

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD


In the Matter of	)	
	)	
POWERTECH (USA) INC.,	)	Docket No. 40-9075-MLA
	)	
(Dewey-Burdock In Situ Uranium Recovery	)	
Facility)	)	

**PETITION TO INTERVENE AND REQUEST FOR HEARING  
OF THE OGLALA SIOUX TRIBE**

**I. INTRODUCTION**

Pursuant to 10 C.F.R. § 2.309, the notice published by the Nuclear Regulatory Commission (NRC or Commission) at 75 Fed.Reg. 467 (Jan. 5, 2010), and the Commission Order of March 5, 2010, Petitioner Oglala Sioux Tribe (Tribe or Petitioner) hereby requests a hearing and petitions to intervene in this proceeding regarding the application of Powertech (USA) Inc. (Powertech) for a uranium recovery license for the Dewey-Burdock Project, a proposed in-situ leach (ISL) uranium mine in Custer and Fall River Counties, South Dakota. The Tribe's standing to intervene is described in Section II of this pleading, and the Tribe's contentions are set forth in Section III.

The Tribe submits this petition because the project may pose serious threats to the Tribe's cultural, historic, economic, and conservation interests. As detailed herein, the Environmental Report, the Technical Report, and the Supplemental Report that comprise the application contain serious defects, such that the application as a whole fails to satisfy the requirements of federal law, including the Atomic Energy Act, the National Historic Preservation Act, and the National Environmental Policy Act, along with the implementing regulations for these laws. As discussed in more detail in Section III on contentions, the primary concerns are the lack of compliance with

	<b>United States Nuclear Regulatory Commission Official Hearing Exhibit</b> In the Matter of: POWERTECH USA, INC. (Dewey-Burdock In Situ Uranium Recovery Facility)
ASLBP #: 10-898-02-MLA-BD01 Docket #: 04009075 Exhibit #: OST-010-00-BD01 Admitted: 8/19/2014 Reflected: Other:	Identified: 8/19/2014 Withdrawn: Stricken:

both federal law and NRC regulations and guidance regarding protection of the Tribe's cultural and historic resources, and the lack of information necessary to determine the hydrogeology and geochemistry of the site. The latter includes the lack of a defensible baseline ground water characterization or a thorough review of the natural and manmade interconnections between aquifers in the area that may allow for cross-contamination with the aquifer slated for chemical mining.

With respect to the environmental impacts of ISL operations, the long-term track record of ISL mine sites in the United States is replete with examples of failure to accurately predict groundwater dynamics, especially with respect to prevention of horizontal or vertical excursions and the inability to restore ground water to pre-mining conditions. These impacts have occurred despite the repeated assurances from prospective mine operators that ISL mining is a safe and even "benign" activity. *See, e.g.,*

[http://www.eoearth.org/article/In\\_situ\\_leach\\_%28ISL%29\\_mining\\_of\\_uranium](http://www.eoearth.org/article/In_situ_leach_%28ISL%29_mining_of_uranium) (World Nuclear Association co-author of article). The recent factual record demonstrates that these projects are not benign, and that grounds for serious concerns exist concerning proper regulation of ISL mining.

For instance, despite being directly subject to NRC regulatory authority, the Smith Ranch-Highland ISL operation was cited by the State of Wyoming in 2008 for multiple serious violations of law, some dealing with fundamental aspects of protection for public health, ground water, and against taxpayer liabilities. March 7, 2008 Notice of Violation (attached as Exhibit 1). These violations were far from insignificant. In its Investigative Report accompanying the Notice of Violation, the State of Wyoming reprimands the operation:

Given that PRI's [Power Resources, Inc.] operation has for many years been the major uranium producer in Wyoming, there is an expectation that the operation might serve as a model for excellence in ISL mining. Unfortunately, that is not the case. There are a number of major long-standing environmental concerns at this operation that demand immediate attention.

Wyoming Department of Environmental Quality Report of Investigation (attached as Exhibit 2) at 1.

The Report of Investigation goes on to charge the facility with numerous violations, including "major deficiencies" in both of its state permits. *Id.* at 2. Among the more serious problems are inadequate reclamation, where "[i]t is readily apparent that groundwater restoration is not a high priority for PRI," in part because "both production and restoration timeframes have doubled or tripled and yet additional wellfields are being brought into production." *Id.* at 3. Further, the Report details "an inordinate number of spills, leaks and other releases," such that "it appears that such occurrences have become routine." *Id.* at 4. Lastly, with respect to bonding, the Report finds that "[r]ough calculations based primarily on PRI's figures reveal an alarming scenario," such that the mine's approved reclamation and bonding plan "is totally infeasible and unsupported by any critical path timeline or water balance," resulting in a finding that "clearly the public is not protected." *Id.* at 4-5. These findings, just two years old, raise serious doubts for the Tribe as to the adequacy of the regulatory framework applicable to ISL uranium mining. At minimum, these concerns are ones that the federal regulatory system ought to have been well aware of and corrected long before they were ever allowed to reach such extremes.

Unfortunately, the apparent inability of ISL uranium mines to succeed in accomplishing ground water restoration is not an isolated occurrence. For example, the U.S. Geological Survey has recently confirmed that "[t]o date, no remediation of an ISR operation in the United States has successfully returned the aquifer to baseline conditions." Otton, J.K., Hall, S., *In-situ*

*recovery uranium mining in the United States: Overview of production and remediation issues* (Abstract), U.S. Geological Survey, 2009, IAEA-CN-175/87ISL (attached as Exhibit 3). This report goes on to express its authors' findings that "[o]ften at the end of monitoring, contaminants continue to increase by reoxidation and resolubilization of species reduced during remediation; slow contaminant movement from low to high permeability zones; and slow desorption of contaminants adsorbed to various mineral phases." *Id.* See also Hall, Susan, *Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain*, U.S.G.S. Open-File Report 2009-1143 (2009) at 30 (attached as Exhibit 4).

As demonstrated, the NRC Staff routinely allows for reductions in ground water standards away from baseline water quality. Thus, it appears from all the available evidence that all NRC-regulated ISL mining has resulted in some degradation of ground water quality over the long-term. The question then becomes one of how much ground water degradation the NRC will allow, and how far the resulting contamination will spread. In view of this track record, and particularly in considering standing, the Board must assume a certain level of ground water contamination.

Apart from the risks associated with ISL mining, as discussed above, recent testimony before the Commission from NRC Staff and U.S. Environmental Protection Agency ("EPA") representatives demonstrates that the regulatory guidance and processes currently in place for ISL mining application reviews are in some instances sorely out of date, and being substantially revised at the current time. For instance, at a March 2, 2010 briefing to the Commission, NRC Staff explicitly recognized that its "regulatory infrastructure, the regulatory guidance, the Standard Review Plans" for ISL mine applications are out of date, and that "the staff is actively working on updating those documents." March 2, 2010 U.S. NRC Briefing on Uranium

Recovery, at 6 (attached as Exhibit 5). The fact that projects such as the Dewey-Burdock Project are currently moving through a regulatory regime that is admittedly out of date raises serious concerns with respect to the ability of such a project to adequately protect the public health and environment, along with the Tribe's other concrete interests.

Indeed, throughout the March 2, 2010 NRC briefing, the broad extent of the needed and ongoing revisions to the NRC's regulatory oversight of ISL mining became clear. NRC staff testified that because of the outdated nature of the ISL regulatory framework "[s]taff is currently revising the standard review plan for in-situ recovery application reviews and ten regulatory guides." Exhibit 5 at 13. NRC staff also indicated that a major revision to the applicable regulatory requirements for ground water protection and restoration at ISL mines was imminent and would be submitted to the Commission as early as April of 2010 (this month). Id. at 9.

Representatives from EPA also testified at the March 2, 2010 briefing that the EPA is updating its fundamental regulations under 40 C.F.R. Part 192 with respect to ISL mining, which the NRC is bound by statute to implement at all ISL mine sites. With respect to the need for this update, EPA representatives confided that:

These regulations have not been substantially changed to recognize the environmental challenges faced by significantly increased use of in-situ leaching recovery technology, as well as possible use of heap leaching by the uranium industry. Nor have they been revised to incorporate potentially relevant recent changes in EPA groundwater and drinking water standards, as well as the most recent updates in good science for radon and radiation protection since the rule was last revised.

Id. at 47-48. This is in addition to the changes EPA is making to its regulatory controls for ISL mines with respect to hazardous air pollutants, including radon under 40 C.F.R. Part 61, Subpart W, and "doing so with recognition of the environmental challenges faced by significantly increased use of ISL recovery technology by the uranium industry." Id. at 49.

In addition to this testimony regarding the outdated nature of the regulatory program, EPA has recently submitted comments on an ongoing NEPA process for ISL uranium mining in Wyoming, expressing substantial concerns with respect to the integrity of the environmental analysis. March 3, 2010 Letter from Carol Rushin, Acting Regional Administrator, Region 8, U.S. EPA to Michael Lesar, Chief, Rulemaking and Directives Branch, NRC (attached as Exhibit 6). This EPA comment letter rates the NEPA documents for three ISL uranium mines in Wyoming as “inadequate” in part because of the failure of NRC to “evaluate the potential effects that non-attainment of baseline groundwater restoration would have on surrounding [underground sources of drinking water].” Among the primary concerns raised related to ground water are the frequent use of alternate concentration limits and a lack of sufficient discussion of the causes of excursions at ISL uranium mine sites. *Id.* at 4-5.

Overall, the significant problems evidenced at ISL mine sites in Wyoming and elsewhere, which are under direct NRC regulatory authority, and the candid admissions from both the NRC staff and the EPA that the regulatory structure for the protection of public health and the environment at ISL mine sites is out of date, elevates the Tribe’s concerns with respect to the ability of the Dewey-Burdock Project to achieve such protections in the context of this regulatory process. As a result, the strictest review must be afforded to this project, and better yet, review should be delayed until a current and legally sound regulatory framework can be put in place.

## **II. STANDING**

The Oglala Sioux Tribe is a federally-recognized Indian Tribe, located on the Pine Ridge Reservation. The Oglala Sioux Tribe is a body politic comprised of approximately 41,000 citizens, with territory of over 4,700 square miles in the southwestern portion of South Dakota. The Oglala Sioux Tribe is the freely and democratically-elected government of the Oglala Sioux

people, with a governing body duly recognized by the Secretary of Interior. The Oglala Sioux Tribe is the successor in interest to the Oglala Band of the Teton Division of the Sioux Nation, and is a protectorate nation of the United States of America. The Oglala Band reorganized in 1936 as the “Oglala Sioux Tribe of the Pine Ridge Indian Reservation” under section 16 of the Indian Reorganization Act of June 18, 1934, ch. 576, 48 Stat. 987, 25 U.S.C. § 476, and enjoys all of the rights and privileges guaranteed under its existing treaties with the United States in accordance with 25 U.S.C. § 478b. The Tribe’s address is P.O. Box 2070, Pine Ridge, South Dakota 57770-2070.

Pursuant to 10 C.F.R. § 2.309(d)(1), a request for hearing must address: 1) the nature of the petitioner’s right under the Atomic Energy Act (“AEA”) to be made a party to the proceeding, 2) the nature and extent of the petitioner’s property, financial, or other interest in the proceeding, and 3) the possible effect of any order that may be entered in the proceeding on the petitioner’s interest.

The AEA states that “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.” 42 U.S.C. § 2239(a)(1)(A). Given this broad and inclusive language, the Atomic Safety and Licensing Board (“ASLB”) has summarized these standing requirements as follows:

A petitioner’s participation in a licensing proceeding hinges on a demonstration of the requisite standing. The requirements for standing are derived from section 189a of the Atomic Energy Act of 1954 (AEA), which instructs the NRC to provide a hearing “upon the request of any person whose interest may be affected by the proceeding.” The Commission’s implementing regulation, 10 C.F.R. § 2.309(d), directs a licensing board, in ruling on a request for a hearing, to consider (1) the nature of the petitioner’s right under the AEA or the National Environmental Policy Act (NEPA) to be made a party to the proceeding; (2) the nature and extent of the petitioner’s property, financial, or other interest in the proceeding; and (3) the possible effect of any decision or order that may be

issued in the proceeding on the petitioner's interest. In that regard, the Commission has long applied the test employed in the federal courts in resolving standing issues — i.e., the petitioner must allege “a concrete and particularized injury that is ... fairly traceable to the challenged action and [is] likely to be redressed by a favorable decision.” In addition, the claimed injury must be arguably within the zone of interests protected by the governing statute. In order to determine whether an interest is in the “zone of interests” of a statute, “it is necessary ‘first [to] discern the interests “arguably ... to be protected” by the statutory provision at issue,’ and ‘then to inquire whether the [petitioner’s] interests affected by the agency action are among them.’ “

*In The Matter of Crow Butte Resources, Inc. (In Situ Leach Facility, Crawford, Nebraska)*, 68 N.R.C. 691, 701-702 (2009)(citations omitted). When NEPA is among the relevant statutes, the zone of interests is quite wide and includes procedural protections and impacts to aesthetic and other non-economic values. See, *Rocky Mt. Oil & Gas Assoc. v. United States Forest Serv.*, 157 F. Supp. 2d 1142, 1144 (D. Mont. 2000), *aff’d*, 12 Fed. Appx. 498 (2001) *cert denied* 534 U.S. 1018 (holding that “the possibility of oil and gas technology spoiling the pristine scenery and diverse resources” and “value of place” are proper factors to consider when raised by the public in a NEPA analysis).

The Tribe's standing to participate in this proceeding is demonstrated by the attached declarations of Oglala Sioux Tribe government officials, Wilmer Mesteth, the Oglala Sioux Tribal Historic Preservation Officer (Declaration attached as Exhibit 7), and Denise Mesteth, Director of the Oglala Sioux Tribal Land Office (Declaration attached as Exhibit 8). These Declarations testify to the Tribe's interest in protecting its cultural and historical resources, along with its lands, natural resources, economic prosperity, and the health, safety, welfare of the tribal members as well as the public. Further, these declarations, along with the attached Declaration of Dr. Robert E. Moran and the Declaration of Dayton Hyde (submitted previously in this proceeding by other proposed petitioners), demonstrate the threats to the Tribe's interest from the proposed project.



As set forth in the Declaration of Wilmer Mesteth, the Tribe seeks to participate in this proceeding to protect its historical, archaeological, and traditional cultural values and sites included within the proposed project area. The Tribe also seeks standing under the National Historic Preservation Act (NHPA) based on the Tribe's procedural rights in identifying, evaluating, and establishing protections for historic and cultural resources. These substantive and procedural interests in protecting cultural and historic resources related to the Tribe's heritage have recently been held by the Commission to adequately establish standing of the Oglala Sioux Tribe to intervene in a source material licensing proceeding. *In The Matter of Crow Butte Resources, Inc. (In Situ Leach Facility, Crawford, Nebraska)*, CLI-09-09, Nuclear Reg. Rep. P 31589, at 3-4 (May 18, 2009).

As stated in the Declaration of Wilmer Mesteth, the project lands are within the traditional aboriginal territory of the Oglala Sioux Tribe. This is confirmed by the fact that the project lands were included in the 1851 Fort Laramie Treaty and the 1868 Fort Laramie Treaty (15 Stat., 635). Further, as set forth in Mr. Mesteth's Declaration, and detailed in the Environmental Report for the Project, a significant number of cultural, historic, and archaeological resources have been identified in the Project area. ER at 3-178 to 3-180. Powertech's Application materials indicate that a small number of identified Euroamerican sites are eligible for the National Register of Historic Places. ER, Appendix 4.10-A, at ii. A large number of the sites identified (87) remain unevaluated for eligibility for the National Register of Historic Places. Id.

The Tribe has not had the opportunity to be involved in the assessment or determination of the significance of the identified sites, nor had the opportunity to identify additional sites that may warrant evaluation or listing. The Applicant has entered into a Memorandum of Agreement

with the State of South Dakota regarding analysis and evaluation of historic, cultural, and archaeological sites, but has not included the Tribe in this Memorandum.

The Tribe also asserts a concrete interest in the protection of its lands, natural resources, economic prosperity, and the health, safety, and welfare of tribal members, which are all threatened by the proposed project. This basis for standing is premised on the Tribe's ownership of lands in proximity to the proposed Project such that the Project may cause air, water, and ground water impacts to the Tribe's land. As set forth in the Declaration of Denise Mesteth, Director of the Oglala Sioux Tribal Lands Office, the Tribe owns lands in the vicinity of the proposed Project, which it leases for domestic, agricultural, water development, conservation, and other purposes. The Tribe relies on revenue from these leases to provide essential services for Tribal members. The Tribe also derives benefit and value, economically and otherwise, from its lands, and has a strong interest, economic and otherwise, in ensuring that these lands and the water resources associated with them remain in an unpolluted state. Thus, any impacts to these lands or to the air, water, or ground water associated with them from the proposed Project will negatively affect the Tribe's interests.

Included among the Tribe's lands are parcels leased to Mr. Dayton Hyde, a proposed Petitioner in this proceeding. See Declaration of Dayton Hyde (attached as Exhibit 9). As described therein, Mr. Hyde owns and operates a horse sanctuary on lands in the direct vicinity of the proposed Project. Portions of the lands Mr. Hyde uses for such purposes are leased from the Oglala Sioux Tribe. Thus, any negative impacts to Mr. Hyde's properties as a result of the Project that threaten his ability to maintain his operations threaten his ability to maintain the lease for lands with the Tribe.

The attached Declaration of Dr. Robert E. Moran details the potential impacts to ground water associated with the proposed Project (Declaration attached as Exhibit 10). In particular, Dr. Moran points to the fractured geology of the area, and to the historic drilling and other anthropogenic disturbances in the area that could serve as pathways for contaminated ground water from the Project area to migrate into adjoining aquifers, thus potentially contaminating other properties in the vicinity of the proposed Project. These properties include lands owned by Mr. Hyde and lands owned by the Tribe. As such, the Tribe has a particularized interest in this proceeding by virtue of its land ownership and economic and aesthetic interests in lands that it leases in the area.

These interests as described above will be protected should the project not obtain a license for any reason. Further, the Tribe's interests will be protected to the extent the Applicant is required to demonstrate full compliance with all federal laws and regulations.

### **III. CONTENTIONS**

As required by the federal register notice and 10 C.F.R. § 2.309, the Tribe sets forth below the specific contentions that it seeks to have litigated in this proceeding. Each contention raises issues with respect to the sufficiency of the Application under NRC regulations, as specified therein, as well as compliance with the National Environmental Policy Act ("NEPA"). Although no NRC NEPA document has yet been prepared for this project, the Tribe references NEPA to preserve its ability to raise these same issues, or others based on any newly available information, once a NEPA document is prepared. See 10 C.F.R. § 2.309(f)(2). The Tribe also contends that the failure to have a completed site-specific environmental impact statement available to (and informing the process of) NRC Staff evaluation of the license application violates the NEPA and its implementing regulations.

**Contention 1: Failure to Meet Applicable Legal Requirements Regarding Protection of Historical and Cultural Resources, and Failure to Involve or Consult the Oglala Sioux Tribe as Required by Federal Law**

The Application fails to meet the requirements of 10 C.F.R. §§ 51.60 and 51.45, and the National Environmental Policy Act because it lacks an adequate description of either the affected environment or the impacts of the project on archaeological, historical, and traditional cultural resources. The Application also fails to demonstrate compliance under the National Historic Preservation Act, and the relevant portions of NRC guidance included at NUREG-1569 section 2.4.

**Basis and Discussion:**

This contention is supported by the Declaration of Wilmer Mesteth, Oglala Sioux Tribe Tribal Historic Preservation Officer (Attached as Exhibit 7).

10 C.F.R. § 51.60 requires each applicant to submit with its application an environmental report containing the information specified in 10 C.F.R. § 51.45. 10 C.F.R. § 51.45(b) requires a “description of the environment affected” and a discussion of the “impacts of the proposed action on the environment.” These requirements are also mandated under the National Environmental Policy Act. In this case, the Environmental Report, at Appendix 4.10-A, demonstrates that a significant number of archaeological, historical, and traditional cultural resources on site have not been evaluated; therefore, the potential impacts to these resources have not been addressed. Among these are 87 known sites. ER, Appendix 4.10-A at ii. Given the lack of involvement by the Tribe, however, as discussed below, this number may be higher. Further, there are discrepancies between the number of sites identified in the report included in the Application at ER, Appendix 4.10-A and sworn testimony given by the state historic preservation officer in a State of South Dakota proceeding related to this matter, such that it appears that some significant

sites may not be included or discussed in the Application. See Declaration of Wilmer Mesteth at ¶¶ 15-19.

NUREG-1569 Section 2.4 imposes several requirements in terms of Section 2.4.3 Acceptance Criteria that have not been met in this case. In particular, Section 2.4.3(1) requires a listing for all properties included in, or eligible for inclusion in, the National Register. As stated, the application materials admit that scores of sites have not been evaluated for listing eligibility. Section 2.4.3(3) specifically mandates consultation with tribal authorities on the likely impacts on Native American cultural resources, which has not occurred in this case. Similarly, section 2.4.3(4) requires evidence of contact with appropriate state historical preservation office and tribal authorities – information lacking in the application with respect to tribal contact. Lastly, section 2.4.3(5) explicitly contemplates a memorandum of agreement “among the state historic presentation officer, tribal authorities, and other interested parties regarding their satisfaction with regard to the protection of historic, archaeological, architectural, and cultural resources during site construction and operations.” The Memorandum of Agreement presented in the application includes only the state personnel, ignoring tribal authorities and other interested parties. ER, Appendix 4.10-B. Given these inadequacies, the application should never have been deemed complete.

Among the additional requirements are those under the National Historic Preservation Act (“NHPA”) and related Executive Orders. Under these authorities, the NRC is required to fully involve Native American Tribes in all aspects of decision-making affecting Tribal interests such as those directly impacted by the project. These mandates require NRC to consult with Tribes as early as possible in the decisionmaking process. Here, despite having the applicant’s materials for approximately a year, and already having begun review of the project with respect

to completeness of the application, the NRC has not yet engaged in the required consultation process. This is especially troubling as the applicant has included an entire report on what it believes is the significance of the archaeological, historical, and traditional cultural resources it has identified at the site, but at no time has the Tribe been involved in the determination as to the significance of these resources or the completeness of the proffered Report, as contemplated by the NHPA. The failure to engage the Tribe in a meaningful way at the earliest possible time presents a ripe contention in this proceeding.

The federal courts have addressed the strict mandates of the National Historic Preservation Act:

Under the NHPA, a federal agency must make a reasonable and good faith effort to identify historic properties, 36 C.F.R. § 800.4(b); determine whether identified properties are eligible for listing on the National Register based on criteria in 36 C.F.R. § 60.4; assess the effects of the undertaking on any eligible historic properties found, 36 C.F.R. §§ 800.4(c), 800.5, 800.9(a); determine whether the effect will be adverse, 36 C.F.R. §§ 800.5(c), 800.9(b); and avoid or mitigate any adverse effects, 36 C.F.R. §§ 800.8[c], 800.9(c). The [federal agency] must confer with the State Historic Preservation Officer (“SHPO”) and seek the approval of the Advisory Council on Historic Preservation (“Council”).

*Muckleshoot Indian Tribe v. U.S. Forest Service*, 177 F.3d 800, 805 (9th Cir. 1999). See also 36 CFR § 800.8(c)(1)(v)(agency must “[d]evelop in consultation with identified consulting parties alternatives and proposed measures that might avoid, minimize or mitigate any adverse effects of the undertaking on historic properties and describe them in the EA.”)

The Advisory Council on Historic Preservation (“ACHP”), the independent federal agency created by Congress to implement and enforce the NHPA, has exclusive authority to determine the methods for compliance with the NHPA’s requirements. See National Center for Preservation Law v. Landrieu, 496 F. Supp. 716, 742 (D.S.C.), *aff’d per curiam*, 635 F.2d 324 (4<sup>th</sup> Cir. 1980). The ACHP’s regulations “govern the implementation of Section 106,” not only

for the Council itself, but for all other federal agencies. *Id.* See *National Trust for Historic Preservation v. U.S. Army Corps of Eng'rs*, 552 F. Supp. 784, 790-91 (S.D. Ohio 1982).

NHPA § 106 (“Section 106”) requires federal agencies, prior to approving any “undertaking,” such as this Project, to “take into account the effect of the undertaking on any district, site, building, structure or object that is included in or eligible for inclusion in the National Register.” 16 U.S.C. § 470(f). Section 106 applies to properties already listed in the National Register, as well as those properties that may be eligible for listing. See *Pueblo of Sandia v. United States*, 50 F.3d 856, 859 (10<sup>th</sup> Cir. 1995). Section 106 provides a mechanism by which governmental agencies may play an important role in “preserving, restoring, and maintaining the historic and cultural foundations of the nation.” 16 U.S.C. § 470.

