPTABLE ENVIRONMENTAL IMPACTS which make issuance of the Licence inimical under Section 40.32(d):</u>

The Applicant's plans do not acknowledge many of the known impacts of the in situ leach mining process and present unacceptable environmental risks. These include:

(91) The Applicant states that placing monitoring wells no more than 400 feet from the production zone and no more than 400 feet apart "will ensure that no leach fluids will pass between the adjacent monitor wells undetected…" (Page 1-19 ER). This makes no sense, as it would be possible for an excursion to pass through an opening at least 300 feet wide without necessarily being detected. Excursions are, of course, common at in situ leach uranium operations. If the Applicant is in denial, rather than in a mindset that expects excursions, it is likely to be less vigilant. Obviously, this increases the risk of major excursions, which is not acceptable.

(92) Multiple spills and leaks involving liquids that are contaminated with radiation and/or heavy metals occur at in situ leach uranium mines. This lack of control and the resulting contamination are not acceptable.

(93) The evidence indicates that the proposed project would have unacceptable impacts on a bald eagle nesting site and on species living on or near land

application sites.

(94) This type of project, which would involve large land disturbance in an area with a lot of cultural resources, cannot avoid unacceptable impacts on cultural and historical sites.

(95) Ownership and treaty rights of the Lakota people are not considered in the Application, and the cumulative impacts of uranium mining on those rights are unacceptable.

(96) Use of 2,423 Million gallons of water from the Madison Aquifer and 2,231 Million gallons of water from the Inyan Kara formation is unacceptable, particularly given the semi-arid nature of the region and the reliance on groundwater.

(97) Creation of settling and storage ponds to hold 308,907,127 gallons of toxic liquids is a threat to public health and the environment, given a history of leaks and spills from impoundments at uranium operations.

(98) Water movement in the aquifers that would be impacted is over 1 mile per year. As excursions are common and not always quickly controlled, this presents risks to wells and surface water users within a short time frame.

(99) Existing negative impacts from historical uranium operations, including existing pits and tunnels, air quality, water quality, and stream sediments, argue against further disturbance of the area.

(100) As the Applicant states, "no operations can occur where mine solutions could contaminate [existing] wells" (Section 5.1 Supplement). The reality is that water in the impacted aquifers moves over a mile a year, excursions are predictable, the area is geologically complex, and the nearest wells could become contaminated within the life of the project. Since these factors clearly create a situation in which "mine solutions could contaminate" wells, I am pleased that the Applicant agrees that the Dewey-Burdock project should not occur. I am firmly in favor of the No Action Alternative.

Contention J: Section 51.45(c), (e) are violated because: the Application fails to describe the extent to which the affected area contains faults and fractures horizontally and vertically between aquifers, through which the groundwater can spread thorium, radium 226 & 288, arsenic and other heavy metals disturbed through the ISL mining process. These metals can travel to contaminate clean drinking water and surface water. The contaminated water can eventually find its way to the pipe that brings drinking water into our homes, or the garden hose that waters our family gardens. Arsenic

and alpha emitters make people sick.

CONCLUSION

For the foregoing reasons, the undersigned respectfully requests a hearing, intervention and asserts standing and admissible contentions as set forth above.

Dated this 8th day of March, 2010.

Respectfully submitted,

/s/ - electronically signed by

David Frankel, on his own behalf and as
Attorney for Above-Referenced Requestor/Petitioners[191]

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[191] Notice of Appearance for such Requestor/Petitioners is being filed herewith.