If an undertaking is the type that “may affect” an eligible site, the agency must make a reasonable and good faith effort to seek information from consulting parties, other members of the public, and Native American tribes to identify historic properties in the area of potential effect. See 36 CFR § 800.4(d)(2). See also *Pueblo of Sandia*, 50 F.3d at 859-863 (agency failed to make reasonable and good faith effort to identify historic properties).

The NHPA also requires that federal agencies consult with any “Indian tribe ... that attaches religious and cultural significance” to the sites. 16 U.S.C. § 470(a)(d)(6)(B). Consultation must provide the tribe “a reasonable opportunity to identify its concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate its views on the undertaking’s effects on such properties, and participate in the resolution of adverse effects.” 36 CFR § 800.2(c)(2)(ii).

Apart from requiring that an affected tribe be involved in the identification and evaluation of historic properties, the NHPA requires that “[t]he agency official **shall ensure that the section 106 process is initiated early in the undertaking’s planning**, so that a broad range of alternatives may be considered during the planning process for the undertaking.” 36 CFR § 800.1(c) (emphasis added). The ACHP has published guidance specifically on this point, reiterating in multiple places that consultation must begin at the earliest possible time in an agency’s consideration of an undertaking, even framing such early engagement with the Tribe as an issue of respect for tribal sovereignty. ACHP, *Consultation with Indian Tribes in the Section 106 Review Process: A Handbook* (November 2008), at 3, 7, 12, and 29.

Regarding respect for tribal sovereignty, the NHPA requires that consultation with Indian tribes “recognize the government-to-government relationship between the Federal Government and Indian tribes.” 36 CFR § 800.2(c)(2)(ii)(C). *See also* Presidential Executive Memorandum entitled “Government-to-Government Relations with Native American Tribal Governments” (April 29, 1994), 59 Fed. Reg. 22951, and Presidential Executive Order 13007, “Indian Sacred Sites” (May 24, 1996), 61 Fed. Reg. 26771. The federal courts echo this principle in mandating all federal agencies to fully implement the federal government’s trust responsibility. *See Nance v. EPA*, 645 F.2d 701, 711 (9<sup>th</sup> Cir. 1981) (“any Federal Government action is subject to the United States’ fiduciary responsibilities toward the Indian tribes”).

In another proceeding before the Commission involving the Oglala Sioux Tribe, it was determined that the contention regarding compliance with the consultation requirements of the NHPA was not ripe. *See In The Matter of Crow Butte Resources, Inc. (In Situ Leach Facility, Crawford, Nebraska)*, CLI-09-09, Nuclear Reg. Rep. P 31589, at 9-11 (May 18, 2009). However, the legal and factual issues in this case are sufficiently distinguishable. Specifically,



in this case, the Tribe argues that the NHPA requires consultation under Section 106 to begin as early as possible in the consideration of an undertaking.

Here, as discussed above, the application was initially submitted to the NRC in February of 2009, well over a year ago. Further, the NRC Staff has already begun processing the application, including making an affirmative determination that the information contained in the application was acceptable to the agency. This analysis necessarily considered whether the applicant's efforts to identify and assess the impacts on historic and cultural resources, as presented in the application, meet the NRC's standards under the NHPA. To exclude the Tribe until a NEPA document is prepared harms the Tribe's ability to participate in the initial identification of historic/cultural properties and hampers its ability to effectively participate at the later stage when the specific impacts from a particular project are analyzed. *See, e.g.*, 36 CFR §§ 800.4 ("Identification of historic properties") and 800.5 ("Assessment of adverse effects"). Given these requirement of the NHPA, the harms to the Tribe began accruing immediately upon NRC consideration of the Application in the absence of tribal consultation. Thus, the harms to the Tribe are ongoing, and the Tribe's contention with respect to this issue is ripe.

### **Contention 2: Failure to Include Necessary Information for Adequate Determination of Baseline Ground Water Quality**

The Application violates 10 C.F.R. § 51.45 and the National Environmental Policy Act, requiring a description of the affected environment, in that it fails to provide an adequate baseline groundwater characterization or demonstrate that ground water samples were collected in a scientifically defensible manner, using proper sample methodologies.

### **Basis and Discussion:**

This contention is supported by the Declaration of Dr. Robert E. Moran (attached as Exhibit 10), particularly ¶¶ 16-24, 29, 33, 47-51, 62.

10 C.F.R. § 51.45 and the National Environmental Policy Act require a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis. 10 C.F.R. Part 40, Appendix A, criterion 7 requires the applicant to provide “complete baseline data on a milling site and its environs.” NUREG-1569 section 2.7.1(4) requires that ISL applications must provide an “assessment of available ground-water resources and ground-water quality within the proposed permit boundaries and adjacent properties, including a quantitative description of the chemical and radiological characteristics of the ground water and potential changes in water quality caused by operations.” NUREG-1569 section 2.7.3(4) sets forth acceptance criteria for the Application requiring a “reasonably comprehensive chemical and radiochemical analysis of water samples, obtained within and at locations away from the mineralized zone(s)...to determine pre-operational baseline conditions.” NUREG-1569, section 2.7.3(4). This acceptance criteria also requires an applicant to “show that water samples were collected by acceptable sample procedures....” Id. See also NUREG-1569 Section 2.7.4. Lastly, NUREG-1569 requires that “[t]he applicant should identify the list of constituents to be sampled for baseline concentrations. The list of constituents in Table 2.7.3-1 is accepted by the NRC for *in situ* leach facilities.” NUREG-1569, section 2.7.3.

The Declaration of Dr. Robert E. Moran, at ¶ 16, states:

The Powertech Application fails to define pre-operational baseline water quality and quantity—both in the ore zones and peripheral zones, both vertically and horizontally. Without adequate baseline water quality data (both ground water and surface water), there is no reasonable method for either the public or the NRC to evaluate the success or failure of either fluid containment or aquifer restoration. The Powertech Application documents repeatedly attempt to convey the impression that the D-B ground water quality is already degraded, rather than compile statistically-defensible data from both the

ore zones and non-mineralized zones. This approach contradicts NRC guidance, which requires that pre-mining baseline conditions be defined before licensing (NRC, 2003, pg. 2-24).

Dr. Moran continues to describe in depth the analytical deficiencies associated with the ground water baseline characterization as set forth in the application materials:

22. No coordinated, statistically-sound data set for **all** Baseline Water Quality data (both surface and ground water) is presented in these documents—as is required in NUREG--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 TR 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 TR, 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.

23. 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. Even should averaging of water quality data over a portion of the aquifer be acceptable, the methodology employed in the Application of discounting relevant data points is untenable.

24. 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 it appears that the Applicant intends that 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**. It is imperative that baseline data for the non-ore zone ground waters be collected and summarized separate from those of the ore zones. Lastly, the Application should already contain a statistically-reliable database of baseline ground water quality data from all known wells within at least a one-kilometer radius of the project boundary.

Declaration of Dr. Moran at ¶¶ 22-24.

Dr. Moran goes on to discuss the deficiencies in the Application with respect to the inadequate characterization of the non-ore regions of the relevant aquifers. Dr. Moran states:

Much of the Application discussion concerning ground water quality seems focused on showing that the site waters are already contaminated. This would not be surprising given the presence of the uranium mineralization and the past mining and exploration activities--all of which would have caused increased concentrations of numerous chemical constituents above true, pre-mining baseline. However, based on statements made in the ER, pg 1-16, Powertech has not adequately defined whether zones peripheral to the D-B ore-bearing geologic formations and bounding formations (above and below) also contain zones of high-quality, possibly potable ground water. Such zones should already have been defined as part of the Application documents.

Declaration of Dr. Robert E. Moran at ¶ 29.

Lastly, with respect to field sampling protocol and methodology, and the resulting integrity of the resulting data obtained, Dr. Moran opines:

The Application is inadequate in its attempt to demonstrate that the ground water quality data are of suitable quality, as on ER pg. 3-61, 62. Here they state that a comparison of field and lab pH and specific conductance data “are within reasonable limits.” Despite the vagueness of the language, this statement / section demonstrates a failure to understand the basics of applied water quality. Ground water chemistry routinely changes between the time a water sample is lifted from a well--where field pH and S.C. measurements should be made immediately--and much later when investigated in a laboratory. Hence, it is inappropriate to argue that, for example, the highest measured field pH was 12.67 and it “was verified by the contracting laboratory which reported a pH of 12.4 in the sample” (p. 3-62). Of course the chemistry changed as the temperature and pressure of the sample changed, the sample de-gassed, and various chemical reactions occurred. However, the authors failed to comment on the significance of the actual, reported pH of 12.67. In such a hydrogeologic setting, a site that had been previously drilled by thousands of exploration boreholes, and possibly previously mined, the logical conclusion is that such a pH represents evidence of some form of contamination---possibly from the incorrect

completion of a well with cement and / or bentonite grout, a spill of some alkaline chemicals, or from some past attempts to test the leachability of these ores using an alkaline lixiviant. The same is true for the insufficient discussion of the field versus lab specific conductance values at well 677, which were reported to be 12,220  $\mu\text{S}/\text{cm}$  versus 11,000  $\mu\text{S}/\text{cm}$  (pg. 3-62). The authors ignore the more reasonable conclusions that some form of contamination has occurred.

Declaration of Dr. Robert E. Moran at ¶ 62.

Based on this evidence, the application fails to adequately describe the affected aquifers at the site and on adjacent lands and fails to provide the required quantitative description of the chemical and radiological characteristics of these waters necessary to assess the impacts of the operation, including potential changes in water quality caused by the operations.

**Contention 3: Failure to Include Adequate Hydrogeological Information to Demonstrate Ability to Contain Fluid Migration**

The application fails to provide sufficient information regarding the geological setting of the area to meet the requirements of 10 C.F.R. § 40.31(f); 10 C.F.R. § 51.45; 10 C.F.R. § 51.60; 10 C.F.R. Part 40, Appendix A, Criteria 4(e) and 5G(2); the National Environmental Policy Act; and NUREG-1569 section 2.6. The application similarly fails to provide sufficient information to establish potential effects of the project on the adjacent surface and ground-water resources, as required by 10 C.F.R. § 51.45, NUREG-1569 section 2.7, and the National Environmental Policy Act.

**Basis and Discussion:**

This contention is supported by the Declaration of Dr. Robert E. Moran (attached as Exhibit 10) and Exhibit 6 (EPA comments).

10 C.F.R. § 40.31 and 10 C.F.R. § 51.60 require an applicant to submit an environmental report with its license application. 10 C.F.R. § 51.45 and the National Environmental Policy Act require that the environmental report include a description of the affected environment and the

impact of the proposed project on the environment, with sufficient data to enable the Commission to conduct its independent analysis. 10 C.F.R. Part 40, Appendix A, Criterion 4(e) requires that uranium processing facilities, including ISL uranium mining facilities, be located away from faults that may cause impoundment failure. Criterion 5G(2) requires an adequate description of the characteristics of the underlying soils and geologic formations.

The descriptions of the affected environment under the above authorities must be sufficient to establish the potential effects of the proposed ISL operation on the adjacent surface water and ground water resources. As discussed in NUREG-1569 at 2.7.1(3), the application must include a description of the “effective porosity, hydraulic conductivity, and hydraulic gradient” of site hydrogeology, including any “other information relative to the control and prevention of excursions.” At minimum, the applicant must develop an acceptable conceptual model of site hydrology adequately supported by the data presented in the site characterization. NUREG-1569 section 2.7.2. This data and model must demonstrate with scientific confidence that the area hydrogeology, including horizontal and vertical hydraulic conductivity, will result in the confinement of extraction fluids and expected operational and restoration performance.

In this case, the application fails to present sufficient information in a scientifically-defensible manner to adequately characterize the site and off-site hydrogeology to ensure confinement of the extraction fluids. These deficiencies include unsubstantiated assumptions as to the isolation of the aquifers in the ore-bearing zones and failure to account for natural and man-made hydraulic conductivity through natural breccias pipe formations and the historic drilling of literally thousands of drill holes in the aquifers and ore-bearing zones in question, which were not properly abandoned. As described in depth by Dr. Moran:

36. The application presents overly-optimistic conclusions about the isolation of the ore-

bearing zones, aquifers, and the lack of fluid excursions that will occur, both vertically and horizontally. Powertech's description and evaluation of possible water-related impacts [ER pg. 8-2 (Table 8.1-1)] are unreasonably optimistic. It is unlikely that the process waters can be contained within the project boundaries given the following sources of the evidence.

37. The D-B uranium deposits occur in subsurface, fluvial channel, sandstone deposits in the Lakota and Fall River formations (Smith, 2005). These sandstones inter-finger with finer-grained silts and shales, often associated with lignites and coals, which form the typical lithologic sequences often seen in classic sedimentary uranium deposits (Abitz, 2005; Gott, 1974; Henry, 1982; Galloway, 1982; Henry, 1980; Harshman, 1972).

38. Hydraulically, such sedimentary packages typically allow ground waters to flow between the inter-fingering facies, both vertically and horizontally, when the coarser-grained sediments are stressed by long-term pumping. The hydraulic inter-connections are verified by conducting long-term aquifer tests integrated with sequential water quality sampling and in-situ measurement of field parameters (Henry, 1982; Galloway, 1982; Moran, R.E.—hydrogeochemical research activities, U.S.G.S., Water Resources Div., 1973—1978).

39. Thus, ore-bearing sandstones in typical sedimentary packages associated with roll-front uranium deposits do not routinely behave as hydraulically-isolated bodies. Numerous specific lines of evidence from the D-B Application documents indicate that the project sediments possess various pathways for the migration of water and contaminants from the ore zones into neighboring sediments, both vertically and laterally. For example, thousands of exploration boreholes have been drilled since the 1950's at the D-B site (Smith, 2005; TR, ER), many of which were not correctly plugged and abandoned (TR, Pg. 2-157; Append. 2.7-B, sub-Appendix D, pg. 1484; TR, Append. 2.6-A, pg. 972-1111). In addition, several sources (Smith, 2005, pg. 9; ER, pg. 3-106) report that the area contains historic, shallow mine workings, both open pits and short tunnels that would provide additional flow pathways.

40. There are numerous old and existing water wells and old oil test wells in the D-B area, many with rusty and leaky casings, often unplugged or partially-plugged, drilled through several formations which act as potential pathways for flow between water-bearing units (ER, pg.3-40; TR, Append. 2.2-A, pg. 740-779; 2.2-B, especially pg. 864-902).

41. The TR, pg. 2-153-154, states that hydraulic connections between local D-B aquifers often result because confining units thin or are absent in many areas (ER, pg.3-56-57). In addition, Gott (1974) and others have mentioned the presence of breccia / evaporite pipes (collapse structures), which create vertical permeability pathways between aquifers. Gott (1974, pg. 27-29) and others discuss the common presence of faults and joints throughout the region, which could easily act as flow pathways.

42. Vertical and lateral hydraulic connectivity between the ore zones and the neighboring facies / formations are also indicated by the aquifer test results conducted in both 1979

and 2008 (ER, pg.3-56-57; TR, pg. 2-170 & 2-180, for example; TR Append. 2.7-B, Knight-Piesold Pumping Test Report, pg. 1290).

43. It seems obvious that the aquifer testing already performed demonstrates leakage between the various formations / facies bounding the ore zone. However, it seems equally likely that longer-duration aquifer tests conducted at even higher pumping rates would demonstrate even more clearly the leaky nature of these site sediments.

44. Repeatedly throughout the Application, Powertech states that the project will bleed 0.5 to 3% of leachate to maintain a cone of depression, which will prevent flow of leachate outwards (i.e. ER, pg. 1-14). Rather than supporting this allegation with long-term, technical data from other operating sites, Powertech has inserted a public relations statement from the mining industries' lobbying group, the National Mining Association (NMA, 2007).

45. D-B Application Supplement, pg. 5-5 describes an aquifer exemption boundary, which acts as an additional buffer zone outside the monitor well rings "to provide protection to adjacent water from the excursions that occur in the normal course of operations." Page 5-6 of the Supplement further states that the aquifer exemption boundary is proposed to be up to 1200 ft. outside the monitor well ring, and would be considered the point of regulatory compliance. Apparently simply pumping to create an inward flow direction is not adequate to control "excursions". It appears this aquifer exemption boundary is actually an expanded ground water sacrifice zone.

**Potential hydrogeologic pathways to nearby wells have not been adequately investigated and documented.**

46. The discussion above presents ample evidence that the D-B area sediments contain numerous possible subsurface pathways for project leach fluids to migrate vertically between water-bearing units and outside the project boundaries. Unfortunately, as noted above, Powertech has not adequately defined the baseline water levels or water quality conditions of neighboring wells within a 1 to 2 mile radius of the D-B project. In addition, the TR, pg. 2-180, states that no public data are available on the use of aquifers in Fall River or Custer counties. Such data should have been compiled by Powertech as part of the Application, and must be required before any licenses are given.

Declaration of Dr. Robert E. Moran (attached as Exhibit 10).

The concerns expressed by Dr. Moran are echoed in Exhibit 6, at 4-5, where EPA critiques the environmental review process conducted by NRC for ISL operations proposed in Wyoming. That discussion is directly applicable here, and provides evidence of the impacts associated with failure to properly assess the baseline site conditions and impacts of lixiviant injection, attempts at restoration, and excursions.



Based on this evidence, the application fails to provide an adequate site characterization of geology and hydrogeology and fails to demonstrate the ability of the applicant to determine effective porosity of the affected aquifers or to demonstrate the ability to confine the leaching fluids.

#### **Contention 4: Inadequate Analysis of Ground Water Quantity Impacts**

The application violates the National Environmental Policy Act in its failure to provide an analysis of the ground water quantity impacts of the project. Further, the application presents conflicting information on ground water consumption such that the water consumption impacts of the project cannot be accurately evaluated. These failings violate 10 C.F.R. § 40.32(c), 40.32(d), and 51.45.

#### **Basis and Discussion:**

This contention is supported by the Declaration of Dr. Robert E. Moran (attached as Exhibit 10).

10 CFR 40.32(c) requires the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR 40.32(d) requires that the issuance of the license not be adverse to the common defense and security or to the health and safety of the public; and 10 CFR 51.45 and the National Environmental Policy Act require the applicant to provide sufficient data for a scientifically-defensible review of the environmental impacts of the operation and for the Commission to conduct an independent analysis. The application as submitted fails to meet these requirements in that it does not provide reliable and accurate information as to the project's ground water consumption. Thus, the applicant has not established that its procedures are adequate to protect, and to not be adverse to, human health or that they will minimize danger to life or property.

The Declaration of Dr. Robert E. Moran sets forth the primary concerns related to the application's lack of credible analysis of ground water quantity impacts:

12. The D-B project area is semi-arid, having an average yearly precipitation of about 12 to 13 inches. While the application documents fail to report yearly evapotranspiration (ET), estimates of ET are roughly 70 inches per year, about 5 times the yearly precipitation (ER, pg. 3-176 and 177; Fig. 3.6-27). Because the project is presently expected to operate for between 7 and 20 years, it will require the use of tremendous volumes of local ground water.

13. Unfortunately, the Application documents present conflicting estimates of the volumes of water actually needed to operate the project. The ER, pg. 4-25, section 4.6.2.7.2 Water Requirements for the Proposed Action Facilities states:

“Water requirements of the CPP and other facilities are estimated to have a maximum requirement of **65 gpm**. As this requirement is relatively large, it is expected that most of this water will be derived from a water supply well in the Madison formation. Some of this water may be withdrawn from the Inyan Kara formation, but if so, it will not occur in a fashion to affect any well field operations.”

While the last sentence is totally unclear as to specific details, the greater problem comes on reading ER pg. 8-2 (Table 8.1-1), which states that ground water consumption will be **320 gpm**. Aside from the obvious lack of consistency, both of the estimates translate into massive amounts of ground water when considered over the full life of the project.

The water usage data for the conflicting water usage numbers referenced in the Application result in total water consumption over the life of the project as follows:

**65 gpm = 34.2 Million gpy (gals / yr).**

**After 7 yrs = 239,148,000 gallons, or 239.15 Million gals.**

**After 17 yrs = 580,788,000 gals or 580.8 Million gals.**

**320 gpm = 168.2 Million gpy (gals. / yr).**

**After 7 yrs = 1,177,344,000 = 1.2 Billion gallons**

**After 17 years = 2,859,264,000 gallons = 2.86 Billion gallons.**

14. The TR, pg. 2-181, also says water requirements will be 65 gpm, but the subsequent discussion (pg. 2-181 and 2-182) indicates great uncertainty. These inconsistencies need to be rectified to enable effective public and NRC staff review. Clearly, both of these estimates indicate that vast quantities of ground water will be extracted from these aquifers over the long-term, and it seems overly-optimistic to simply state that no significant impacts will occur. At a minimum, Powertech should be required to construct a credible, project water balance and to more seriously investigate the potential that such large-volume water use might impact local / regional ground water levels. At present, I see no evidence that the Application contains a reliable compilation of baseline water level data for the surrounding domestic and agricultural wells (see discussion below). Without such reliable,

summarized data, there will be no viable method to demonstrate that ground water levels (and related pumping costs) have not been impacted by project-related activities.

Declaration of Dr. Robert E. Moran (attached as Exhibit 10).

### **Contention 5: Failure to Adequately Calculate Bond for Decommissioning**

The application fails to provide a sufficient and acceptable financial assurance cost estimate, as required by 10 C.F.R. Part 40, Appendix A, Criterion 9, to assure the availability of sufficient funds to complete the reclamation plan and the activities in the application by an independent contractor.

#### **Basis and Discussion:**

This contention is supported by the Declaration of Dr. Robert E. Moran (attached as Exhibit 10) and the Technical Report, Appendix 6.6-A, and Section 1.0.

10 C.F.R. Part 40, Appendix A, Criterion 9 requires:

Financial surety arrangements must be established by each mill operator prior to the commencement of operations to assure that sufficient funds will be available to carry out the decontamination and decommissioning of the mill and site and for the reclamation of any tailings or waste disposal areas. The amount of funds to be ensured by such surety arrangements must be based on Commission-approved cost estimates in a Commission-approved plan....This will yield a surety that is at least sufficient at all times to cover the costs of decommissioning and reclamation of the areas that are expected to be disturbed before the next license renewal.

In this case, the application states that the operation will continue for 7 to 20 years and extract approximately one million pounds of uranium each of those years. TR at 1-8. See also Figure 1.9-1 Projected Construction, Operation, Restoration and Decommissioning Schedule. The estimates of both restoration and reclamation costs, however, are based on full production only in 2011, minor production levels in 2012, and no production anticipated beyond 2012. TR, Appendix 6.6-A. The costs of decontamination and decommissioning as portrayed in the application are thus grossly underestimated and insufficient for the reclamation of all activities as

required by 10 C.F.R. Part 40, Appendix A, Criterion 9. Further, the application states that the restoration times may be longer than originally anticipated, and this fact is not incorporated into the financial surety calculation. TR at 1-8. See also Exhibit 6 at 4 (EPA stating that “Studies-cited in the GEIS concluded that, for sites that were reviewed, aquifer restoration took longer and required more aquifer pore volume flushing than originally planned.”).

**Contention 6: Inadequate technical sufficiency of the application and failure to present information to enable effective public review resulting in denial of due process**

The application fails to present relevant information in a clear and concise manner that is readily accessible to the public and other reviewers, as required by the National Environmental Policy Act, Regulatory Guide 3.46, and NUREG 1569.

**Basis and Discussion:**

This contention is supported by the Declaration of Dr. Robert E. Moran (Declaration attached as Exhibit 10).

NUREG-1569 is the NRC’s current updated standard review plan. NUREG-1569 states:

The standard review plan complements Regulatory Guide 3.46, Standard Format and Content of License Applications, Including Environmental Reports for *In Situ* Uranium Solution Mining (NRC, 1982) which is guidance to applicants and licensees on an acceptable format and contents for a license application. Sections of this standard review plan are keyed to sections in Regulatory Guide 3.46 (NRC, 1982). Applicants should use Regulatory Guide 3.46 (NRC, 1982) as guidance in preparing their applications.

NUREG-1569 at xv. Regulatory Guide 3.46 provides explicit instruction for applicants in presenting information in an application, cautioning, “[t]he applicant should strive for clear, concise presentation of the information in the license application.” Regulatory Guide 3.46 at vii. Regulatory Guide 3.46 goes on to require:

An evaluation of information or data should clearly state the conclusions of the evaluation and should present the analyses and supporting data in sufficient detail to

permit an independent reviewer to verify this result. Tables, line drawings, and photographs should be used wherever they contribute to the clarity and brevity of the application. The number of significant figures stated in numerical data should reflect the accuracy of the data. Descriptive and narrative passages should be brief and concise. In cases where test results to support conclusions are presented, the procedures, techniques, and equipment used to obtain the test data should be included.

Id.

Similarly, NEPA regulations require that environmental documents “be written in plain language and may use appropriate graphics so that decisionmakers and the public can readily understand them.” 40 C.F.R. § 1502.8. See also 40 C.F.R. § 1500.2(b)(“Environmental impact statements shall be concise, clear, and to the point....”).

In this case, the Application has not been presented in a form acceptable under NEPA or NRC regulations. As set forth by Dr. Moran:

5. Powertech D-B Application is so disorganized and technically-deficient that it does not comply with the terms of NUREG-1569 and other relevant NRC regulations and should be revised. The various portions of the D-B Application total almost 6000 pages and are composed of:

- Technical Report (TR)-- 3103 pages;
- Environmental Report (ER)-- 2615 pages;
- Supplement to Application-- 66 pages.

The relevant information, if compiled in a direct, transparent manner using predominantly maps, tables and graphs, could easily have been summarized in 150 pages for the main volume. Instead, the Application is so duplicative and poorly-organized that it makes informed review by both the regulators and general public largely impossible. The Table of Contents for both the TR and ER provide no page numbers for the masses of information presented in the Appendices. The Appendices, in places, seem to have been thrown together with little or no logic to the organization. The authors of the main portions of the ER and TR, whoever they are, have made the review process unnecessarily convoluted, for both the NRC and the public. To that point, for numerous sections of the Application, it is not possible to discern whose opinions are being stated – Powertech’s, one of their consultants, or some other source.

6. What follows in paragraphs (6-10) are a few examples of the disorganized nature of these documents: For both the ER and TR, the tables of contents present basic titles, but no page numbers for the thousands of pages of appendices. As it is the Appendices that contain much of the corroborating data, such careless organization makes document review and substantiation of claims written in the text unnecessarily difficult. The headings of the

appendices, figures and tables often are far too vague to be useful. For example, regarding ER Append. 3.4-A, the title simply says: WELL LOCATION DATA. This is an inadequate presentation and several questions are evident. Data compiled by whom? When was the data compiled? For what types of wells (domestic? agricultural?)? Are those wells still in use? Are those wells monitored?

7. There are several other similar examples. One title says: Wells in Dewey-Burdock Database. Was this database originally compiled by Powertech? TVA?

8. Surface water sites discussed on pg. 2-192 through 2-194 of the TR have no specific names; they are simply labeled BVC01, BVC04, CHR01, CHR05. The field data for these sites are not integrated with the lab data from the same samples.

9. Application documents fail to provide summary tables and figures where they are most necessary. For example, the ER, pg. 3-39-40 provides no summary of the wells discussed, their uses, water-bearing units / formations, etc. such tables should be included in the text where the discussions are taking place.

10. Water-related discussions / data are scattered throughout the ER and present inconsistent findings. For example, a reviewer (NRC or public) of water-related issues must search through the following sections:

3.4 Affected Environment [WQ and Q discussions not integrated];

4.6 Potential WR Impacts

6.1.8 GW Sampling

6.2 Physiochemical GW Monitoring

7.4.3 Potential GW Impacts

8.1 Summary of Env. Consequences

Appendices:

3.3A, D

3.4A, B, C, D, E

3.5I

6.1B, C, D, E, F, G

Given the need for the applicant to submit supplemental information, these deficiencies should have been resolved at that time.

Declaration of Dr. Robert E. Moran (attached as Exhibit 10).

## **Contention 7: Failure to Include in the Application a Reviewable Plan for Disposal of 11e2 Byproduct Material**

The Environmental Report indicates that Powertech intends to use some unidentified facility for disposal of the 11e2 Byproduct generated at the proposed ISL Facility. See Powertech ER at 1-7, 4-6. It is not sufficient, however, for an applicant to merely state that permanent disposal will occur in conformance with applicable laws.

The very reason for the licensing process is to ensure that the problems associated with mill tailings which UMTRCA addresses do not recur under the modern licensing regime. Nowhere do the regulations at 10 C.F.R. Part 40, Appendix A allow an applicant to merely assert that tailings will be handled in accordance with applicable law. The opposite is required by federal law: an applicant must address permanent disposal at the time it seeks a license for activities which create 11e2 Byproduct.

### **Basis and Discussion**

The relevant regulations applicable to new uranium processing operations state in plain language:

***Every applicant for a license to possess and use source material in conjunction with uranium or thorium milling, or byproduct material at sites formerly associated with such milling, is required by the provisions of § 40.31(h) to include in a license application proposed specifications relating to milling operations and the disposition of tailings or wastes resulting from such milling activities.***

40 C.F.R. Part 40 Appendix A (emphasis added). This regulation implements the UMTRCA amendments to the Atomic Energy Act, which require the NRC to ensure that the specific proposal for disposition of tailings and wastes involved in milling is subjected to review in the initial license application. However, it is impossible to determine, based on the application, Environmental Report, and NEPA documents, whether any specific plans exist for the

disposition of the 11(e)2 Byproduct that will be produced by Powertech and what impacts such disposition would entail.

For this reason alone, the Powertech application must be summarily denied, without conduct of further proceedings. Such result is contemplated by the regulations:

Each application must clearly demonstrate how the requirements and objectives set forth in appendix A of this part have been addressed. Failure to clearly demonstrate how the requirements and objectives in appendix A have been addressed shall be grounds for refusing to accept an application.

40 C.F.R. § 40.31(h). Even where the regulations recognize flexible implementation, specific plans for handling the tailings is a mandatory requirement:

In many cases, flexibility is provided in the criteria to allow achieving an optimum tailings disposal program on a site-specific basis. However, in such cases the objectives, technical alternatives and concerns which must be taken into account in developing a tailings program are identified. As provided by the provisions of § 40.31(h) applications for licenses must clearly demonstrate how the criteria have been addressed.

40 C.F.R. Part 40 Appendix A.

The failure to address disposal requirements for 11e2 byproduct is not a technical deficiency that can be cured by expending NRC staff resources to cure minor defects. Where the applicant has a duty to provide specific information on this major feature of an ISL license application, and such information is omitted, the NRC staff must not expend federal resources and must instead reject the license without further inquiry or assistance to an applicant who fails to meaningfully address this critical licensing requirement. In sum, the application (including the Environmental Report) does not provide the necessary information to fulfill the applicant's burden to demonstrate that its proposal satisfies the criteria set out in Part 40 Appendix A.

Moreover, the policies set forth by NEPA prevent the NRC staff from segmenting the disposal issues from the inquiry into whether applicant will be allowed to create 11e2 Byproduct



material in the first instance. *In re Pac. Gas & Elec. Co.*, 67 N.R.C. 1, 13 (N.R.C. Jan. 15, 2008). (“There is no genuine dispute that NEPA and AEA legal requirements are not the same [ . . . ] and NEPA requirements must be satisfied.”). Failure to identify the permanent disposal facility avoids examination of all direct, indirect, and cumulative impacts of the proposal, as required by NEPA. *Custer County Action Ass’n v. Garvey*, 256 F.3d 1024, 1035 (10th Cir. 2001)(Where a “federal action” exists, the NEPA process must “analyze not only the direct impacts of a proposed action, but also the indirect and cumulative impacts of ‘past, present, and reasonable foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.’”).

Where “federal action” triggers NEPA -- here, the applicant’s proposal to conduct ISL mining activities -- an agency cannot define “the project’s purpose in terms so unreasonably narrow as to make [NEPA] ‘a foreordained formality.’” *City of Bridgeton v. FAA*, 212 F.3d 448, 458 (8th Cir. 2000)(citations omitted). Here, NEPA mandates that the NRC consider the ISL mining activities which create tailings at the same time it considers the specific method, transportation requirements, and site for tailings disposal. This mandate of federal law attaches at such time as the need for disposal is reasonably foreseeable, which occurs before submission of an application to the NRC for a license to create 11e2 Byproduct by processing uranium, not after the NRC rules on the admissibility of contentions submitted without benefit of NEPA documentation.

The CEQ regulations that apply to each agency’s implementation of NEPA state that the requisite site-specific environmental impact statement should be available at all stages of the decision-making process, not merely at the end of that process as a “rubber stamp” to approve the environmental impacts of the process. Because the application in this case involves

extensive, site-specific consideration -- including but not limited to, access, geology, hydrogeology, quantitative impacts upon water supplies for domestic use, livestock, agriculture, non-domesticated plants and animals, and qualitative on-going and subsequent impacts to water supplies of all the same due to releases of chemicals into the surface, groundwater and aquifers flowing through the licensed site -- failure of the site-specific environmental impact statement to inform every step of the license application decision-making process means that the final decision cannot comply with NEPA. At a minimum, without a completed, site-specific environmental impact statement as a guide, NRC staff, the public, and the Tribe have no basis to identify and access alternatives to the license application and find ways to avoid or mitigate possible adverse environmental impacts of the licensed activity.

These NEPA requirements are consistent with the requirement in Subpart 40, Appendix A's *Criteria One*, which requires that the applicant and the NRC examine "alternative tailings disposal sites" when considering a milling application. *See Natural Resources Defense Council v. Hodel*, 865 F.2d 288, 299 (D.C.Cir. 1988)(citing *Kleppe v. Sierra Club*, 427 U.S. 390, 410 (1976)(formulation of alternatives during the NEPA disclosure and study process is at the heart of the NEPA-mandated procedures).

The history, legal requirements, and policies embodied in federal laws applicable to the present proceedings require NRC staff to refuse further analysis of an application which lacks any analysis of the specifications for a reasonable range of alternatives for final disposition of the 11e2 byproduct material. The deficiencies in the application require denial or rejection of the application without further inquiry or expenditure of scarce government resources.

**Contention 8: Requiring the Tribe to Formulate Contentions before an EIS is Released Violates NEPA**

The procedure used by NRC to consider the Powertech application fails to satisfy the public participation and informed decision-making mandates of NEPA. The procedural requirements of NEPA are designed to benefit those who participate in agency decision-making processes and to require that the agency take a “hard look” at the impacts, alternatives, mitigation measures, and other aspects of a federal action at the earliest stages of the decision process, in recognition that when a “decision is made without the information that NEPA seeks to put before the decisionmaker, the harm that NEPA seeks to prevent occurs.” *See: Sierra Club v. Marsh*, 872 F.2d 497, 500 (1st Cir. 1989) *quoting Commonwealth of Massachusetts v. Watt*, 716 F.2d 946 at 953 (1st Cir. 1983)

By contrast, the procedure used in the present proceedings denies the Tribe and the NRC the information that a NEPA analysis provides. Importantly, this interdisciplinary analysis and information is provided during the NEPA process by the applicant, staff, and members of the public. All of these sources of information are recognized by NEPA, but the Tribe is prejudiced here when significant sources of information are not available until the NRC has taken final action to accept or deny its contentions. It is of no consequence that the NRC provides an opportunity to seek permission to pursue new or rejected contentions later in the proceedings, based on information revealed in the NEPA analysis. *See: Id.* (“Once large bureaucracies are committed to a course of action, it is difficult to change that course - even if new, or more thorough, NEPA statements are prepared and the agency is told to ‘redecide.’”).

### **Basis and Discussion**

NRC Staff has violated NEPA by requiring that the Tribe formulate and submit detailed contentions before the NEPA process is complete, denying the Tribe the benefit of NEPA analysis. This statutory violation is not remedied by providing a *post hoc* NEPA analysis, as is

contemplated by the NRC regulations. Failure to conform to the timing policies and requirements of NEPA wastes resources of both the NRC Staff and the Tribe. The procedural harms are demonstrated by previously aborted attempts to gain approval of plans to mine in the Dewey-Burdock area: “A Draft Environmental Statement (DES) was prepared by TVA to address the impact of a proposed underground mine in the Dewey-Burdock area, but TVA never completed the NEPA process.” Powertech Environmental Report at 1-4.

Conducting NEPA analysis early in the process is necessary to meet the requirement that NEPA analysis must precede the decision-making process, lest the agency unleash a “bureaucratic steam roller” aimed at approval, but without the public participation and informed decisionmaking requirements of NEPA.” *See Davis v. Mineta*, 302 F.3d 1104, 1115 (10th Cir. 2002). In short, the procedures the NRC used for the present application fail to satisfy NEPA’s purpose, which is to influence the decision making process “by focusing the [federal] agency’s attention on the environmental consequences of a proposed project,” so as to “ensure[] that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast.” *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

### **Contention 9: Failure to Consider Connected Actions**

The Powertech proposal to conduct ISL operations and conduct associated waste disposal activities is being considered by multiple federal agencies. However, NRC, the lead agency for purposes of NEPA - has failed engage these other agencies and therefore has failed to comply with the “action-forcing” mandate and purpose of NEPA.

### **Basis and Discussion:**

The mandate and purpose of NEPA is to influence the decision making process “by focusing the [federal] agency’s attention on the environmental consequences of a proposed project,” so as to “ensure[] that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast.” *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). The NEPA analysis must be prepared by the NRC in a manner which timely addresses, identifies, and analyzes any actions that are “connected” to the project under review. *See* 40 C.F.R. § 1508.25; *Utahns for Better Transp. v. United States Dep’t of Transp.*, 305 F.3d 1152, 1182 (10th Cir. 2002), *modified in part on other grounds*, 319 F.3d 1207 (2003).

For example, Powertech has recently filed an application with the Environmental Protection Agency (“EPA”) for a Class V deep injection well. However, there appears to have been no attempt by the NRC (or EPA) to conduct any NEPA analysis of the proposal for deep injection of hazardous materials in conjunction with the pending AEA license application. The Class V deep injection well is a “connected action” and even though EPA is the permitting agency, the deep injection proposal must be analyzed in the same NEPA analysis as the full Powertech proposal. Even if the disposal plans could somehow avoid analysis as “connected action” the deep well disposal activities must still be fully analyzed in the “cumulative impacts” analysis. See Exhibit 6, at 2-3 (providing evidence applicable here as to the requirements of NEPA with respect to analysis of waste disposal alternatives and impacts).

Here, the Tribe would be harmed should NRC continue to ignore the EPA permitting process on the basis that the “EIS has neglected to mention a serious environmental consequence, failed adequately to discuss some reasonable alternative, or otherwise swept

stubborn problems or serious criticism . . . under the rug.” *Lee v. United States Air Force*, 354 F.3d 1229, 1242 (10th Cir. 2004) *citing* *Sierra Club v. Peterson*, 228 F.3d 559 (5th Cir. 2000).

### **Contention 10: The Environmental Report does not Examine Impacts of a Direct Tornado Strike**

The Environmental Report provides an encyclopedic recital of considerable irrelevant information, but fails to provide information on reasonably foreseeable impacts of the proposal. As one example, although tornado strikes are common occurrences in the region, there is no recognition of this reasonably foreseeable impact, even though it is coupled with catastrophic consequences. See Exhibit 11 (NOAA announcement regarding tornado preparedness in region surrounding Rapid City, South Dakota). This is but one example of the applicant’s failure to provide a complete Environmental Report and the NRC failure to comply with the NEPA requirements at the earliest stages of the proceedings.

### **Basis and Discussion**

The CEQ has published NEPA regulations at 40 C.F.R. § 1502.22(b)(3), which are applicable to all federal agencies and which require the NRC “to consider low-probability environmental impacts with catastrophic consequences, if those impacts are reasonably foreseeable.” Here, neither the applicant’s environmental report nor any NEPA document produced by the NRC has examined the impacts which would occur if the proposed ISL facility received a direct or indirect hit from a tornado. Tornadoes are not uncommon occurrences in the region and planning for tornado impacts is a common practice among all levels of government. [http://dps.sd.gov/emergency\\_services/emergency\\_management/natural\\_hazard\\_info.aspx](http://dps.sd.gov/emergency_services/emergency_management/natural_hazard_info.aspx)

The impact of a tornado strike is not only reasonably foreseeable, a tornado has impacted radioactive materials at the Fansteel Plant in Muskogee, Oklahoma (NRC License No. SMB-911) where on June 1, 1999, an F1 tornado was accompanied by a storm that also produced very

large hail. The tornado struck the Fansteel plant, and damaged numerous buildings. According to documents in NRC files, the liners of Pond Numbers 3, 8, and 9 were torn above the water line and a stored soils cover was ripped. Damage to the Sodium Reduction Building allowed bagged material to fall out of the building and tear open with approximately 500 pounds of material released to the ground surface within a 10-foot-diameter area before being recovered and bagged.

*See: Docket No: 40-7580, Safety Evaluation Report For License Amendment Application To Approve Decommissioning Dated July 24, 2003.*

Where it is reasonably foreseeable that a tornado could strike the proposed ISL facility and damage the control facilities, with the associated winds dispersing toxic and radioactive materials across the landscape, the NRC and the applicant have ignored an important, and foreseeable, environmental impact with potentially catastrophic consequences.

#### **IV. CONCLUSION**

For the foregoing reasons, the Tribe has demonstrated that it has standing and that its contentions are admissible. Therefore, the Tribe is entitled to a hearing on its contentions.

Respectfully Submitted,

/s/ Jeffrey C. Parsons

Jeffrey C. Parsons  
Western Mining Action Project  
P.O. Box 349  
Lyons, CO 80540  
303-823-5732  
Fax 303-823-5732  
[wmap@igc.org](mailto:wmap@igc.org)

Attorney for Oglala Sioux Tribe

Dated at Lyons, Colorado  
this 6<sup>th</sup> day of April, 2010

Grace Dugan  
Mario Gonzalez  
Attorney for Oglala Sioux Tribe  
522 7<sup>th</sup> Street, Suite 202s  
Rapid City, SD 57701  
(307) 202-0703  
[dugan@wavecom.net](mailto:dugan@wavecom.net)

Travis E. Stills  
Energy Minerals Law Center  
Managing Attorney  
Energy Minerals Law Center  
1911 Main Avenue, Suite 238  
Durango, Colorado 81301  
[stills@frontier.net](mailto:stills@frontier.net)  
phone:(970)375-9231  
fax: (970)382-0316



UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
POWERTECH (USA) INC.,	)	Docket No. 40-9075-MLA
	)	
(Dewey-Burdock In Situ Uranium Recovery	)	
Facility)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing Petition to Intervene and Request for Hearing in the captioned proceeding were served via the Electronic Information Exchange (“EIE”) on the 6<sup>th</sup> day of April 2010, which to the best of my knowledge resulted in transmittal of same to those on the EIE Service List for the captioned proceeding.

/s/ signed electronically by \_\_\_\_\_

Travis E. Stills  
Energy Minerals Law Center  
Managing Attorney  
Energy Minerals Law Center  
1911 Main Avenue, Suite 238  
Durango, Colorado 81301  
[stills@frontier.net](mailto:stills@frontier.net)  
phone:(970)375-9231  
fax: (970)382-0316

**DEPARTMENT OF ENVIRONMENTAL QUALITY  
STATE OF WYOMING**

**NOTICE OF VIOLATION**

**IN THE MATTER OF THE NOTICE OF  
VIOLATION ISSUED TO  
POWER RESOURCES, INC.  
P.O. BOX 1219**

**DOCKET NO. 4231-08**

**GLENROCK, WY 82637**

**Re: Insitu Uranium Operation, Permit #603**

**Re: Insitu Uranium Operation, Permit #633**

**NOTICE**

**NOTICE IS HEREBY GIVEN THAT:**

1. Notice of Violation is being sent to you pursuant to W.S. §35-11-701(c) which requires that a written notice shall be issued in the case of failure to correct or remedy an alleged violation specifying the provision of the act, rule, regulation, standard, permit, license, or variance alleged to be violated.
2. As a result of Land Quality Division (LQD) concerns over the slow pace of groundwater restoration of wellfields at Power Resources, Inc. Permits 603 and 633 Insitu Uranium Mine, an investigation was conducted of the mine and reclamation plans in the approved permits, plus information provided in annual reports. This investigation was conducted by LQD staff during October and November of 2007. In addition to the violations cited below, LQD identified serious deficiencies with both permits. The plans contained in the permit documents are dated and incomplete in numerous ways: spill detection, reporting, and follow-up protocols are not defined in the permit; groundwater restoration procedures, necessary facilities, and time schedules for restoration must be thoroughly described; waste disposal facilities and processes must be described for all waste streams; all critical process installations need thorough construction details and specifications; and topsoil protection procedures are not adequately defined. As a consequence of the inadequacies of the permits, both operations are seriously under-bonded.
3. The investigation found that PRI failed to conduct concurrent reclamation which is a violation of Chapter 3, Section 2(k)(i)(D) requiring concurrent reclamation; and that PRI failed to follow the approved permits, which is a violation of W.S. §35-11-415(a). The following lists the specific violations:

*Permit 603*

- a. Wellfield C was in production for approximately ten years. The approved Mine Plan states, "*Once a wellfield is installed it takes approximately one to three years to recover the leachable uranium from a production area.*" Extending the production time period has become a routine practice and is not in compliance with the approved permit or the requirement for concurrent reclamation.
- b. In addition to the production phase, Wellfield C has now been in restoration for ten years. The 2007 Annual Report states that the ground water quality is similar to "*end of mining*" wellfield conditions. The permit states that restoration and stability are estimated to take approximately five years. This restoration delay is not in compliance with the approved permit or the requirement for concurrent reclamation.
- c. Wellfield E has removed 100% of the leachable reserves, and in recent years wellfield production has slowed to maintenance levels. This rate of production delays completion of mining and restoration of this wellfield

unit. This is not in compliance with the approved permit, and is a violation of Chapter 2, Section 2(b)(ii) which requires coordination of the Mine and Reclamation Plans to facilitate orderly development and reclamation.

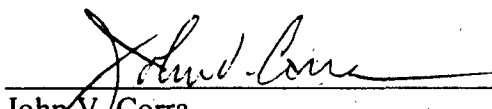
- d. The timetable listing the schedule of mining-related activities in the permit (Figure A, page OP-3A) and the timetable provided in the 2007 annual report both indicate that PRI is not in compliance with their restoration schedules for Wellfields C, D, and E. The schedule shows that Wellfield C should be decommissioning instead of in restoration, and that Wellfields D and E should be in restoration instead of production.

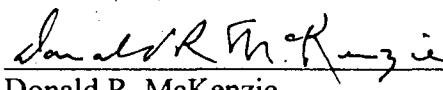
*Permit 633*

- a. The permit indicates that "An updated schedule will be supplied with the annual report if the mining or restoration schedule varies from Table 3-1." The timetable commitments in the permit are not consistent with wellfield status. Therefore, the table in the annual report is the schedule that PRI is committed to for wellfield status. Based on this table, PRI is not in compliance with their restoration schedules for Wellfields 2, 3, and 4/4A. The annual report text indicates that Wellfield 2 will continue to be in production, while the annual report schedule referred to in the permit shows that it will be in restoration in 2008. Wellfields 3 and 4/4a should be in restoration instead of production.
  - b. The permit states that it generally takes "three years for uranium production, and three years for aquifer restoration." Actual times for wellfield production and restoration are, thus far, 2-3 times longer than permit commitments.
4. Wyoming Statute §35-11-901(a) provides that any person who violates any provision of the Environmental Quality Act or any rule, standard, permit, license or variance adopted hereunder is liable to a penalty of ten thousand dollars (\$10,000.00) for each day of violation, which penalty may be recovered in a civil action brought by the Attorney General in the name of the People of the State of Wyoming.

**NOTHING IN THIS NOTICE** shall be interpreted to in any way, limit or contravene any other remedy available under the Environmental Quality Act, nor shall this Order be interpreted as being a condition precedent to any other enforcement action.

SIGNED this 7th day of March, 2008

  
 John V. Corra  
 Director  
 Department of Environmental Quality

  
 Donald R. McKenzie  
 Administrator  
 Land Quality Division

Please direct all inquiries regarding this Notice of Violation to Mr. Donald R. McKenzie, Administrator, Land Quality Division, Wyoming Department of Environmental Quality, 122 West 25<sup>th</sup> Street, Cheyenne, WY 82002. Telephone No. (307) 777-7046.

cc: Lowell Spackman, District I  
 Mark Moxley, District II  
 Docket # 4231-08  
 Doug Mandeville, NRC

## Report of Investigation

**Operator** : **Power Resources, Inc.**

**Facility** : **Smith Ranch - Highland Uranium Project**  
**Mine Permit #603 (Highland) and #633 (Smith Ranch)**

**Prepared By** : **Mark Moxley, LQD District 2 Supervisor**

**Date** : **November 21, 2007**

### Background:

This investigation was conducted at the request of Rick Chancellor, LQD Administrator, in response to concerns over recent spills and the slow pace of groundwater restoration at the Smith Ranch-Highland ISL operation. PRI's operation is located in Converse county in LQD District 1. An investigator was brought in from LQD District 2 with the intention of having a fresh pair of eyes look at the operation. The investigation was intended to identify and focus on "big picture" issues, not specific details. The investigation proceeded as follows:

- Review of permit documents and annual reports
- Interviews with LQD District 1 staff
- Site tour and interviews with PRI staff
- Interviews with LQD District 3 staff
- Follow-up reviews and discussions

PRI began producing in 1988 and is currently the only significant producer of uranium in Wyoming. They are currently producing at capacity levels (2 million pounds of yellow-cake in 2006 and they are expecting similar production in 2007). PRI has applied for a mine permit amendment to add the Reynolds Ranch property and they are also planning to consolidate the Smith Ranch and Highland permits. This will result in a combined mine permit area some 41,000 acres in size. PRI is planning to increase their throughput capacity next year and add approximately 30 people to their current staff of 100. They are also considering adding facilities to provide toll milling services to process feedstock from other operators.

Given that PRI's operation has for many years been the major uranium producer in Wyoming, there is an expectation that the operation might serve as a model for excellence in ISL mining. Unfortunately, this is not the case. There are a number of major long-standing environmental concerns at this operation that demand immediate attention. Recommendations are made as to how to address these concerns.

Currently the uranium industry is experiencing a major boom. Drilling and pre-permitting investigations are proceeding on many different properties around the state, including several owned by PRI. The LQD is expecting numerous new ISL mine permit applications within the coming 12-18 months. This increase in workload will be a major challenge for the LQD staff. Achieving regulatory effectiveness and efficiency will be a high priority for LQD and it will require the cooperation of the industry.

## **Major Regulatory Issues and Concerns with Permits 603 & 633:**

### **1. Mine Permit:**

The mine permit document is the primary regulatory mechanism governing the operation. The mine and reclamation plan should describe in detail how the operation will be conducted so as to comply with all of the major regulatory requirements. The mine and reclamation plans should be updated and maintained so as to be a definitive reference for the operator, the regulatory agencies, and also the public. Having a definitive mine and reclamation plan is particularly important for new staff. In the case of the Smith Ranch - Highlands operation (mine permits #603 and #633), the plans contained in the permit document are out of date and incomplete in several important areas. The following major deficiencies were noted:

- A. The approved mining and reclamation schedules are not being followed and are not current. PRI is not conducting contemporaneous restoration as required by their permit and WDEQ-LQD regulations. See discussion under item 2, below.
- B. Spill detection, reporting, delineation, remediation, follow-up and tracking protocols are not defined in the permit and should be. PRI experiences spills on a routine basis. See discussion under item 3 below.
- C. Groundwater restoration processes, facilities and procedures (incorporating and defining BPT), flow rates and time schedules should be thoroughly described in the permit so that expectations are clear. This has implications for bonding also.
- D. Waste disposal facilities and processes should be clearly defined for all waste streams. One example of inaccurate information in permit #603 (on pages OP-15 and 19) states that byproduct solid waste materials will be disposed at the ANC Gas Hills facility (which closed in 1994). This waste actually goes to the Pathfinder Shirley Basin facility.
- E. Construction details and specifications should be thoroughly described for critical process installations, including wells, pipelines, header houses, ponds, etc. One example of inaccurate information in permit #603 (on page OP-24) states that well casing joints are fastened with screws. This practice is not consistent with the regulations and was discontinued years ago.
- F. Topsoil protection procedures are not adequately defined to assure that disturbance is minimized and that the soil resource is protected. PRI's typical wellfield installation procedures result in the near total disturbance of the native vegetation and soils. This is not consistent with the regulation that allows for "minor disturbance" without topsoil stripping. More definitive procedures should be implemented to restrict and consolidate disturbance from roadways and pipelines and to insure careful topsoil salvage from well sites, mud pits, pipelines, roadways, etc.

With the permit updates required by Chapter 11 and the proposed consolidation of the Highland and Smith Ranch permits, now is an opportune time to correct permit deficiencies and construct a permit that is informative and useful to all parties.

## **2. Contemporaneous Reclamation:**

One of the fundamental requirements for any mining operation is that reclamation be conducted concurrently with mining. Not only is this the most efficient operational strategy but it also insures that the reclamation liability is kept at a reasonable and manageable level. This approach ensures that the public is protected in the event of a forfeiture.

The schedule in permit #603, Highland, dates from 2005. An identical schedule was provided in the July, 2007 annual report. That schedule shows that restoration of the C wellfield should have been completed in 2006 and decommissioning should now be in progress. In actuality the restoration of the C wellfield has been on-going for ten years and the RO treatment phase has only just recently begun. According to the schedule, restoration of the D wellfield should have commenced in 2006 and restoration of the E wellfield should have commenced in early 2007. The annual report states that both the D and E wellfields are still in production. According to the schedule there should now be five wellfields in production (D-ext, F, H, I & J), two in restoration (D & E) and three restored (A, B & C). In fact there are currently 7 wellfields in production, one in restoration (C), and only 2 restored (A & B) at Highland.

The schedule contained in permit #633, Smith Ranch, dates from 1998. A more current schedule was provided in the July, 2007 annual report, yet even this recent schedule is not being followed. According to that schedule, wellfields 1, 3 and 4/4A should now be in restoration. Production from these wellfields was started in 1997, 1998 and 1999 respectively. Restoration of wellfield 1 is to be complete by mid 2008 and restoration in wellfield 2 is to commence in early 2008. However, as reported in the annual report only wellfield 1 is in restoration (no completion date stated) and no mention is made of any other planned restoration. In addition, a new wellfield (K) went into production this year and it does not even appear on the schedule. According to the schedule there should now be three wellfields in production (2, 15 & 15A) and three in restoration (1, 3 & 4/4A). In fact there are currently five wellfields in production and only one in restoration. No wellfields have been restored at Smith Ranch.

It is readily apparent that groundwater restoration is not a high priority for PRI. Reclamation is not contemporaneous with mining. A total of 12 wellfields are now in production and restoration is proceeding (slowly) in only 2 wellfields. Only 2 wellfields (A and B) have been restored in 20 years of operation. The permits project that production will typically last for 3-5 years per wellfield and restoration will take 3-5 years per wellfield. It appears in reality that both production and restoration timeframes have doubled or tripled and yet additional wellfields are being brought into production.

It is recommended that a notice of violation be issued to PRI for failure to conduct concurrent reclamation and failure to follow the approved schedules. A rigorous compliance schedule should be implemented to accelerate restoration. A thorough re-evaluation of the operation schedules is warranted. As pointed out below, new deep disposal wells (DDW's) and RO units will be required to support restoration operations. LQD approval of the Reynolds Ranch amendment as well as any new wellfields should be contingent on installation of appropriate DDW's and RO units and completion of restoration in existing wellfields.

### **3. Spills, Leaks and Excursions:**

Over the years there have been an inordinate number of spills, leaks and other releases at this operation. Some 80 spills have been reported, in addition to numerous pond leaks, well casing failures and excursions. Unfortunately, it appears that such occurrences have become routine. The LQD currently has two large three- ring binders full of spill reports from the Smith Ranch - Highland operations.

Protocols for spill detection, reporting, control, delineation, remediation and tracking should be defined in the mine plan to cover all potential fluid types (injection fluids, production fluids, waste fluids, chemicals and petroleum products) and all potential sources (buried pipelines, surface pipelines, wellhead fittings, headerhouses, ponds, well casing failures, etc.). Protocols should include mapping and delineation of the extent of soil and/or groundwater contamination associated with each occurrence. A GIS system should be developed to facilitate long term tracking of all spills and releases. An updated cumulative spill map showing all historic spills and releases should be presented in each annual report along with documentation of follow-up actions. Excursion protocols are addressed in some detail in the permit, but excursions should be tracked on a cumulative basis in the annual report.

Cumulative tracking of spills and releases is important to insure appropriate follow-up on every incident. Some of the spills may have little impact individually, but cumulatively they might have a significant effect on soils and/or groundwater. A cumulative record will also assist in pinpointing potential problem areas and developing appropriate preventative measures. PRI should develop and implement an inspection and maintenance program designed to prevent future spills. Spills should not and need not be an accepted consequence of ISL mining.

### **4. Reclamation Cost/Bonding:**

The reclamation cost estimates contained in PRI's annual reports assume completion of all groundwater and surface reclamation in 4 years with a staff of 26 people (1/4 of current staff), using the existing facilities with the addition of only 2 new 400gpm RO units. This scenario is totally infeasible and unsupported by any critical path timeline or water balance. Rough calculations based primarily on PRI's figures reveal an alarming scenario.

- Adding the pore volumes for all of the existing wellfields gives a total pore volume (PV) for the project (excluding restored wellfields A&B) of 5,133 Ac.Ft.
- PRI's bond calculation includes only one PV of groundwater sweep, vs three PV's specified in the permit. [Removal of this volume of water from the aquifer would be problematic and warrants further evaluation.] PRI's four existing deep disposal wells (DDW's) have a combined capacity of approximately 600gpm (@100% availability). Disposal of one PV would take more than 5 years! This is not an acceptable schedule. A more reasonable scenario would require at least doubling the disposal capacity (1,200gpm), which would require 4 or 5 new DDW's. These would also be needed for disposal of RO brine and should be included in the bond.

- PRI's bond calculation includes only 3 pore volumes of RO treatment. The approved reclamation plan specifies circulation of a total of 6 PV's (3 groundwater sweep and 3 RO). It is likely that at least 5 PV's of RO treatment would be required if only one PV of groundwater sweep was completed. Using the five existing RO units on the site, plus two new 400 gpm units included in the bond calculation, producing a combined total of 1,360gpm of permeate (@80/20 permeate to brine ratio @100% availability), it would take 854 days (2.3 years) to treat one PV! It would take at least 11.5 years to treat 5 pore volumes. This is a not an acceptable schedule. A more realistic reclamation scenario would require increasing the RO capacity by 2-3 times (3,000 - 4,000 gpm permeate production). The additional RO units, as well as the additional building space, ancillary treatment facilities and piping, should be included in the bond.
- Using the existing RO units (plus the two bonded RO units) and existing DDW's, reclamation would take 20+ years, assuming groundwater restoration was achieved without any problems. (5 years for one PV of GW sweep + 11.5 years for 5 PV's of RO treatment + 1 year stability monitoring + 1 year decommissioning + 1 year of surface reclamation). Clearly this is not an acceptable schedule, but it does point out the need for reevaluation of the reclamation plan, restoration schedule and the bond calculation.
- PRI's bond calculation includes minimal funds for new infrastructure, maintenance, replacement and repair. Only two new 400 gpm RO units are included in the bond estimate. The need for new wells, including DDW's, water storage and treatment ponds, additional RO units, membranes, pumps, piping and general wellfield renovation should be anticipated and included in the bond calculation.
- PRI's bond calculation assumes a staff of only 26 people, with 22 of them on a salary of only \$34,000 per year! If their current operations require a staff of 100 people then it will take at least 1/2 to 2/3 of that staff to conduct restoration. The restoration operations will look very similar to production operations. Operation of RO units, in particular, is very high maintenance and labor intensive. Retaining competent staff will require that wages and benefits be at least \$50,000 per year.
- Considering that reclamation will take several times longer, require at least twice the staff with higher wages and require much greater investments in infrastructure than PRI has estimated, a realistic reclamation cost estimate for this site would likely be on the order of \$150 million, as compared to PRI's current calculation of \$38,772,800. PRI is presently bonded for a total of only \$38,416,500. No bond adjustments have been made since 2002. Clearly the public is not protected. It is recommended that PRI's bond be immediately raised to a level of \$80 million until a thorough evaluation, including critical path analysis, can be completed and an appropriate bonding level established. No permit amendments should be approved or new wellfields authorized until the bonding situation is corrected.



## **5. Regulatory compliance:**

Achieving environmental compliance at an operation of the size and complexity of PRI's Smith Ranch - Highland Mine requires a high level of commitment from both the company and the regulatory agency. PRI's environmental efforts have suffered from inadequate staffing, high turnover, lack of institutional memory and a low level of corporate commitment. There has been a lack of continuity and follow-through on many issues. At this point in time, overall environmental compliance at this operation is poor. PRI should retain a full-time environmental staff of 4-5 qualified people, including a groundwater hydrologist to manage the groundwater restoration. It is recommended that LQD immediately assign a staff person full-time to manage this project as their #1 priority, and that monthly inspections be conducted to get a handle on the issues identified in this investigation.

**End of Report**

## **In-situ recovery uranium mining in the United States: Overview of production and remediation issues**

**J.K. Otton, S. Hall**

U.S. Geological Survey, Lakewood, Colorado, United States of America

*E-mail address of main author: jkotton@usgs.gov*

In 2007, in-situ recovery (ISR) methods produced about 95% of U.S. production of 4.53 million pounds. Eleven new and five expansion ISR applications or letters of intent were filed with the U.S. Nuclear Regulatory Commission for the period from 2007-2009. ISR mining can be conducted in water-saturated, permeable, hydrologically confined sandstone beds where the uranium is soluble. Contamination of ground water during and after ISR operations has become a major issue for nearby residents, and for local, county and state governments. Colorado has raised ISR mining requirements and established a burden of proof that operations can return water quality to baseline conditions. Similar concerns are affecting mining plans in Wyoming, Texas, New Mexico, South Dakota, and Nebraska. Major issues affecting restoration at ISR mining operations include the following:

- Baseline water quality: Is the water presently potable or suitable for livestock or irrigation? What parts of the local aquifer should be sampled to establish baseline? What sampling methods are required to establish water quality conditions?
- Control of fluid flow during operations: How much hydrologic understanding of the ore zone is necessary to avoid flow problems?
- Ground-water restoration: To what standard should the ground water be restored? How long should monitoring occur after mining is completed?
- Ground-water restoration: What technologies work or might work?

To date, no remediation of an ISR operation in the United States has successfully returned the aquifer to baseline conditions. Often at the end of monitoring, contaminants continue to increase by reoxidation and resolubilization of species reduced during remediation; slow contaminant movement from low to high permeability zones; and slow desorption of contaminants adsorbed to various mineral phases. New remediation technologies are being examined, including bioremediation and monitored natural attenuation. Bioremediation can occur through addition of a carbon source such as acetate or molasses to augment the natural bacterial population which can induce simultaneous reduction and precipitation of uranium in solution. Bioremediation experiments are presently being conducted at U.S. Department of Energy sites in western states. Monitored natural attenuation suggest that ground-water flow that created the deposit moved from an oxidized zone through the orebody to a reduced zone. Re-establishment of ground-water flow after mining should move contaminants from the mined orebody into the reduced zone where natural processes can reduce the contaminants and remove them from the ground water. Questions: 1) Is current ground-water hydrology suitable? 2) What is the reducing capacity of the reduced zone? 3) Do kinetics of reduction reactions in the reducing zone vs. speed of ground water flow? 4) Effects of heterogeneity in mining zone and reducing zone? 5) Can all analytes of concern be attenuated? 6) Monitored attenuation- can the limited time frame preferred by operators be achieved?



## Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain



Open-File Report 2009–1143



# **Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain**

By Susan Hall

Open-File Report 2009–1143

**U.S. Department of the Interior  
U.S. Geological Survey**

**U.S. Department of the Interior**

KEN SALAZAR, Secretary

**U.S. Geological Survey**

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## Introduction

This talk was presented by U.S. Geological Survey (USGS) geologist Susan Hall on May 11, 2009, at the Uranium 2009 conference in Keystone, Colorado, and on May 12, 2009, as part of an underground injection control track presentation at the Texas Commission on Environmental Quality (TCEQ) Environmental Trade Fair and Conference in Austin, Texas.

Texas has been the location of the greatest number of uranium in-situ recovery (ISR) mines in the United States and was the incubator for the development of alkaline leach technology in this country. For that reason, the author chose to focus on the effectiveness of restoration at ISR mines by examining legacy mines developed in Texas. The best source for accurate information about restoration at Texas ISR mines is housed at the TCEQ offices in Austin. The bulk of this research is an analysis of those records.





## USGS Uranium ISR Research

**Phase 1: Forensic Chemistry (Nearing Completion)**

- Compile historic chemistry of ISR operations throughout the United States
- Characterize groundwater chemistry in past ISR operations
- Compare effectiveness of restoration techniques (monitor ongoing studies)

**Phase 2: Long-term Monitoring (Site and Funding Search Underway)**

- Resample old well fields to test for long-term aquifer contamination
- Measure capacity of host formations to naturally attenuate ISR well field waters
- Resample around well fields to determine if contamination has moved outside original monitor wells
- Determination of mineralogic transformations through mining and reclamation

**Phase 3: Improved Restoration Techniques (Preliminary Testing Initiated)**

- Bench scale testing to try to develop more effective geochemical techniques for groundwater restoration in ISR mines
- Pilot studies implementing new techniques



### USGS Uranium ISR Studies

The USGS initiated a study of the effects on groundwater by ISR mining in 2008 in response to increased activity in uranium exploration and mining and the increasing number of applications for ISR mines to the U.S. Nuclear Regulatory Commission. USGS geologists were particularly intrigued with the widespread assertion that “Groundwater has never been returned to baseline at any ISR mine.”

USGS ISR studies are broken down into three phases:

1. Compilation of forensic chemistry: the examination of legacy projects.
2. Investigations of groundwater chemistry over time.
3. Development of improved restoration techniques.

The USGS is nearing completion of Phase 1, the forensic chemistry portion of our project, and these are some of the interim results of this work. The search for a suitable field site and funding to evaluate long-term impacts and natural attenuation of groundwater in ISR well fields (Phase 2) is underway, and preliminary testing of new restoration technologies for ISR well fields (Phase 3) has begun.



### Outline of Presentation

To determine the effectiveness of groundwater restoration at ISR mines, the following topics will be addressed:

1. The establishment of baseline and restoration goals.
2. Effectiveness of groundwater restoration.
3. Long-term stability of well fields.
4. An evaluation of best restoration technologies, including:
  - (a) Pump and treat techniques (Texas),
  - (b) The addition of reductants (Wyoming and New Mexico), and
  - (c) Bioremediation (Nebraska and Wyoming).

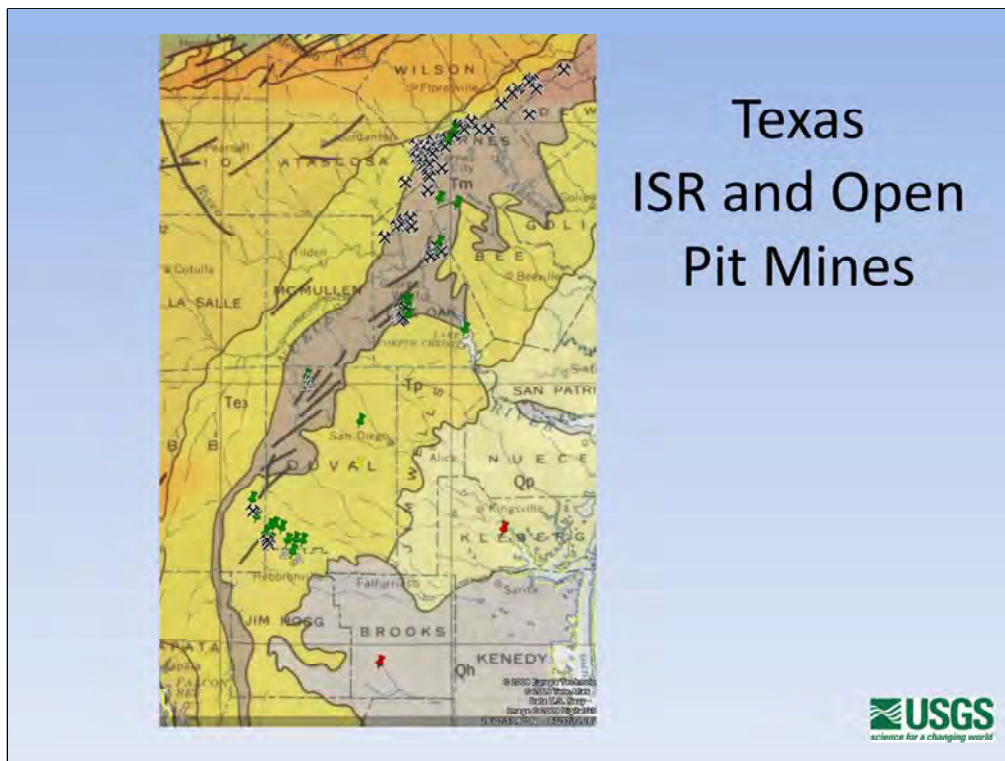


## Background

The United States has been steadily producing uranium using ISR mining since the mid-1970s. In April 2009 there were four active mines in the United States (red markers): Cameco's Smith Ranch/Highland property in Wyoming and Crow Butte mine in Nebraska, and Mestena Uranium's Alta Mesa mine and URI's Kingsville Dome mine, both located in Texas.

Most uranium production from ISR mines has come from mines in Wyoming and Texas (green markers), with only pilot projects testing mining and restoration techniques developed in New Mexico (Crown Point, Mobil) and Colorado (Grover, Wyoming Minerals). More than 20 ISR mines anticipate or have begun the process of applying for licensing (yellow markers).

According to the Energy Information Agency, the United States imported 82 percent of its uranium in 2007 (Energy Information Agency, 2009) and 38 percent of U.S. uranium reserves are classified as ISR amenable (Nuclear Energy Agency, 2008). Thus, the safe and effective use of ISR technology in mining uranium deposits is a potentially critical element in the movement towards energy independence in the United States

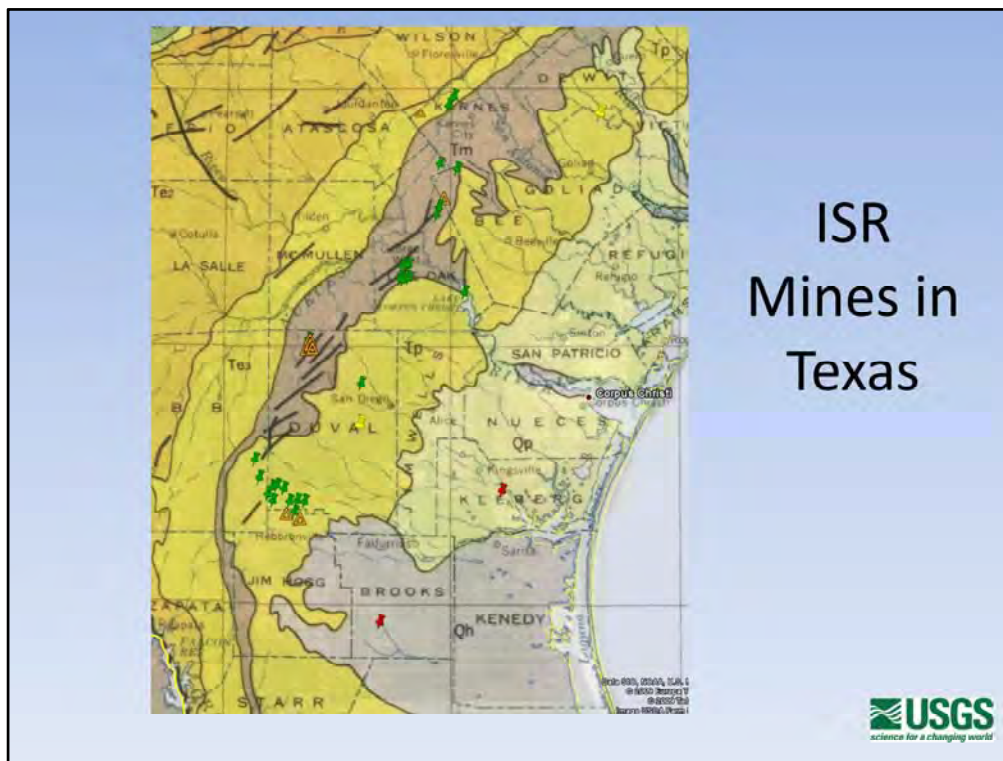


### Texas Coastal Plain Uranium District

Historically, uranium in Texas has been produced from Tertiary units along the southwest coastal plain. Uranium was first mined from a series of open-pit deposits developed in the Whitsett Formation (Jackson Group) and Catahoula Formation, starting in the late 1950s, when uranium was discovered during radiometric surveys in support of oil and gas exploration in Texas.

Black crossed mine symbols are uranium properties identified by the USGS Mineral Resources Data System database (<http://tin.er.usgs.gov/>) and show mostly historical open-pit mines located near Karnes City, Texas. The green markers represent closed ISR mines, and the red markers indicate operating ISR mines as of April 2009.





Along the southwest Texas coastal plain, uranium is mined, using ISR techniques, from the:

- Goliad Formation (Tp); a series of Miocene mudstone, conglomerates, and limestones, which is host to seven ISR mines
- Oakville Sandstone and Catahoula Formation (Tm); Miocene and Oligocene sandstone, clays, mudstones and Catahoula tuffs hosting 27 mines; 15 mines in the Oakville Sandstone and 13 mines in the Catahoula Formation
- Whitsett Formation (Te, Jackson Group); Oligocene mudstones, sandstones and tuffs which host two mines.

Thirty-six sites were authorized in Texas; seven were never mined (orange triangles), one was a tailings project (white square), and one was combined with another property. This leaves 27 mines (green markers) that were developed by construction of 77 well fields, termed Production Authorization Areas (PAAs) in Texas. The term “well field” and “PAA” will be used interchangeably throughout this presentation. Baseline and “amended restoration” values are available for all 27 mines/ 77 PAAs in TCEQ records.

Currently two mines are active in Texas: the Kingsville Dome mine in Kleberg County, operated by Uranium Resources International (URI), and the Alta Mesa mine in Brooks County, operated by Mestena Uranium (red markers). Two mines are in standby or shut down (green markers): the Vasquez and Rosita mines, both URI properties in Duval County. Two ISR mines are in the process of being permitted (yellow markers): Goliad in Goliad County (Uranium Energy Corporation) and La Palangana, a South Texas Mining Ventures property in Duval County.

Table 1: Baseline Water Quality for Zamzow PAA-1

ATTACHMENT G

BASELINE WATER QUALITY TABLE

TEXAS WATER COMMISSION

GROUNDWATER ANALYSIS REPORT SUMMARY

BASELINE WATER QUALITY - Evaluation Mining

Site Name: JEC-PAA-1

Site Area: JEC-PAA-1

New Area: JEC-PAA-1 (New and Existing Data)

Data Acquisition: 01/08/2001-31, 1998

BASELINE WATER QUALITY TABLE

PARAMETER	UNIT	NON-PRODUCTION ZONE**			PRODUCTION ZONE			WELL I.D. BY AREA*				
		Low	Sample	High	MINE AREA**		PRODUCTION AREA		NON-PROD. ZONE	PROD. ZONE		
					Low	Average	High	Low			Average	High
1 Calcium	mg/l				132	21.2	652	196	259	304		
2 Magnesium	mg/l				15	28.4	84.7	5.0	71.1	56		
3 Sodium	mg/l				739	382	750	235	382	444		
4 Potassium	mg/l				19	30.3	49	18.9	26.7	50		
5 Carbonate	mg/l				0	0	0	0	0	0		
6 Bicarbonate	mg/l				128	297	400	157	269	346		
7 Sulfate	mg/l				454	733	1,520	441	801	940		
8 Chloride	mg/l				350	602	936	304	538	862		
9 Fluoride	mg/l				0.16	0.45	1.19	0.01	0.36	0.50		
10 Nitrate-N	mg/l				<0.01	0.16	0.9	<0.01	0.14	0.49		
11 Silica	mg/l				31	51.6	85	11	43.9	74		
12 pH	Std. unit				6.6	7.0	7.64	6.68	7.0	7.45		
13 TDS	mg/l				1,627	2,282	3,220	1,810	2,037	2,360		
14 Conductivity	umhos				2,720	3,404	4,300	2,680	3,049	3,430		
15 Alkalinity	Std. unit				105	225	400	206	238	204		
16 Acidity	mg/l				<0.001	0.009	0.03	<0.001	0.006	0.044		
17 Cadmium	mg/l				<0.0001	0.001	0.002	<0.0001	0.0006	0.0013		
18 Lead	mg/l				0.01	0.015	0.0	0.03	0.074	0.26		
19 Zinc	mg/l				<0.001	0.001	0.006	<0.001	0.004	0.02		
20 Manganese	mg/l				0.003	0.024	0.05	0.01	0.018	0.15		
21 Mercury	mg/l				<0.0001	0.0004	0.0018	<0.0001	0.0006	0.001		
22 Selenium	mg/l				<0.001	0.01	0.01	<0.001	0.004	0.01		
23 Arsenic	mg/l				0.01	0.171	1.4	0.01	0.201	0.78		
24 Uranium	mg/l				<0.001	0.121	1.7	<0.001	0.079	0.132		
25 Molybdenum	mg/l				<0.001	0.01	0.06	<0.001	0.004	0.1		
26 Radium-226	pCi/l				1.15	1.19	1.99	0.19	1.02	1.44		

\* LIST THE IDENTIFICATION NUMBERS OF WELLS USED TO OBTAIN THE LOW, AVERAGE AND HIGH VALUES.

\*\* MONITOR WELLS



## TCEQ ISR Restoration Database

The ISR restoration database is housed in the TCEQ offices in Austin, Texas. The database consists of binders for each mine in a data room adjacent to regulator offices. TCEQ does not represent these data as validated. Official data are on microfiche in an adjacent building, but the data are poorly organized and difficult to search. A digital database, compiled by a retired TCEQ employee, was also made available to the USGS. This digital database was cross-checked against original data sheets from the TCEQ data room, which forms the basis of this research.

TCEQ employees were extremely helpful in allowing the USGS full access to their data and copying facilities and were always available to answer questions about the database or permitting process.

This table is a typical data sheet summarizing pre-mining groundwater baseline data for a Texas PAA. In Texas, 26 chemical constituents are measured before mining to establish a baseline, as shown in Table 1. Restoration values are initially set as baseline, with operators selecting the highest average concentration from either the production or mine area as their restoration goal. At this Zamzow well field, PAA-1, 0.171 milligram per liter uranium was the highest average value from the mine or production area for uranium, as highlighted in Table 1.

Table 2 : Initial Restoration Table for Zamzow PAA-1

Production Area Authorization  
Permit No. URO2108-011

Page 3

ATTACHMENT A  
RESTORATION TABLE

Parameter	Unit	Concentration
Calcium	mg/l	317
Magnesium	mg/l	38.4
Sodium	mg/l	387
Potassium	mg/l	30.3
Carbonate	mg/l	0
Bicarbonate	mg/l	297
Sulfate	mg/l	793
Chloride	mg/l	538
Fluoride	mg/l	0.54
Nitrate-N	mg/l	0.16
Silica	mg/l	61.6
pH	Std. Unit	7
TDS	mg/l	2,269
Conductivity	umhos	3,204
Alkalinity	Std. Unit	275
Arsenic	mg/l	0.009
Cadmium	mg/l	0.001
Iron	mg/l	0.013
Lead	mg/l	0.004
Manganese	mg/l	0.224
Mercury	mg/l	0.0006
Selenium	mg/l	0.01
Ammonia	mg/l	0.374
Molybdenum	mg/l	0.226
Uranium	mg/l	0.171



Table 2 is a copy of the initial restoration table for Zamzow PAA-1. Note that the restoration goal for uranium in groundwater is set as 0.171 milligram per liter, as highlighted on the table, which was the highest average uranium content from the PAA mine area, as shown on Table 1.

Table 3: Amended Restoration Table for Zamzow PAA-1

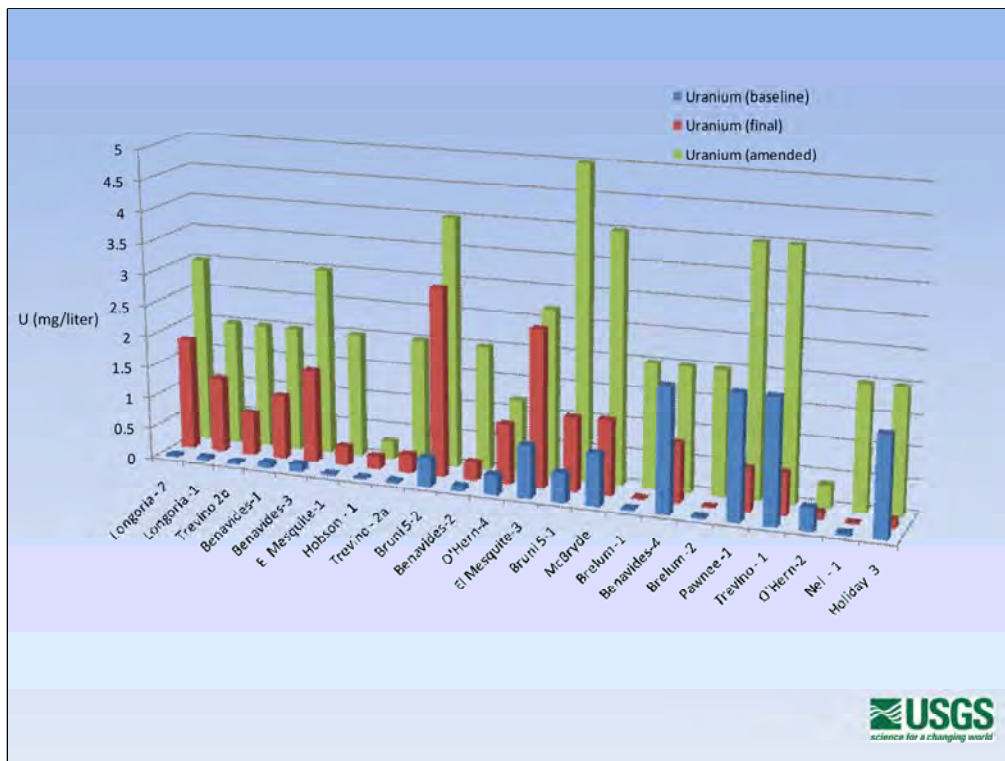
ATTACHMENT A  
RESTORATION TABLE  
(Amended)

Parameter	Unit	Concentration
Calcium	mg/l	317.
Magnesium	mg/l	38.4
Sodium	mg/l	450.
Potassium	mg/l	30.3
Carbonate	mg/l	0
Bicarbonate	mg/l	750.
Sulfate	mg/l	793.
Chloride	mg/l	538.
Fluoride	mg/l	0.54
Nitrate-N	mg/l	0.16
Silica	mg/l	51.6
pH	std. units	6.5 - 8.5
TDS	mg/l	2289.
Conductivity	µmhos	3204.
Alkalinity	std. units	500.
Arsenic	mg/l	0.2
Cadmium	mg/l	0.001
Iron	mg/l	0.915
Lead	mg/l	0.004
Manganese	mg/l	0.224
Mercury	mg/l	0.0006
Molybdenum	mg/l	5.
Selenium	mg/l	0.01
Uranium	mg/l	3.
Ammonia-N	mg/l	200.
Radium-226	pCi/l	200.



All PAAs in Texas have received amended restoration goals for at least one element after operators have expended a reasonable degree of effort to restore groundwater, as determined by TCEQ regulators, following established guidelines. The final restoration table for Zamzow PAA-1 shows an amended limit of 3.00 milligrams per liter for uranium. This amended restoration value is believed to be a relatively arbitrary value set by the regulators, as illustrated by the number of PAAs that set amended values at rounded whole numbers that were unrelated to any restoration level actually achieved in the PAAs. As there are no “final sample” data for Zamzow PAA-1, no information is available to describe the degree to which this well field was restored.





This graph of uranium concentration for various Texas PAAs illustrates the relationship between baseline, final values, and amended restoration goals in the PAAs where final values were available. The blue bars represent baseline restoration goals for uranium as set by the highest average uranium concentration in baseline samples from either the mine or the production area. Well-field designations are shown on the X-axis of this chart. Red bars represent “final values” for uranium prior to release of the PAAs, and green bars represent amended restoration goals for uranium. There is no clear relationship between the final value achieved for uranium in groundwater at the PAAs, and the amended restoration goals. Amended restoration goals do not reflect the degree of restoration achieved at the PAAs in Texas for which final values are available. Therefore, only those fields for which final values were available were chosen for this analysis.

Only 22 PAAs from 13 mines have final sample values. These 22 PAAs form the basis of the study of restoration at these well fields.

**Table 4: Baseline Groundwater in United States  
ISR Mines – Constituents with EPA MCLs**

Baseline Groundwater Characteristics of U.S. Uranium ISR Projects								
Chemical Constituent (mg/L unless stated otherwise)	EPA MCL	Texas Baseline Range (71- 77 PAAs)	Texas - Number of PAAs Where Average Baseline Exceeds MCL/total # of PAAs & percentage	New Mexico Crown Point ISL Pilot	Colorado Grover ISL Pilot	Wyoming (SR WF1, CR MU2-6, Irigaray MU1- 5)	Nebraska Crow Butte (MU 1-5 & R&D Site)	
<b>USEPA Primary Maximum Contaminant Levels (MCLs):</b>								
Arsenic	0.010	0.0010 - 0.2000	45/73	62%	0.004	0.01	0.006	0.001
Barium	2	-	-	-	0.1	0.03	0.073	0.10
Cadmium	0.005	0.0001 - 0.126	21/73	29%	0.006	0.002	0.016	0.006
Chromium	0.1	-	-	-	0.007	0.003	0.259	0.01
Copper	1.3	-	-	-	0.01	0.06	0.043	0.012
Cyanide	0.2	-	-	-	0.088	-	-	-
Fluoride	4	0.2 - 2.0	0/73	0%	0.39	0.7	0.307	0.69
Gross Alpha (pCi/L)	15	-	-	-	-	87.67	-	-
Gross Beta (millirems/year)	4	-	-	-	-	15.23	-	-
Lead	0.015	0.001 - 1.970	35/73	48%	0.003	0.02	0.038	0.032
Mercury	0.002	0.00003 - 0.44500	6/73	8%	0.00024	0.0002	0.001	0.0007
Nitrate	10	0.01 - 12.0	1/77	1%	0.09	1.4	3.01	0.07
Nitrite	1	-	-	-	-	-	0.168	0.004
Radium ( <sup>226</sup> & <sup>228</sup> Ra: pCi/L)	5	5.45 - 1536.5	71/71	100%	<14.1	13.4	293.15	405.4
Selenium	0.05	0.001 - 0.600	7/73	10%	0.01	0.01	0.015	0.002
Uranium	0.03	0.002 - 2.913	66/73	90%	0.01	0.086	0.193	0.103

#### Baseline Characterization of Groundwater in U.S. ISR Well Fields

Baseline standards for all 77 Texas PAAs can be used to characterize Texas ISR well fields that serve as a basis of comparison with baseline values determined for other ISR well fields in the United States. The argument is commonly made that before mining, groundwater in ISR well fields is so contaminated that it should not be used for human consumption. Before mining, these aquifers are typically granted exemptions from the Clean Water Act, termed aquifer exemptions, by the U.S. Environmental Protection Agency (USEPA).

In Texas, more than 25 percent of PAAs are characterized by baseline groundwater above the maximum contaminant level (MCL) for arsenic, cadmium, lead, radium, and uranium (shown highlighted on Table 4). MCL is set by the U.S. Environmental Protection Agency (USEPA;

<http://www.epa.gov/safewater/contaminants/index.html>) for those elements with well-established links to negative human health effects. All PAAs contain radium above MCL, and 90 percent contain uranium above MCL. Although baseline is artificially elevated in this database because the operator is selecting the highest average value within the production or mine area, this value does serve to identify elements of concern in these well fields.

In the Crown Point pilot project in New Mexico, only cadmium was elevated above MCL. At the Grover pilot project in Colorado, baseline water showed gross alpha, gross beta, radium, and uranium above MCL. In Wyoming, averaged values for the Smith Ranch 1, Christensen Ranch 2-6, and Irigaray 1-5 mine units were elevated above MCL for cadmium, chromium, lead, radium, and uranium.

In Nebraska (Crow Butte mine units 1-5 and the Crow Butte R & D site), average cadmium, lead, radium, and uranium were elevated above MCL. Elements above MCL are highlighted in the table.

With the exception of the New Mexico deposit (Crown Point), these well fields are characterized by groundwater elevated in multiple MCLs prior to mining. Radium is almost always elevated above MCL while uranium is typically elevated and cadmium and lead commonly elevated. These well fields would require pretreatment to be used as a source for drinking water.

**Table 5: Baseline Groundwater in U.S. ISR Mines – Constituents with EPA Secondary (recommended) Standards**

Baseline Groundwater Characteristics of U.S. Uranium ISL Projects								
Chemical Constituent (mg/L unless stated otherwise)	EPA Secondary Standard	Texas Baseline Range (71/ 77 PAAs)	Texas - Number of PAAs Where Average Baseline Exceeds Secondary Standards/total # of PAAs & Percentage (highlighted if > 75% of PAAs Exceed Secondary Standards)		New Mexico Crown Point ISL Pilot	Colorado Grover ISL Pilot	Wyoming (SR WFT, CR MU-6, Highway MU1- 5)	Nebraska Crow Butte (MU 1-5 & R&D Site)
EPA Secondary Recommended Standards:								
Aluminum	0.200	-	-	-	0.02	0.537	0.117	-
Chloride	250	122.5 - 3505.0	64/77	83 %	20.3	7	9.8	202.6
Iron	0.30	0.01 - 6.3	32/72	44 %	0.67	0.7	0.648	0.04
Manganese	0.05	0.01 - 5.06	37/73	51 %	0.05	0.02	0.018	0.03
Silver	0.10	-	-	-	<0.01	0.003	-	-
Sulfate	250	10.3 - 1197	10/77	13 %	38	38.3	300	353
Total Dissolved Solids	500	628 - 6349	73/73	100 %	357	295	616	1177
Zinc	5	-	-	-	0.01	0.04	0.073	0.017

Recommended secondary standards are set by the USEPA for constituents that, in high enough concentrations, negatively affect the esthetic quality of groundwater, but are not conclusively linked to any negative human health effect. Of those elements for which secondary standards are set by the USEPA, iron, sulfate, and total dissolved solids (TDS) are commonly elevated above recommended levels in pre-mining water at ISR facilities. Chloride and manganese are commonly high in Texas PAAs before mining, while TDS is elevated above the recommended standard in all pre-mining Texas PAAs. Elements elevated above secondary standards are highlighted in Table 5.

**Table 6: Baseline Groundwater in U.S. ISR Mines – Constituents with no MCL or Secondary Standard**

Baseline Groundwater Characteristics of U.S. Uranium ISR Projects						
Chemical Constituent (mg/L unless stated otherwise)	USEPA MCL	Texas Baseline Range (71- 77 PAAs)	New Mexico Crown Point ISR Pilot	Colorado Grover ISR Pilot	Wyoming ISR W1-1, CR MU2-6 (mparay MU1-5)	Nebraska Crow Butte (MU 1-5 & R&D Site)
<i>No Established MCL or Recommended Secondary Standard:</i>						
Alkalinity (as CaCO <sub>3</sub> )	-	24 - 349	-	154.7	116.1	-
Ammonia-N	-	0.01 - 7.49	0.47	0.25	0.344	0.26
Bicarbonate	-	125 - 500	228	220.1	171.6	344
Boron	-	-	0.1	0.1	0.1	0.93
Calcium	-	0.2 - 395	5.8	9.1	29.4	12.97
Carbonate	-	0.10 - 38	-	4.31	22.4	369
Cobalt	-	-	<0.05	-	-	-
Conductivity (umhos/cm)	-	1,110 - 11,160	-	380.7	1051	1947
Magnesium	-	0.48 - 150.0	-	1.1	5.324	3.27
Molybdenum	-	0.01 - 2.53	0.172	0.02	0.100	0.05
Nickel	-	-	0.02	0.2	0.093	0.03
Phosphorous	-	-	-	0.05	-	-
Potassium	-	6.38 - 101.1	-	4.43	9.810	13.10
Silica	-	15 - 98	-	5.45	10.496	16.7
Sodium	-	174 - 2,356	114	85.2	155	410
Thorium	-	-	-	0.7417	-	-

Table 6 shows average concentrations and a range of concentrations in Texas PAAs, within pre-mining baseline groundwater for those analytes for which no primary or secondary standards have been set by the USEPA.

Table 7: Groundwater Chemistry of Texas In-situ Uranium Production Authorization Areas (22 PAAs where final analyses are available)							
Analyte	USEPA and TCEQ Drinking Water Standards (mg/l)	Baseline Range	Post-Restoration Range	PAAs with Baseline Above MCL or Recommended Standards	PAAs with Post-Restoration Water Above MCL or Recommended Standards	PAAs Where Post-Restoration Analyses Exceed Baseline	PAAs Where Post-Restoration Analyses are Below Baseline
USEPA and TCEQ Primary Maximum Contaminant Levels (MCLs):							
Arsenic	0.01	0.04 - 0.23	0.002 - 0.323	77%	55%	18%	82%
Cadmium	0.005	0.0001 - 0.0126	0.0001 - 0.01	45%	23%	27%	73%
Fluoride	4	0.21 - 1.8	0.29 - 1.6	0%	0%	31%	69%
Lead	0.02	0.003 - 1.97	0.001 - 0.05	81%	16%	9%	91%
Mercury	0.002	0.0001 - 0.445	0.0001 - 0.01	9%	0%	22%	64%
Nitrate	10	0.031 - 10.0	0.001 - 2.8	0%	0%	4%	96%
Selenium	0.05	0.001 - 0.049	0.001 - 0.102	18%	4%	54%	45%
Radium (226 & 228 Ra: Po/l)	5 pei/l	0.36 - 429.8	6.2 - 149	100%	100%	4%	96%
Uranium	0.03	0.025 - 2.0	0.013 - 3.02	95%	86%	68%	32%
TCEQ Secondary Recommended Standards							
Sulfate	300	15.8 - 250	78 - 3881	0%	18%	86%	14%
Chloride	300	196.9 - 3505	138 - 3326	86%	86%	22%	78%
Total Dissolved Solids	1000	785.7 - 6349	706.3 - 6155	81%	77%	31%	55%
Iron	0.3	0.04 - 5.48	0.01 - 2.7	54%	9%	4%	96%
Manganese	0.05	0.01 - 0.41	0.01 - 0.84	77%	50%	40%	60%
No Established MCL or Secondary Standards							
Calcium	-	4.13 - 241	14.7 - 191			77%	23%
Magnesium	-	0.477 - 125	2.27 - 53			72%	28%
Sodium	-	200 - 2356	189 - 2247			31%	65%
Potassium	-	6.38 - 101	6.1 - 70			14%	86%
Carbonate	-	0.1 - 17.9	0 - 14.6			50%	30%
Bicarbonate	-	160 - 500	160 - 500			66%	25%
Silica	-	16.3 - 76	13.4 - 77.6			19%	81%
Conductivity (umhos/cm)	-	1310 - 11180	1429 - 3697			76%	24%
Alkalinity (as CaCO <sub>3</sub> )	-	134 - 349	145 - 408			81%	10%
Molybdenum	-	0.01 - 0.2	0.0001 - 3.38			42%	54%
Ammonia-N	-	0.01 - 7.49	0.04 - 120			76%	24%
Baseline and post-restoration data was available for all 22 PAAs with the exception of: Ra, Mo, K, Si, Bicarbonate, Ammonia (21), Conductivity (14), Alkalinity (11) & Carbonate (10).							

## Restoration Results for Texas PAAs

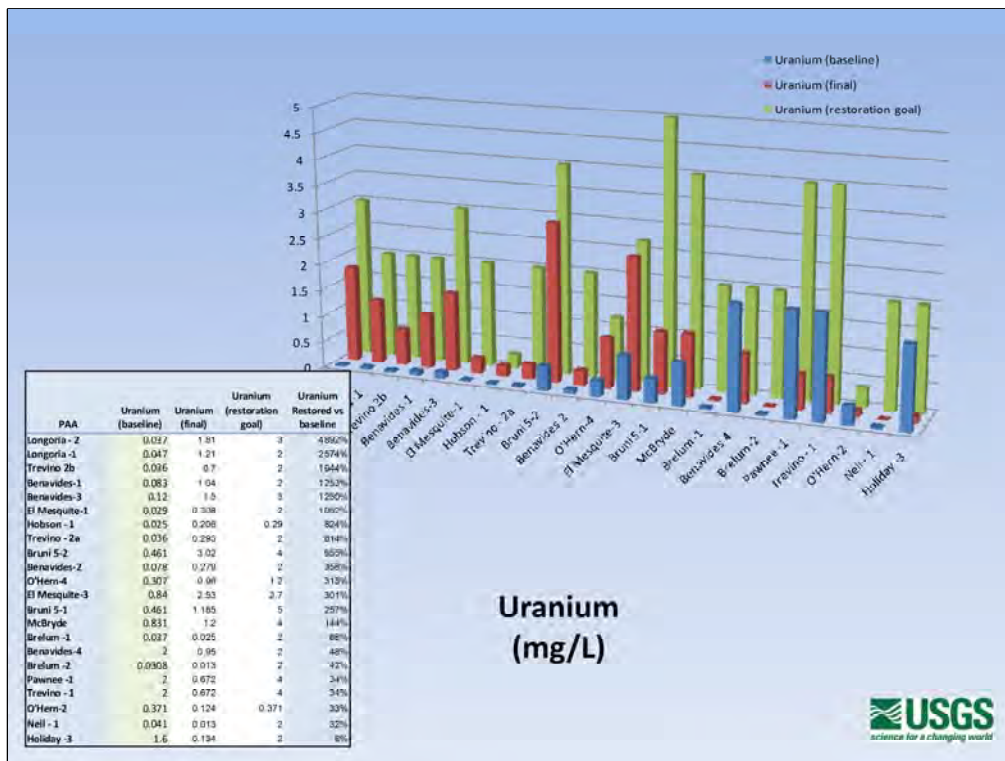
Table 7 shows the average value, post-restoration, and baseline ranges of chemical constituents for all 22 well fields that have post-restoration analyses in the TCEQ records.

In general, at PAAs where post-restoration values exceed MCL, the elements elevated in baseline values (As, Cd, Pb, Se, Ra, and U) continue to be elevated after mining.

As compared to baseline values for the PAAs, uranium and selenium are elevated in the majority of PAAs. More than half of PAAs show a decrease in As, Cd, Fl, Pb, Hg, nitrate, and Ra after mining.

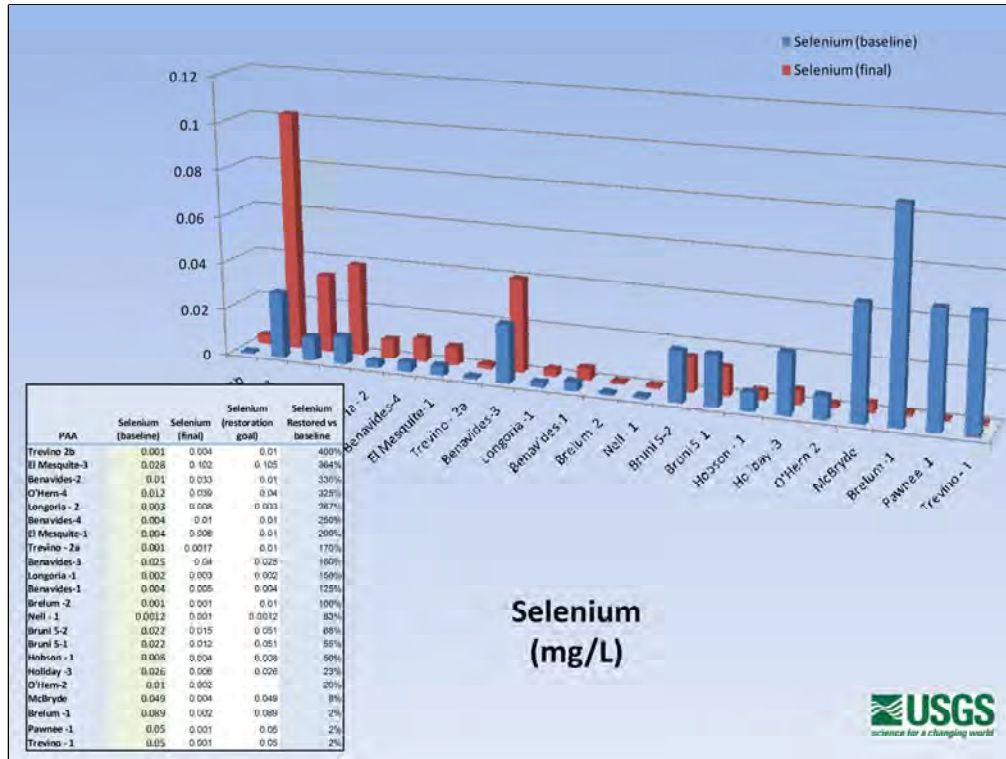
The following slides examine these trends in detail.



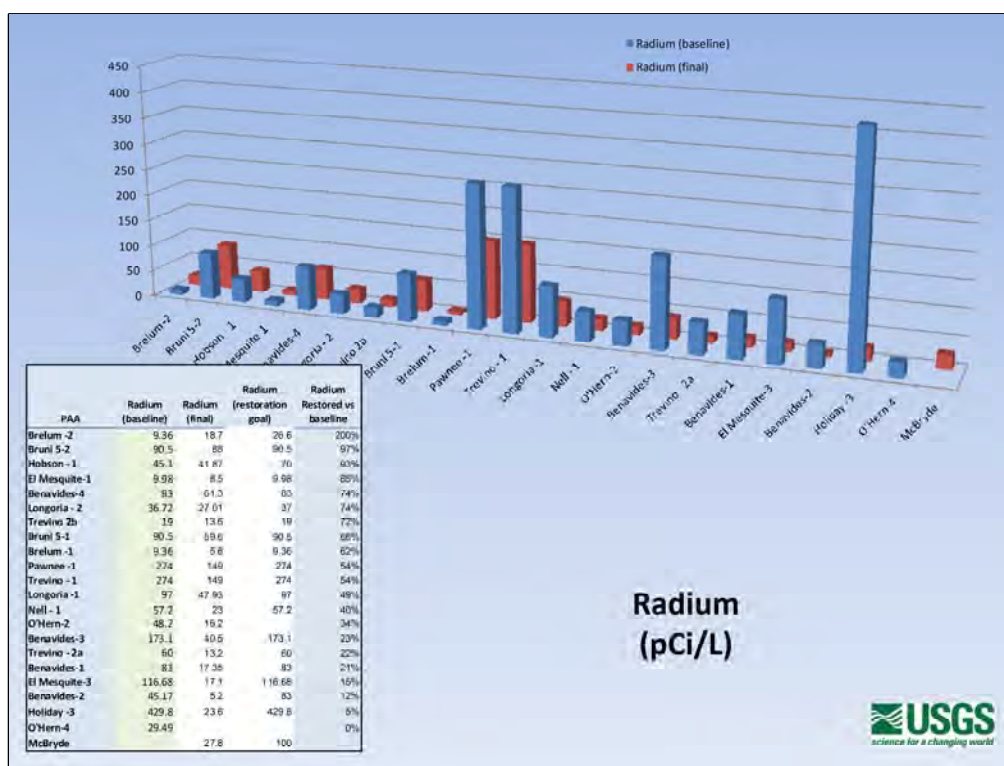


The USEPA-established MCL for uranium in drinking water is 0.03 milligram per liter. Ninety-five percent of Texas PAAs have a baseline value above MCL. Only the Hobson-1 and El Mesquite-1 PAAs were below the MCL for uranium and El Mesquite “rounded out” to equal MCL.

Eighty-six percent of Texas PAAs show a final restoration above MCL. In 68 percent of PAAs, final value exceeded baseline, and in 32 percent of PAAs, restoration was below baseline for uranium.

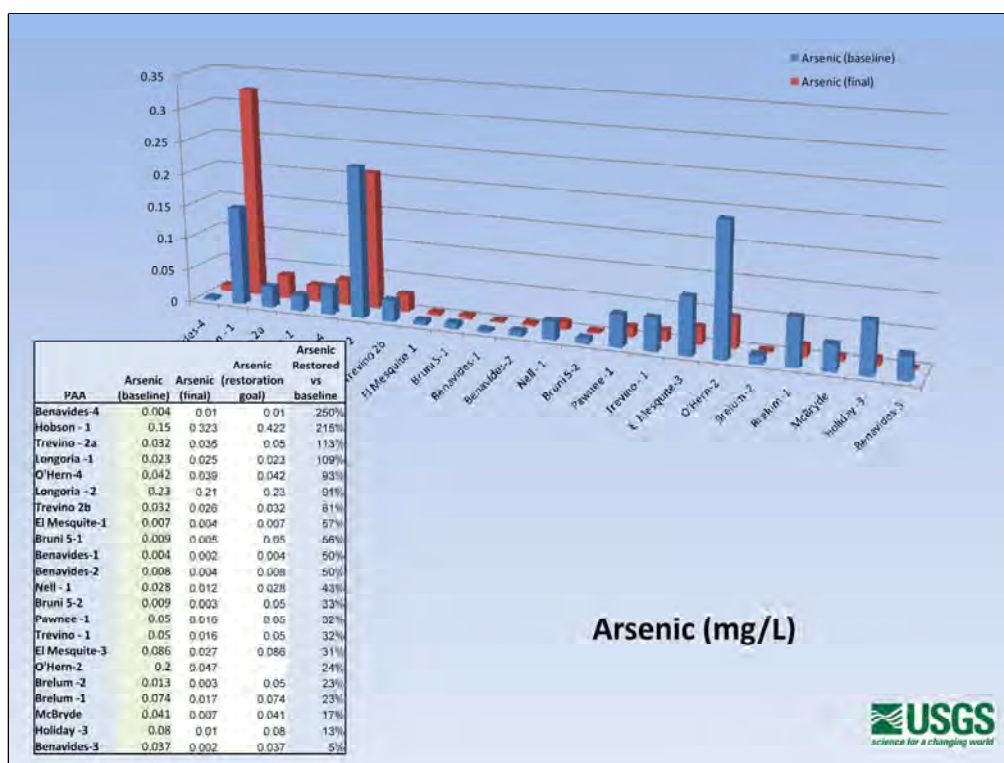


The MCL for selenium is 0.05 milligram per liter in drinking water. In 18 percent of PAAs, baseline of groundwater was above MCL, and in 24 percent of PAAs, the final restoration value was above MCL. After mining and restoration, 55 percent of PAAs exceeded baseline and 45 percent of PAAs were below baseline.



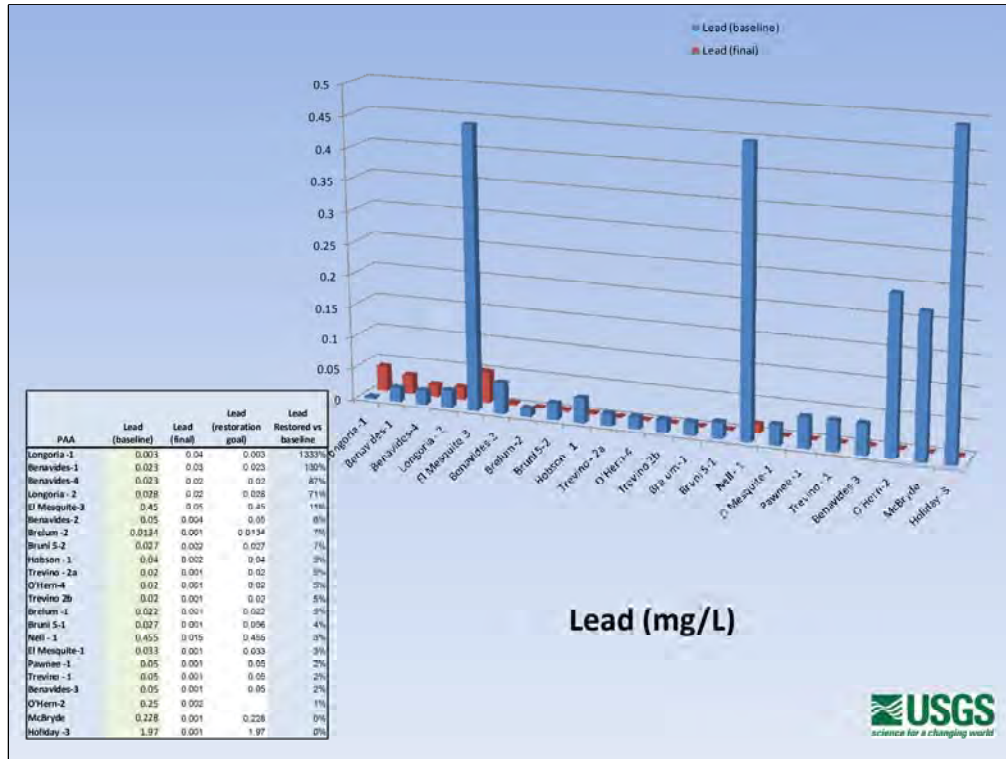
The MCL for radium ( $^{226}\text{Ra}$  and  $^{228}\text{Ra}$ ) is 5 pCi/L in drinking water. All PAAs are characterized by baseline and post-restoration radium concentrations above MCL. After mining and restoration, 4 percent of PAAs were above baseline, and 96 percent of PAAs were below baseline.





The MCL for arsenic is 0.01 milligram per liter in drinking water. Before mining, 77 percent of PAAs showed arsenic above the MCL, and after restoration 55 percent of PAAs were above the MCL.

After restoration, 18 percent of PAAs exceeded baseline and 82 percent of PAAs were below baseline.



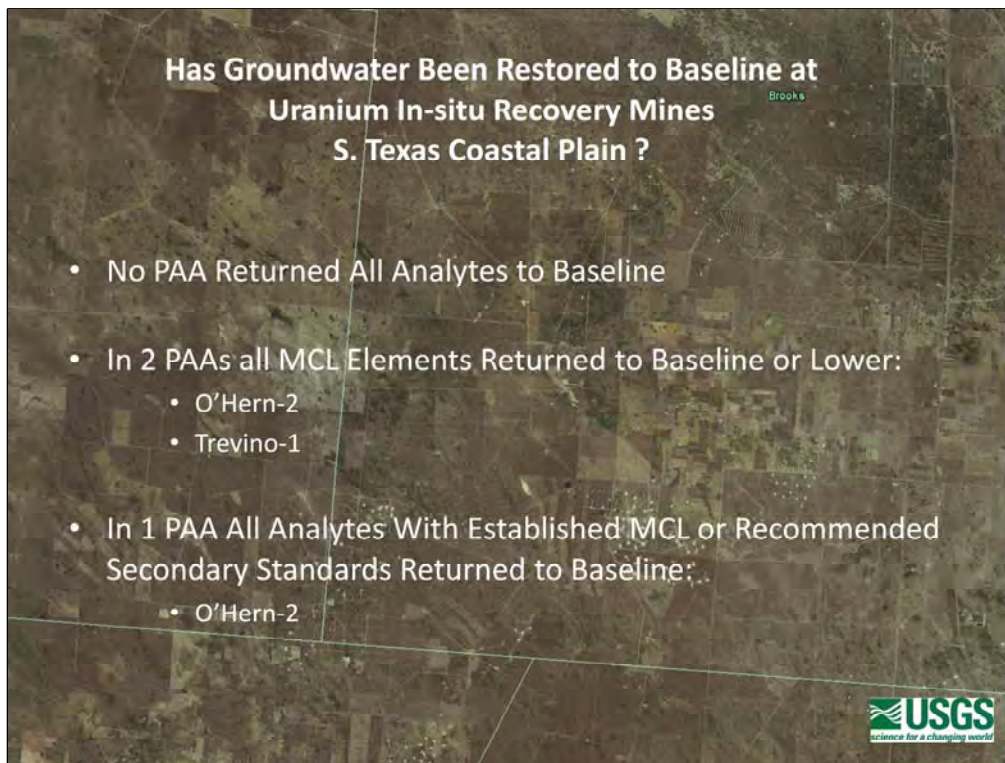
The MCL for lead is 0.02 milligram per liter in drinking water. Eighty-one percent of PAAs have baseline levels above MCL, and 18 percent of PAAs are characterized by final restoration values above MCL.

After mining and reclamation, 9 percent of PAAs were above baseline and 91 percent of PAAs were below baseline.

Table 7: Ground-water Chemistry of Texas In-situ Uranium Production Authorization Areas (22 PAAs where final analyses are available)							
Analyte	USEPA & TCEQ Drinking Water Standards (mg/L)	Baseline Range	Post-Restoration Range	PAAs with Baseline Above MCL or Recommended Standards	PAAs with Post-Restoration Water Above MCL or Recommended Standards	PAAs Where Post-Restoration Analyses Exceed Baseline	PAAs Where Post-Restoration Analyses are Below Baseline
USEPA & TCEQ Primary Maximum Contaminant Levels (MCLs)							
Arsenic	0.01	0.04 - 0.23	0.02 - 0.323	77%	55%	18%	82%
Cadmium	0.005	0.0001 - 0.0126	0.0001 - 0.01	45%	23%	27%	73%
Fluoride	4	0.21 - 1.8	0.29 - 1.6	0%	0%	31%	89%
Lead	0.02	0.003 - 1.97	0.001 - 0.05	81%	18%	9%	91%
Mercury	0.002	0.0001 - 0.445	0.0001 - 0.01	9%	0%	22%	64%
Nitrate	10	0.031 - 10.0	0.001 - 2.8	0%	0%	4%	96%
Selenium	0.05	0.001 - 0.049	0.001 - 0.102	18%	4%	54%	45%
Radium (226 & 228 Ra: Pci/L)	5 Pci/L	9.36 - 429.8	5.2 - 149	100%	100%	4%	96%
Uranium	0.03	0.025 - 2.0	0.013 - 3.02	95%	86%	68%	32%
TCEQ Secondary Recommended Standards							
Sulfate	300	15.8 - 250	78 - 3881	0%	18%	86%	14%
Chloride	300	196.9 - 3505	138 - 3326	86%	86%	22%	78%
Total Dissolved Solids	1000	765.7 - 6349	706.3 - 6155	81%	77%	31%	55%
Iron	0.3	0.04 - 5.49	0.01 - 2.7	54%	9%	4%	96%
Manganese	0.05	0.01 - 0.41	0.01 - 0.84	77%	50%	40%	60%
No Established MCL or Recommended/Secondary Standard							
Calcium	-	4.13 - 241	14.7 - 191			77%	23%
Magnesium	-	0.477 - 125	2.27 - 53			72%	28%
Sodium	-	200 - 2356	189 - 2247			31%	65%
Potassium	-	6.38 - 101	6.1 - 70			14%	86%
Carbonate	-	0.1 - 17.9	0 - 14.6			50%	30%
Bicarbonate	-	160 - 500	160 - 500			86%	25%
Silica	-	16.3 - 76	13.4 - 77.6			19%	81%
Conductivity (umhos/cm)	-	1310 - 11160	1429 - 3897			76%	24%
Alkalinity (as CaCO <sub>3</sub> )	-	134 - 349	145 - 408			81%	19%
Molybdenum	-	0.01 - 0.2	0.0001 - 3.38			42%	54%
Ammonia-N	-	0.01 - 7.49	0.04 - 120			76%	24%
Baseline and post-restoration data was available for all 22 PAAs with the exception of: Ra, Mo, K, Si, Bicarbonate, Ammonia (21), Conductivity (14), Alkalinity (11) & Carbonate (10).							

Although restoration results vary widely for individual well fields, among the elements with an MCL, only selenium and uranium show overall increases in post-restoration groundwater in more than 50 percent of PAAs (Table 7). Of constituents for which secondary standards are established by the USEPA, sulfate increased in the majority of well fields after mining and restoration, whereas chloride, TDS, iron, and manganese decreased in the majority of well fields.

Of those chemical constituents for which there are no established MCLs or secondary standards, calcium, magnesium, bicarbonate, conductivity, carbonate, alkalinity and ammonia increased; sodium, potassium and silica decreased in the majority of well fields after mining and restoration. Statistically, molybdenum decreased in the small majority of well fields after mining.




Regarding the original question of whether or not groundwater has been restored to baseline in Texas uranium ISR well fields, it was observed that no well field for which final sample results were found in TCEQ records returned every element to baseline. However, two PAAs returned all elements for which USEPA has established MCLs to baseline: the O'Hern-2 and Trevino-1 PAAs.

Trevino-1, which was mined from the Oakville Sandstone and restored using electrodialysis, shows restored sulfate to 164 percent of baseline. Reclamation at O'Hern-2 returned constituents with secondary standards or MCLs to baseline values or below.



**Table 8: Baseline and Final Chemistry of Groundwater at the O'Hern PAA-2 Well Field**

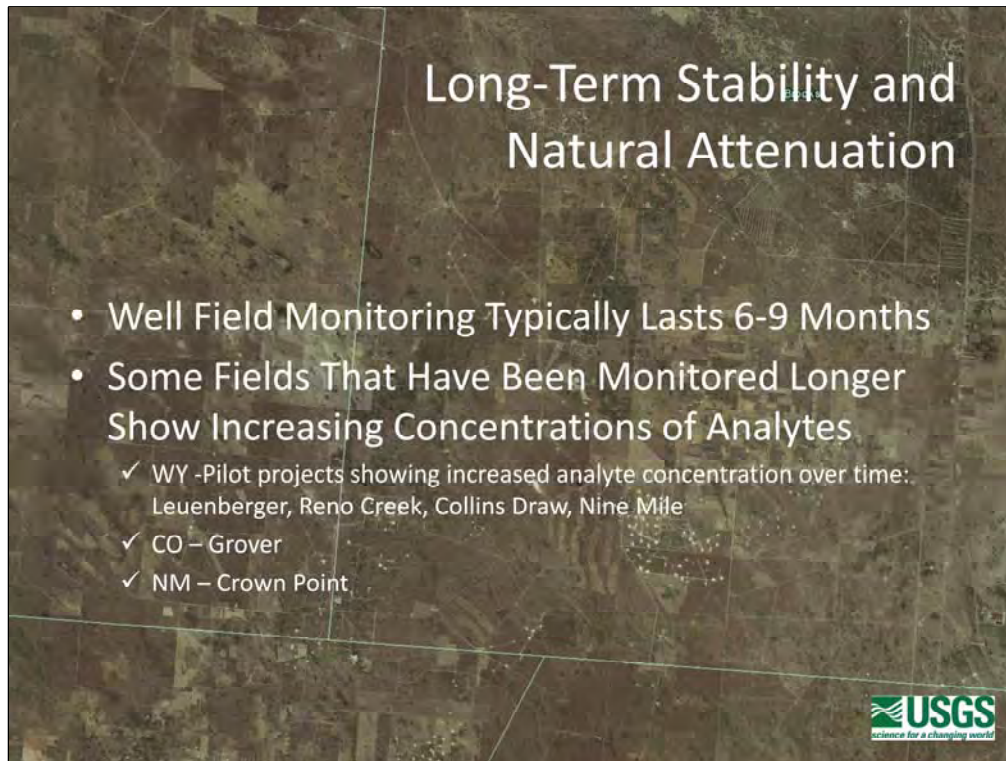
O'Hern-2 Groundwater Sweep and Reverse Osmosis	Analyte	Baseline	Final
Analyses for which EPA and TCEQ have set Maximum Contaminant Levels	Arsenic	0.2	0.047
	Cadmium	0.01	0.0005
	Fluoride	1.37	0.73
	Lead	0.25	0.002
	Mercury	0.445	0.0001
	Nitrate-N	0.86	0.47
	Selenium	0.01	0.002
	Radium	48.2	16.2
	Uranium	0.371	0.124
	Sulfate	129	102
Analyses for which TCEQ has set Secondary Recommended Upper Limits	Chloride	254	220
	TDS	979	890
	Iron	3.52	0.02
	Manganese	0.124	0.03
	Ca	13.7	14.7
	Mg	2.7	2.27
	Na	310	289
	K	9.7	6.6
	Carbonate	1.78	2.6
	Bicarbonate	347	
	Silica	43.7	35
	Conductivity	1626	1429
	Alkalinity		
	Ammonia-N	0.77	0.3
	Molybdenum	1.1	0.24



Specifically looking at restoration details from the O'Hern PAA-2, this well field was developed by Cogema from 1979 to 1982 in the Catahoula Formation. Groundwater sweep and reverse osmosis were both used to restore groundwater after mining. Calcium and carbonate were both slightly elevated above baseline following mining and reclamation, as shown in Table 8 above.

The aquifer overlying O'Hern-2 is characterized by an average calcium of 27 milligrams per liter and carbonate of 10.1 milligrams per liter, so post-restoration elevation of these elements in the O'Hern-2 PAA seems inconsequential in the scheme of local hydrochemistry. No final values for bicarbonate or alkalinity were reported, so the specific degree to which this PAA was restored is unknown.

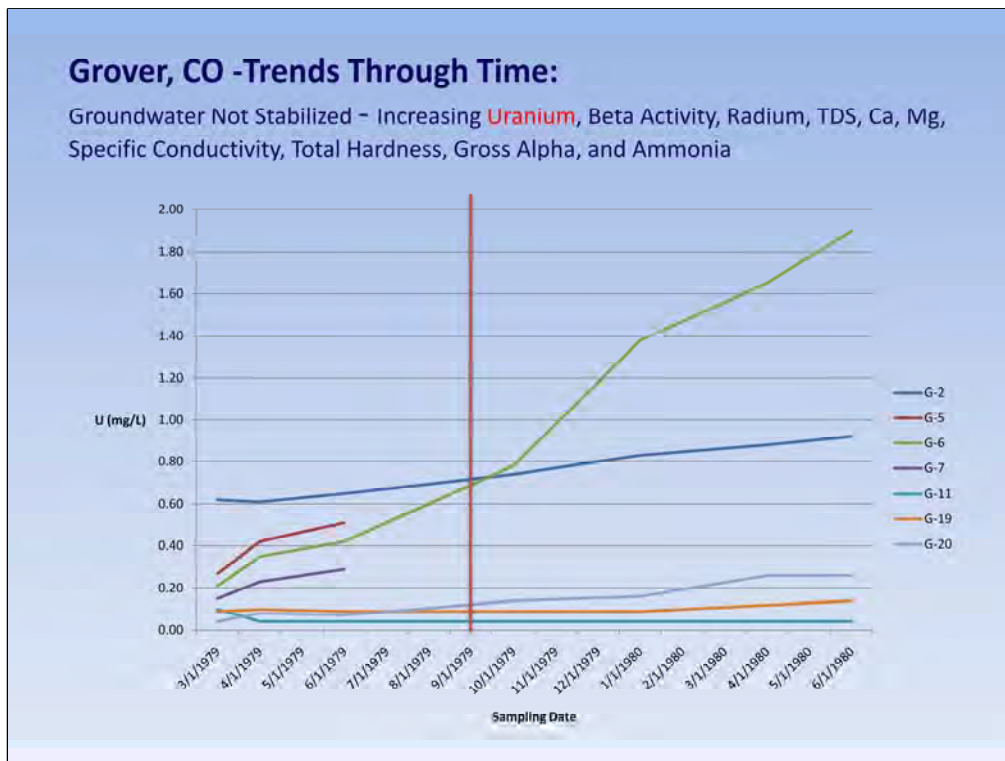
There is a notation in the TCEQ database that O'Hern PAA-3 did not receive any amendments. However, this could not be corroborated by TCEQ records.



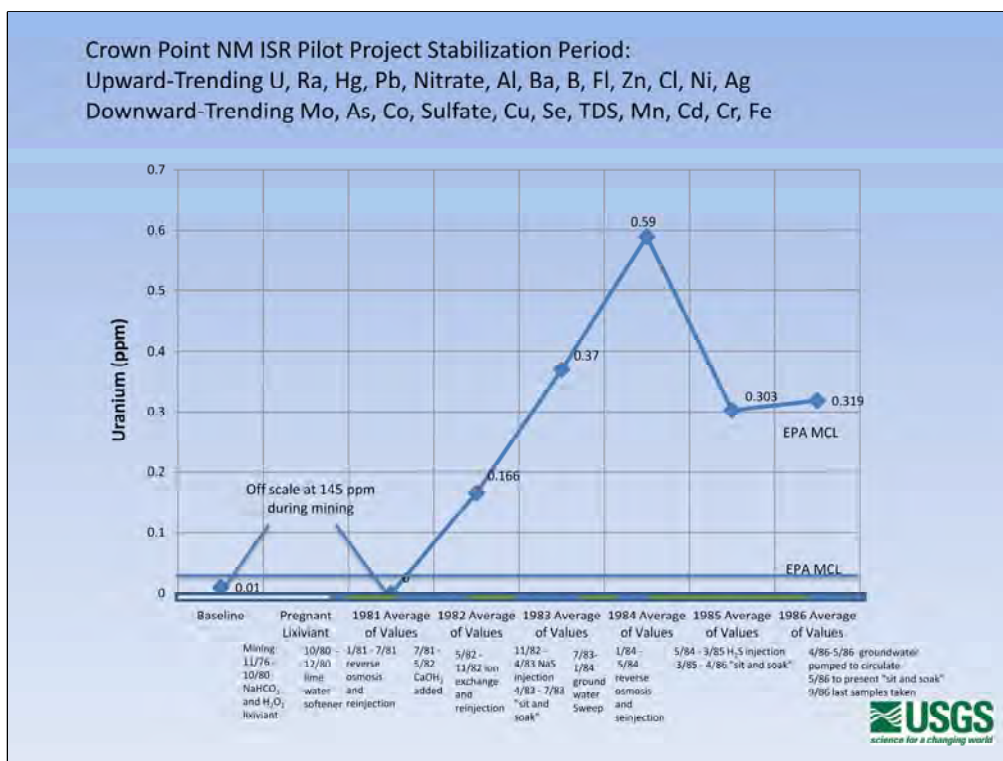
### **Long-Term Stability and Natural Attenuation**

In Texas, after ISR mining ceased and restoration of the well fields was completed, PAAs were monitored for a minimum of 6 months. This period of monitoring has recently been increased to one year if no amendments to the restoration table are requested, and to two years if the operator requests an amendment to the restoration table.

Some well fields monitored for longer periods of time during the post-mining and remediation stability period show trends of increasing analyte concentration, as noted by USGS geologists while examining records at pilot projects in Colorado (Grover), New Mexico (Crown Point), and throughout Wyoming.



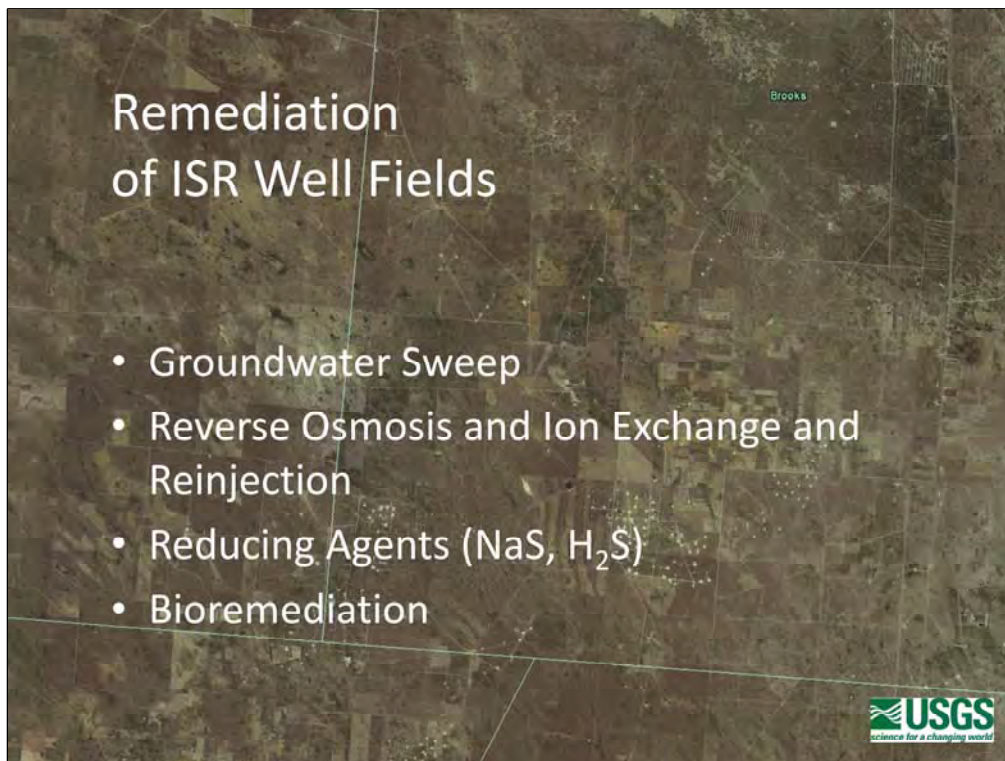
At the Grover, Colorado, pilot test site, pump and treat technologies did not return groundwater to baseline. Analysis of data collected by Colorado State regulators showed upward-trending uranium, beta activity, radium, TDS, calcium, magnesium, specific conductivity, total hardness, gross alpha, and ammonia. Results from individual wells differentiated using solid colored lines are shown above in the time series plot of uranium concentration. Note that the vertical red line indicates the end of the 6-month stabilization period required for Texas PAAs. These increasing concentrations of analytes indicate groundwater may not have stabilized when the Grover well field was released.



During the one-year stabilization period that followed restoration at Mobil's Crown Point, New Mexico ISR pilot project, both upward and downward trends in various chemical constituents were noted (Mobil, 1981). The Crown Point data are not detailed enough to analyze these trends, but the data indicate that groundwater may not have stabilized when the final samples were collected, similar to the Grover, Colorado, project.

Examples from Grover, Colorado, Crown Point, New Mexico, and ISR pilot projects in Wyoming indicate that the 6-month stability period mandated by Texas ISR rules may not have been long enough to adequately determine if groundwater in well fields had stabilized. Recent rule changes in Texas allow for longer term monitoring and could yield valuable data about the chemical stability of groundwater after ISR mining.





### Effectiveness of Restoration Techniques

After mining has ceased, a restoration method called groundwater sweep can be used whereby groundwater in a mined aquifer is pumped from the well field either to a deeper aquifer, an adjacent well field where mining is being initiated, or to surface ponds where it is allowed to evaporate. Local groundwater then “sweeps in” to replace the displaced water. This is typically the first method of restoration applied to a well field (Mays, 1994).

Reverse osmosis and ion exchange are methods of removing contaminants from groundwater in well fields. The cleaned water is then reinjected into the well fields (Mays, 1994).

Reducing agents (H, NaS and H<sub>2</sub>S) have been added to well-field groundwater in an attempt to return groundwater and host rocks to reducing conditions, thereby reversing the effects of oxidizing mining solutions (lixiviants) within the aquifer.

Bioremediation, the stimulation of native bacteria within the aquifer whose life processes fix metals from solution, is another remediation technique currently receiving much attention (Long and others, 2008).

Table 9: Elements with USEPA and TECQ Primary Maximum Contaminant Levels Restored vs. Baseline for Texas Well Fields With Known Restoration Methods									
PAA	Restoration Method	Arsenic	Cadmium	Fluoride	Lead	Mercury	Nitrate-N	Selenium	Radium Uranium
Hobson - 1	GW Sweep Only	215%	1%	134%	5%	16%	9%	50%	93% 824%
Lorigoria -1	GW Sweep Only	109%	10000%	98%	1333%	333%	34%	150%	49% 2574%
Longoria - 2	GW Sweep Only	91%	10000%	82%	71%	333%	22%	267%	74% 4892%
McBryde	GW Sweep Only	17%	6%	50%	0%	10%	56%	8%	144%
<b>Average for GW Sweep Only</b>		<b>108%</b>	<b>5002%</b>	<b>91%</b>	<b>353%</b>	<b>173%</b>	<b>30%</b>	<b>119%</b>	<b>72% 2109%</b>
Benavides-4	RO	250%	3333%	77%	87%	100%	3%	250%	74% 48%
Bruni 5-1	RO	58%	2%	143%	4%	11%	15%	55%	66% 257%
Bruni 5-2	RO	33%	4%	155%	7%	11%	22%	68%	97% 655%
O'Hern-4	RO	93%	91%	63%	5%	13%	NR	325%	NR 313%
<b>Average for RO only</b>		<b>108%</b>	<b>858%</b>	<b>110%</b>	<b>26%</b>	<b>34%</b>	<b>13%</b>	<b>175%</b>	<b>79% 318%</b>
El Mesquite-1	RO and Ion Exchange	57%	17%	117%	3%	50%	22%	200%	85% 1062%
El Mesquite-3	RO and Ion Exchange	31%	83%	74%	11%	40%	19%	364%	15% 301%
Holiday -3	RO and Ion Exchange	13%	200%	94%	0%	100%	53%	23%	5% 8%
<b>Average for RO and ion exchange</b>		<b>34%</b>	<b>100%</b>	<b>95%</b>	<b>5%</b>	<b>63%</b>	<b>31%</b>	<b>196%</b>	<b>35% 457%</b>
Brelum -1	GW Sweep and RO	23%	6%	107%	5%	10%	3%	2%	62% 68%
Brelum -2	GW Sweep and RO	23%	1%	97%	7%	11%	5%	100%	200% 42%
O'Hern-2	GW Sweep and RO	24%	5%	53%	1%	0%	55%	20%	34% 33%
<b>Average for GW Sweep and RO</b>		<b>23%</b>	<b>4%</b>	<b>86%</b>	<b>4%</b>	<b>7%</b>	<b>21%</b>	<b>41%</b>	<b>99% 48%</b>
Trevino - 1	Electrodialysis	32%	1%	82%	2%	5%	5%	2%	54% 34%
Trevino - 2a	Electrodialysis	113%	1%	83%	5%	33%	8%	170%	22% 614%
Trevino 2b	Electrodialysis	81%	1%	81%	5%	33%	19%	400%	72% 1944%
<b>Average for Electrodialysis</b>		<b>75%</b>	<b>1%</b>	<b>82%</b>	<b>4%</b>	<b>24%</b>	<b>10%</b>	<b>191%</b>	<b>49% 931%</b>

## Pump and Treat Technology

Texas provides a database that can be used to examine the effectiveness of the “pump and treat” technologies of groundwater sweep, reverse osmosis, ion exchange, and electrodialysis. Historically, pump and treat techniques were the only restoration techniques used in ISR mines developed in Texas.

Uranium in groundwater is 2,109 percent of baseline in well fields using groundwater sweep only, yet is 48 percent of baseline when groundwater sweep is combined with reverse osmosis (Table 9). Similar trends are shown for arsenic, cadmium, lead, mercury, and selenium. Trends for fluoride and nitrate are not as clear.

Analysis of patterns in Texas PAAs show restoration using groundwater sweep coupled with reverse osmosis results in the greatest decrease in concentration of chemical constituents. These coupled techniques are commonly used in many well-field restoration projects nationwide.



**Table 10: Summary of ISR Mines Where Chemical Reduction Was Used to Remediate Groundwater**

Type of Reductant	Sites	Pros	Cons
H <sub>2</sub> S	Smith Ranch, Irigaray and Collins Draw, WY; Crown Point, NM	Good Reducer	Volatile, difficult to use, mixed results, well clogging
Na <sub>2</sub> S	Crown Point, NM; Highland, WY	Less expensive than bioremediation	Overall mixed results, likely doesn't have reducing capacity necessary to effect any noticeable improvement in groundwater quality, may produce transitory effects
H <sub>2</sub>	Kingsville Dome, TX	Good Reducer	2009 pilot project. results not yet available



## Chemical Reduction

Inorganic chemical reductants are designed to reverse the effects of oxidizing lixiviant solutions on host rock and groundwater. Overall, these techniques when used in remediation of U.S. ISR mines, show mixed results (Table 10). Crown Point and Irigaray did not appear to significantly benefit from the addition of reductants into groundwater at the levels applied (LQD/DEQ Response Document, 2005; Mobil, 1981). Uranium Resources International is completing a pilot project in Texas to test the restoration effectiveness of hydrogen gas in removing analytes from groundwater (M. Pelliza, oral commun., May 2009). Results of this study are not yet available.

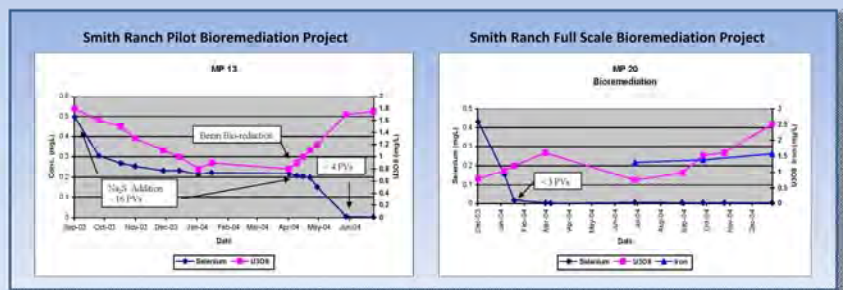
# Bioremediation

## Crow Butte, NE

- Jan. 2009: Emulsified oil substrate added to six production wells in Mine Unit 4 after groundwater sweep, ion exchange

## Smith Ranch, WY

- 2003 – Methanol and molasses (Highland Well field B)
- Selenium rapidly to non-detection levels, uranium shows upward trend



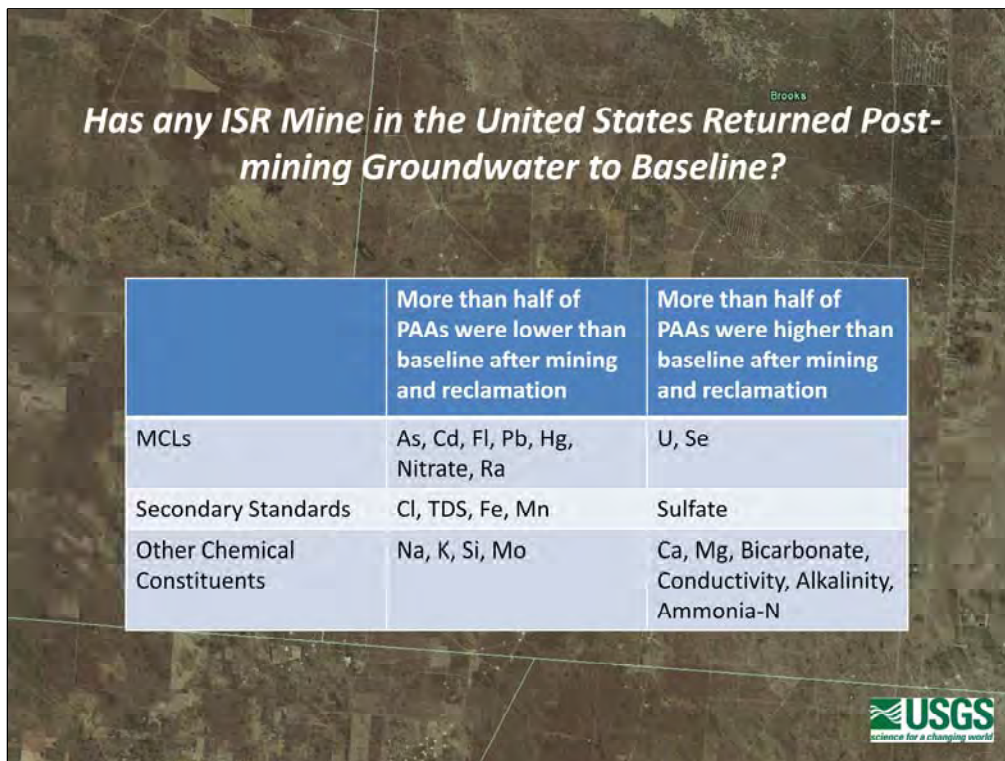
## Bioremediation

Nutrients, such as acetate, methanol, and molasses, can be added to groundwater as a food source to stimulate native bacteria populations. As bacteria populations rise in response to increased food, metal concentrations decrease in groundwater; however the exact mechanism is uncertain.

In January 2009, an emulsified oil substrate was added to 6 production wells at the Crow Butte ISR mine as part of remediation of groundwater in Mine Unit 4 (NDEQ, 2009). The first 4 months of preliminary results do not show a significant reduction in uranium. At a Smith Ranch/Highland ISR remediation project in 2003, methanol and molasses were added to wells in the Highland B well field, first as a pilot project following chemical reduction ( $\text{Na}_2\text{S}$ ) and then in a full-scale remediation project without prior chemical reduction (Reimann and Huffman, 2005). Selenium in groundwater was rapidly reduced in both the pilot (MP13) and full-scale (MP20) fields, although uranium concentration initially increased (see graphs above). Uranium increases noted in groundwater after bioremediation had been initiated may be attributable to the dissolution of iron oxyhydroxides and the concomitant release of their contained uranium in response to increasingly reducing conditions created during bioremediation (Reimann and Huffman, 2005). In subsequent bioremediation projects at Smith Ranch, cheese whey coupled with methanol has been used as a biostimulant.

The USGS continues to gather and process records from State agencies to track the effectiveness of these bioremediation methods.





## Conclusions

Can we answer the question: “Has any ISR mine in the United States returned post-mining groundwater to baseline?”

Answer: Not based upon analysis of the Texas database because “final value” records were found for only 22 of 77 PAAs (13 of 36 mines).

We can conclude that in Texas, ISR mines are characterized by high baseline arsenic, cadmium, lead, selenium, radium, and uranium. After mining and restoration, for those well fields that reported “final values” in TCEQ records, more than half of the PAAs had lowered levels of many elements, including some that dropped below MCL.

Of those elements for which MCL is established, the majority of PAAs showed increases in uranium and selenium after mining and restoration and decreases in arsenic, cadmium, fluoride, lead, mercury, nitrate, and radium to below baseline for the majority of well fields.

Analytes for which secondary standards have been established show that sulfate is the only constituent that increased in the majority of well fields after mining and remediation, whereas chloride, TDS, iron, and manganese decreased. Chemical constituents for which no MCL or secondary standards were set are higher than baseline for calcium, magnesium, bicarbonate, conductivity, alkalinity, and ammonia. Sodium, potassium, silica, and molybdenum were lower than baseline in the majority of well fields after mining and remediation.

**For More Information Contact:**

Susan Hall  
U.S. Geological Survey  
Central Energy Resources Science Center  
Box 25046, MS 939  
Denver, CO 80225

[susanhall@usgs.gov](mailto:susanhall@usgs.gov)

303-236-1656

## References Cited

- Energy Information Agency, 2009. EIA – Nuclear Data, Reports, Analysis, Surveys, 11 May 2009. accessed data at <http://www.eia.doe.gov/fuelnuclear.html>.
- Long, P.E., Yabusaki, S.B., Meyer, P.D., Murray, C.J., N'Guessan, A.L., 2008, Technical basis for assessing uranium bioremediation performance: NUREG/CR-6973. U.S. Nuclear Regulatory Commission Office of Nuclear Research, 128 p.
- LQD/DEQ Response Document, January 10, 2005 Comments, 2005, Irigaray Well field Restoration Report TFN 4 1/170 prepared by Cogema Mining Inc., Petrotek Engineering Corporation, and Resource Technologies Group.
- Mays, W.M., 1994, Restoration of groundwater at three in-situ uranium mines in Texas, IAEA Technical Committee Meeting, Vienna Austria, Oct. 5-8, 1992 as reviewed in Nuexco Review, May 1994; Groundwater Restoration of In-Situ Uranium Mines.
- Mobil, 1981. Internal company reports describing Mobil Oil Corporation's Crown Point ISR Pilot Test Project.
- NDEQ, 2009, Nebraska Department of Environmental Quality Monthly Restoration Reports Crow Butte Mine Unit 4.
- Nuclear Energy Agency, 2008, Uranium 2007 Resources, Production and Demand: a Joint Report by the OECD Nuclear Energy Agency and the International Atomic Energy Agency, 420 p.
- Reimann, L. and Huffman, L., 2005, Biological reduction of metals during ground water restoration: presented at the Global Uranium Symposium, July 13, 2005, Casper, Wyoming.

UNITED STATES NUCLEAR REGULATORY COMMISSION

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BRIEFING ON URANIUM RECOVERY

+ + + + +

TUESDAY,

MARCH 2, 2010

+ + + + +

The Commission met at 9:30 a.m., the Honorable Gregory B. Jaczko, Chairman, presiding.

COMMISSIONERS PRESENT:

GREGORY B. JACZKO, Chairman

DALE E. KLEIN, Commissioner

KRISTINE L. SVINICKI, Commissioner



### PANEL 1- NRC Staff

BILL BORCHARDT, Executive Director for Operations

PATRICIA BUBAR, Deputy Director, Environmental Protection and Performance Assessment directorate, Division of Waste Management and Environmental Protection, FSME

ANDREA KOCK, Chief, Environmental Review Branch, Division of Waste Management and Environmental Protection, FSME

BILL VON TILL, Chief, Uranium Recovery Licensing Branch, Division of Waste Management and Environmental Protection, FSME

KEITH MCCONNELL, Deputy Director, Decommissioning and Uranium Recovery Licensing Directorate, Division of Waste Management and Environmental Protection, FSME

### PANEL 2- Federal Representatives

ROY SIMON, Associate Branch Chief for Prevention, Drinking Water Protection Division, U.S. Environmental Protection Agency

JONATHAN EDWARDS, Director, Radiation Protection Division, U.S. Environmental Protection Agency

FRANK MARTIN, Deputy Chief, Solid Minerals Division, Bureau of Land Management, U.S. Department of Interior

### PANEL 3- Stakeholders

DONALD MCKENZIE, Administrator, Land Quality Division, Wyoming Department of Environmental Quality

GEOFFREY FETTUS, Senior Project Attorney, Natural Resources Defense Council

KATIE SWEENEY, General Counsel, National Mining Association

SUSAN JABLONSKI, Director, Radioactive Materials Division, Texas

Commission on Environmental Quality

## PROCEEDINGS

CHAIRMAN JACZKO: Well, good morning. Today we will be focusing on the licensing aspects of new uranium recovery facilities during our Commission meeting. And I think we need to look no further than the country's experience with uranium mining and milling activities in really the early years of the nuclear power development to appreciate the importance of the regulatory work that we do.

Many of those early sites are dealing with significant environmental challenges, notably, groundwater contamination. That may take years or even decades to resolve. And I think it's this work that we do in this area in particular that puts the environmental protection in the NRC's mission for environmental protection. I mean, this is really, in many ways, what the work is about here, is it is that piece of our public health and safety mission that deals with those environmental issues as we address that.

So today, we find ourselves in a very different situation. With an increase price for uranium, we have a lot more interest in the potential for new uranium recovery facilities and even for restarting existing ones.

So right now, we are in the process of strengthening our licensing and oversight programs. And I think as an agency, we have taken a lot of steps to take that process and make it more efficient and effective, and ultimately with the goal of making sure that we protect

public health and safety and the environment.

The Commission meeting we have today is a long one. We have three panels. We will first hear from the staff, and they will tell us a little bit about what they are doing to deal with these issues and achieve our important mission.

We will then hear from a second panel. The officials from the Environmental Protection Agency and the Bureau of Land Management will discuss some of their related activities. And then finally, we will hear from a diverse panel of stakeholders, which include State and Government regulators and advocacy representatives.

And I would just remind everyone today is going to be a long meeting, we have a lot of different speakers, so if everyone can stick to their -- we have a nice little clocks for everybody to follow, and if they can stick to their time and leave the Commission an opportunity to ask questions and engage in dialogue, and we will do our best to stick to our time, too.

So with that, if there are any comments from my fellow Commissioners.

Okay. Bill.

MR. BORCHARDT: Good morning. Along with the interest in new reactors being constructed in this country, there's been a corresponding increase in the development of new uranium recovery capacity in the United States. In December of 2008, the staff provided

a briefing to the Commission on the current status of NRC's uranium recovery program. In today's Commission meeting we will provide an update to that meeting.

Just make a couple of points before I turn over to the staff. One is that the exact details of the future are uncertain. And, in fact, the current budget that we have and the budgets that we have proposed for the out years will allow us to complete the work that we think is most likely to come before us. But it would not allow us to do all of the work that would be required to be done if every letter of interest and potential applicant actually came forward to the NRC.

So, we have done our best guess, we have done our best estimation of what work will come before us, and that was the basis for that budget.

Also, as a result of next to no activity in this area over a period of about 20 years, we made the very conscious decision to let our regulatory infrastructure, the regulatory guidance, the Standard Review Plans fall a little bit out of date. We are and the staff is actively working on updating those documents. But we recognize that needs to be done, but it was a conscious decision utilizing the resource as most efficiently as we thought we could over the past 20 years.

So we really appreciate the stakeholder involvement in this process and the update of those documents.

With that, I'm turning over to Keith McConnell.

MR. McCONNELL: Thanks Bill. Good morning, Mr. Chairman, Commissioners.

Can I have Slide 3, I guess. Thanks.

My presentation this morning is going to provide an overview of NRC's uranium recovery new licensing program. My colleagues here at the table will address much of what I discuss in more detail. This slide provides, if it's up there, the topics that I will address.

Slide 4, please.

What we wish to convey this morning is that we are completing our licensing actions for new expansion and restart facilities in a timely fashion and are taking the necessary measures to improve the program, to make it more efficient and effective.

At the outset of the surge of new applications, we set a 2-year post-acceptance goal as the metric for completing our licensing actions. We knew this would be a challenging goal to meet because it's been 20 years since we received an application and because it includes factors that are largely beyond our control, such as the ability of applicants to provide timely responses to requests for additional information. We are striving to meet this goal, and as experience is gained and the regulatory framework is improved and stabilized, we expect to be able to exceed the metric.

In that regard, we are aggressively working with others in the uranium recovery process to make it more integrated and

transparent. This includes working with States and other Federal Agencies to integrate the licensing process and avoid unnecessary overlap; working with industry to ensure that we receive high quality applications; and working with Native American Tribes and other parties to ensure that they have the opportunity to be involved in the process and that their concerns can be addressed.

Slide 5, please.

We are also looking internally to identify ways we can make the review process more efficient and effective. Some of our specific measures are:

We have instituted an enhanced acceptance review approach that allows 90 days to evaluate whether an application is materially complete and of high quality. This enhanced acceptance review process has led to the withdrawal of two of the applications that we received, but they were subsequently resubmitted after the deficiencies were corrected. We believe that as experience is gained, both by the NRC staff and industry, this 90-day period for acceptance review can be reduced.

We have completed the Generic Environmental Impact Statement for in-situ uranium recovery facilities in June of 2009. The CIS serves as starting point for site-specific reviews, and as Patty and Andrea will address later this morning, will result in ensuring efficiencies in completing our obligations under the National Environmental Policy Act.

Finally, we are working with the Office of Research and the Center for Nuclear Waste Regulatory Analysis in San Antonio to update, consolidate and improve the regulatory guides and standard review plans that are out of date.

Slide 6, please.

In terms of policy issues that may come before the Commission in the near term, they all come in the form of rulemaking activities.

In March of 2006, the Commission directed the staff to initiate a rulemaking tailored to groundwater protection and in situ uranium recovery facilities. Such a rulemaking must conform to the Environmental Protection Agency's or EPA's 40 CFR 192, which sets the standards for uranium recovery facilities.

We continue to develop a draft proposed rule, and have been working with EPA to address their concerns, particularly in the area of groundwater monitoring after restoration. I would note that we do anticipate providing that rule to the Commission in draft form in April of this year.

In conjunction with our own rulemaking, we are following EPA's efforts to review and potentially revise 40 CFR 192. Under the Uranium Mill Tailings Radiation Control Act, EPA is required to consult with both NRC and the Department of Energy should it revise those standards. EPA is here today in the next panel and can address the timelines for that rulemaking effort.



Finally, the Office of General Counsel has drafted a rule for the definition of construction as it applies to Part 40 licensees, including in situ recovery licensees. That rule is now before the Commission. I think it's SECY-10-0018.

Slide 7.

Although we have been largely successful to date in keeping up with the volume of work related to new uranium recovery facility licensing, we continue to face a number of challenges.

First, as Bill mentioned, we are challenged to accurately predict the applications expected to be submitted. Our forecasts are based on Letters of Intent we solicit and other interactions we have with industry, but these are largely a reflection of the price of uranium at that time. The dynamic nature of the price of uranium, as well as industry itself, causes uncertainty in our budget formulation, which relies on the current projections of license application submissions to predict budgets 2 years into the future.

We address this uncertainty by taking a measured approach to budgeting and hiring. The strategy has been successful to date and there are sufficient resources available to complete work expected this fiscal year, but other applications that may come in in future years could prove to be a resource challenge to us.

A second area where uncertainty challenges the uranium recovery program is regulatory uncertainty. As I have noted, both the NRC and EPA are working on rulemakings that could change

the framework for licensing new facilities, and we are updating the regulatory guidance in parallel with our licensing reviews. This regulatory instability has led to frustration on the part of industry. We understand this frustration and working to address it.

Finally, Mr. Chairman, as you mentioned in your opening remarks, the legacy of widespread contamination from past uranium recovery mining and milling operations in the '50s, '60s, '70s and '80s still confronts us today. Some mills that ceased operations 20 to 30 years ago are still actively remediating their sites. This legacy of contamination is a source of great concern to members of the public and Native American Tribes in those areas and also to the NRC staff. Although we believe the framework is in place to avoid such legacy sites in the future, building public confidence in our licensing actions is a continuing challenge.

And with, that I'll turn it over to Bill von Till, who will talk about our operations.

MR. VON TILL: Thank you, Keith, good morning Mr. Chairman, Commissioners. As Keith mentioned, I will discuss the status of uranium recovery program operations.

Next slide, please.

My discussion topics will include the status of new application reviews, projections for future applications, communication with industry, guidance revisions and groundwater protection.

Next slide, please.

To date, we have received six applications for new in-situ recovery facilities, five in Wyoming and one in South Dakota. The first three applications are in the late stage of the review process. Staff is working with the applicants on remaining open issues and preparing final supplemental environmental impact statements. The Powertech Dewey Burdock application is currently under review. The Uranium One Jab and Antelope review is on hold at the applicant's request, due to issues dealing with the Sage Grouse in Wyoming. Andrea Kock will talk more later about this scope of the Sage Grouse issue. Uranium One Ludeman application is undergoing an acceptance review.

Next slide, please.

Since the resurgence in the uranium industry in 2006, the timing for new application arrivals has been dynamic. This slide illustrates current projections for the receipt of future applications based on letters of intent. Fifteen applications for new facilities and expansions of existing facilities are estimated over the next several years. Staff keeps a table on the public website showing projected applications and this table is updated monthly. We frequently request revised letters of intent from potential applicants to better project future work.

Next slide, please.

During this presentation, you will hear from staff on our increased effort with outreach to Native Americans, Federal and State

agencies and stakeholders. Since the industry has voiced some concerns with communication and their ability to comment on guidance, I will focus on that.

It has been challenging for the staff to take on multiple license application reviews while at the same time addressing outdated guidance documents. Staff feels that a large effort to communicate with industry and the public has taken place in many forms. There have been numerous publicly noticed meetings with applicants on site specific reviews. The staff participates in the annual National Mining Association uranium recovery workshop to discuss multiple issues.

Staff held a public workshop with industry in November of 2009, in Denver, Colorado, mainly to discuss issues related to health physics reviews of license applications in relation to regulatory guides. In addition, staff provided the public and industry the opportunity to comment on a regulatory information summary dealing with preconstruction at uranium recovery sites.

Next slide, please.

Staff is revising many of the outdated guidance documents in the uranium recovery program. This is being implemented in parallel to license application reviews and other work in uranium recovery. Staff is currently revising the standard review plan for in-situ recovery application reviews and ten regulatory guides.

In addition, the staff has issued three regulatory

information summaries dealing with the topics of preconstruction, groundwater restoration and licensing of in-situ recovery satellite operations. As guidance documents are revised, we plan to have an open process and provide the public with an opportunity to comment. It is important to acknowledge that industry has expressed concerns about this dynamic and real-time process, and we are working to address this.

Next slide, please:

Since most of the operations of an in-situ recovery facility occur in the groundwater, monitoring and restoration of groundwater is fundamental to the protection of human health and the environment, and is therefore a large focus of staff oversight of these facilities. During the operation of a well field, groundwater monitoring is implemented to assure that recovery fluids are contained to the production zone and to protect adjacent aquifers. Once operations have ceased for a particular well field, it is essential that restoration begins in a timely manner and continues until standards are met.

During the December 11, 2008 Commission briefing on uranium recovery, stakeholders raised concerns regarding historical environmental impacts for in-situ recovery facilities and the lack of readily available data. At the Commission's request on July 10, 2009, staff submitted a report summarizing historic data for the three NRC-licensed operational in-situ recovery facilities. The staff identified a total of 11 NRC-approved well field restorations.

Although not all parameters were restored to background levels, the primary restoration goal, staff only approved alternate levels after it was demonstrated they would have no adverse impacts on adjacent groundwater use outside the exempted aquifer.

Staff also reviewed historical data on groundwater impacts from production fluid excursions from well fields and well construction failures. The data indicate that excursions and well failures do occur and have the potential to impact surrounding aquifers. However, extensive groundwater monitoring and corrective actions for excursions ensure that impacts are promptly detected, controlled and properly mitigated so that adverse impacts are avoided.

In summary, through license conditions, the staff requires sufficient groundwater monitoring and restoration of in-situ recovery facilities to ensure that public health and the environment are protected.

I'll now turn the briefing over to Patty Bubar. Thank you.

MS. BUBAR: Thank you, Bill.

Good morning, Chairman and Commissioners. Today I will be discussing some of the improvements we have made in completing environmental reviews for uranium recovery.

May I have the next slide, please.

The topics that I will be covering are listed on this slide.

Next slide, please.

The Generic Environmental Impact Statement or the

GEIS was prepared to identify the impacts of in-situ recovery facilities for four regions in the western United States where NRC has regulatory authority. The GEIS is a starting point for the National Environmental Policy Act or NEPA analyses for site-specific applications for new in-situ recovery facilities.

Public comments on the draft GEIS expressed concerns that the impacts considered were not based on enough site-specific information. Commenters also expressed concern that opportunities for public comment provided to support preparation of the GEIS were not focused on specific applications.

So in response to these comments, the site-specific NEPA strategy was changed from issuing a site-specific Environmental Assessment or EA to a site-specific supplemental Environmental Impact Statement or an SEIS tiering from the Generic Environmental Impact Statement.

The SEISs will be issued for public comment, just as the EAs for new applications were going to be issued for public comment. And the applicable sections of the GEIS will be incorporated by reference into the site-specific SEISs.

If the GEIS analysis cannot be incorporated by reference, then further site-specific analyses will be completed. This revision in NEPA strategy improves the efficiency and consistency of NRC environmental reviews for in-situ recovery applications, and we believe it is responsive to public concerns, thereby increasing public

confidence in the process.

This approach eliminates the potential for unanticipated schedule delays due to having to complete an EIS when significant effects were determined from an EA. That is, a FONSI was not able to be published.

Additionally, this revision in the strategy continues to provide a savings of approximately \$1 million per assessment and 6 months of review time.

Next slide, please.

Three public scoping meetings were held for the GEIS in 2007 in New Mexico and Wyoming. After publishing the draft GEIS, eight public meetings were held in four different states to receive comments on the Generic Environmental Impact Statement. As discussed in the earlier slide, public comments will be gathered on the draft SEISs for new applications.

Next slide.

In September 2008, as the NRC began preparation of NEPA documents for the first group of new in-situ recovery applications, the staff determined that both NRC and the Bureau of Land Management or BLM have responsibilities under NEPA for sites involving Federal land. The NRC and the BLM have prepared a Memorandum of Understanding or MOU. This MOU provides a framework for a cooperative relationship and identifies the responsibilities of each agency.



The intent of the MOU is to improve interagency communications, facilitate the sharing of special expertise and information and coordinate the preparation of NEPA documents associated with NRC licensing actions and BLM administration of public lands.

During development of the MOU, the agencies met multiple times to understand the roles and responsibilities of each agency. Due to differences in the agency's missions, the scope and purpose of the NEPA reviews will not be the same.

Additionally, it became clear that unless applicants submit the NRC's license application and a BLM Plan of Operations concurrently, the timelines for coordinated environmental review would not coincide. Nevertheless, the NRC and the BLM have agreed to coordinate in-situ recovery environmental reviews closely to ensure that portions of each agency's environmental reviews can be incorporated by reference.

I would like to reemphasize that the maximum level of efficiency will be gained if applicants submit a Plan of Operations and an NRC license application simultaneously, so that the timelines for the agency's NEPA reviews coincide and agency resources are aligned. And Frank Martin from BLM will actually elaborate on how we will be using this MOU.

Next slide.

A strategy was prepared and published which articulates

the NRC's approach to promote government to government relations between itself, and Federally-recognized Indian Tribes that have a known interest in, or may be particularly affected by NRC's regulation of uranium recovery facilities.

In addition to these site-specific government to government interactions, the NRC staff is focusing on government to government meetings that will allow more communication and understanding of the NRC licensing process for uranium recovery. Government to government meetings were set up with the Navajo Tribes, the Acoma, the All Indian Pueblo Council and two Pueblo Tribes, the Zuni and the Laguna. And additionally, we continue to meet with Tribal governments to discuss site-specific issues. And Andrea will discuss that in more detail.

Next slide, please.

In addition to the GEIS saving \$1 million and 6 months of review time per assessment, the staff has been working on several other mechanisms and activities that should help gain efficiencies. In 2008, the staff realized that there is benefit to reviewing the resource needs over a 5-year period.

That 5-year look helped the staff realize that further efficiencies and predictability could be gained if multiple support contracts were put in place to allow flexibility. So an acquisition strategy was written, and Chairman approval was requested and received to put three contracts in place to assist the staff with

completing the NEPA reviews.

A key component of that strategy is a 3 to 5-year contract with the Center for Nuclear Waste Regulatory Analysis or CNWRA. Additionally, contracts with a 8-A firm as well as an Indefinite Deliverable Indefinite Quantity or IDIQ contract are being put in place.

Over the last year, the staff has also been working on guidance, templates and other tools such as a database of previous NRC NEPA documents to provide not only efficiency but enhanced knowledge management.

To help expand the knowledge base of the FSME staff and to help ensure consistency in how the agency approaches NEPA, the FSME office has initiated an intragency working group and steering committee with representatives from the Office General Counsel, the Office of Nuclear Material Safety and Safeguards, the Office of Nuclear Reactor Regulation, and the Office of New Reactors.

And finally, integration between the safety and environmental review processes continue. We have focused on integrating the budget formulation processes and the review processes to help build confidence that the environmental review and safety reviews are consistent in their rigor, timing and usefulness.

Next slide.

Finally, we continue to manage the processes and resources to allow for timely and transparent decision-making. We

recognize there are challenges, as has been discussed, such as the number and timing of applications which need to be recognized, anticipated and managed.

The public interest in uranium recovery projects is growing and we will need to ensure our processes allow adequate recognition of the need for the public to understand the process and provide us their input. The contract with the Center for Nuclear Waste Regulatory Analysis is in place, and we are moving to put two new contract vehicles in place with an 8-A and several companies under an IDIQ mechanism.

And finally, we will remain diligent in optimizing our interface with BLM to allow for sharing of information and elimination of duplication between the two agencies.

I thank you for the opportunity to review this information, and I will now turn it over to Andrea Kock.

MS. KOCK: Thank you, Patty.

Good morning, Chairman and Commissioners. I will be discussing the status, the accomplishments and the challenges associated with environmental reviews for uranium recovery facilities.

Next slide, please.

Slide 24 contains the topics that I will be going over today.

Next slide, please.

As Bill mentioned, we currently have ongoing reviews for

six new uranium recovery milling applications that we received in 2008 through 2010. As the environmental and the safety reviews are integrated, each safety review contains also an environmental review.

Staff has made significant progress. For example, on June 5, 2009, the Generic Environmental Impact Statement for in-situ recovery facilities was issued, and on December 11, 2009, we issued three Supplemental Environmental Impact Statements for new uranium recovery milling applications. The comment period for these documents ends tomorrow.

Our environmental review schedules are set to meet a licensing goal of completing the licensing action within 2 years of the date the application is accepted. The public nature of the NEPA process, delays in response to the staff's requests for additional information, the potential for litigation or staffing constraints can extend this timeline.

The first three environmental reviews that tier from the GEIS will be completed slightly after the 2-year mark due to delays in response to the staff's request for additional information, extension of the comment period on the Supplemental Environmental Impact Statements and the lack of infrastructure to support the reviews early in the process.

Completion of these documents near the 2-year mark will be an accomplishment, given these challenges and given the staff's efforts to increase the public participation in our process.

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Over the last year, the staff has applied the experience that we gained to improve our environmental review process and the public's understanding of this process. In order to ensure that our stakeholders understand that the GEIS is a starting point, not a replacement for, a site-specific review, the staff met with stakeholders at the July 2009 National Mining Association meeting to discuss the purpose and the use of the GEIS. We expanded the discussion of the intended use of the document in the GEIS and the associated Supplemental Environmental Impact Statements, and we emphasized the intended use of the GEIS in our Federal Register notices and press releases that were issued for the reviews that tier from the GEIS.

The staff also emphasized this point during meetings with other agencies and non-governmental organizations while doing site visits and information gathering for our environmental reviews.

As Patty mentioned, we also fully integrated our environmental and safety project plans and project teams to gain efficiencies and to ensure that the staff schedules and evaluations are aligned.

Bill mentioned that the staff has provided you with a summary of the groundwater impacts at ISR facilities. We have used this information from this summary, as well as other information from the safety review to provide the public with more information in our

NEPA documents about the operational impacts of ISR facilities.

One issue that has been critical is the need for timely and complete information from applicants, both in the initial license application, as well as in response to the staff's request for additional information.

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The staff's experience with the first few uranium recovery environmental reviews has highlighted some of the associated technical challenges.

Bill referred to the importance of groundwater in the staff's reviews. And clearly explaining these complex systems has been a challenge in a public document. To clarify the associated groundwater requirements, the staff added information to the Supplemental Environmental Impact Statements issued in December to emphasize the NRC and other agency requirements for protection of groundwater during ISR operations.

The safety and the environmental review teams have also worked closely together to ensure consistent and quality technical review.

Protection of Sage Grouse is becoming an increasingly important issue in the western United States, and the species is under consideration for listing as an endangered species by the United States Fish and Wildlife Service. The staff is currently working closely with State of Wyoming and the BLM to assess any additional

mitigation which might be required by these agencies given status of the species.

Many of the sites that the staff has received applications for contain sites of cultural significance. In such cases, we have worked closely with the State historic preservation officer to develop mitigation plans that are satisfactory to all parties.

And due to remoteness of these locations, socioeconomic impacts can also be important in our environmental reviews. We meet with local governments to ensure we obtain the most up-to-date information and to obtain information on the socioeconomic response to fluctuations in the uranium recovery industry.

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The staff continues to extensively coordinate with local, State, Federal agencies tribes and other interested stakeholders. We contact agencies with jurisdiction or interest to obtain their input, and we have also taken steps to ensure that all interested stakeholders have an opportunity to provide insights early in our reviews.

In addition to requesting public comments on the Supplemental Environmental Impact Statements for new applications, the staff has entered into more formal arrangements for the coordination such as the MOUs that we developed with the BLM and the State of Wyoming. We have extensive and regular contact with



the BLM and the State of Wyoming to discuss the status of applications, the roles of each agency and the areas where our reviews overlap.

The staff has fully integrated BLM interactions into our project plans to ensure that we are involving BLM to the fullest extent under the MOU.

And recognizing that EPA has a critical role in the review of groundwater impacts, we have coordinated extensively with the EPA. For example, we held a call on October 6, 2009, during which we discussed with EPA their perspectives on groundwater issues associated with ISRs.

We also coordinated our reviews early in the process with the EPA, and we have committed to notifying EPA when the staff begins information gathering for our environmental documents.

In addition to the outreach that Patty discussed, we interact with Native American Tribes to inform them of the status of our reviews and solicit input on the scope of our environmental documents. And on a site-by-site basis, we are considering the need for more extensive outreach, including formal government to government meetings.

In response to concerns during development of the GEIS that the process would decrease public involvement, the staff has also gone a step beyond what is required and we placed advertisements in local newspapers soliciting information on what should be

considered in our reviews.

And in addition to meeting with local and State governments and Tribes, we have reached out to stakeholders that we know are interested in UR projects to also gather their perspectives.

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In conclusion, the staff continues to address challenges and apply experience that we have gained from reviews completed to date. Significant progress has been made. We have continued extensive outreach with local, State and Federal agencies, Native American Tribes and other interested parties to ensure our decisions are based on the most accurate information and that all perspectives are considered.

We thank you for the opportunity to discuss uranium recovery program this morning. This concludes the staff's presentation, and we welcome your questions and comments. Thank you.

CHAIRMAN JACZKO: Well, thank you. Right on the nose. It is clear the staff has gotten the efficiency and effectiveness message.

I wanted to start, Bill, with the other piece probably of the review process, which is the safety piece. When we last met, one of the things that the Commission asked the staff to look into was to just take a look at what had happened at various facilities, and you provided a good summary and a good response to the Commission.

One of the things I just want to explore a little bit is what it means. You talked, I think -- I think, Bill, you touched on this a little bit about some of these excursions. And I thought I would kind of go through what's in the paper, so we kind of have the framework here.

What you told us is that there were about 60 events, I guess as we characterize them, events of excursions from -- I guess I'll just read what's here, and then we will know.

With regard to the migration of production liquids toward the surrounding aquifer, each licensee must define and monitor a set of non-hazardous parameters to identify any unintended movement toward the surrounding aquifer. Exceedance of those parameters result in an event termed an excursion.

Excursion events are not necessarily environmental impacts, but just indicators of the unintended movement of production fluids. The data show over 60 events had occurred at the three facilities. These are the three facilities that under groundwater restoration and monitoring. And for most of those events, the licensees were able to control and reverse them through pumping and extraction at nearby wells.

Most excursions were short-lived, although a few of them continued for several years. None had resulted in environment impacts.

So, the good news in the end, none of them had resulted in environmental impacts. I guess the part I wanted to ask is maybe

you can characterize a little bit more what is meant by "unintended"? Why are these occurring? You know, if we go through and is it a problem with our analysis, we don't fully understand the hydrogeology? How are these occurring if we have a good program in place?

MR. VON TILL: That is a good question. First of all, there is monitoring, extensive monitoring involved with each well field to detect excursions on the horizontal side and also wells in the aquifers above and below to detect these excursions.

And excursions can occur if during operations the production fluids may get little bit away from the core area of production, and then hit into one of the monitoring wells. And that would be an excursion right there. Then they have to pull it back in.

Also, you can have well construction failures. The industry is required to do MIT testing, mechanical integrity testing, on all these wells. We have had thousands of wells at these facilities. And they have to do mechanical integrity testing. But some well failures do occur, and then an excursion can take place, either in the horizontal aquifer surrounding the production or an aquifer above or below.

And so, we have extensive requirements upon these licensees to report these excursions and detect the excursions through the groundwater monitoring system, and then to take corrective actions on these excursions. But they can occur.

You have a lot of piping under the ground, miles of piping from the wells to the header houses to the production facilities, and, so, some events can occur. But the point I would like to make is we have a lot of monitoring in place to detect these and then take care of them.

CHAIRMAN JACZKO: Are there things that we can be doing to put in place maybe a better framework to minimize -- I don't know if I have anything to compare the 60 events at the three facilities. We certainly have more well fields in areas that will be going into a period of monitoring.

So, with those new ones that are coming, are there things we can be doing now to minimize that number so that the unintended ones become even less frequent?

MR. VON TILL: I think so. And we discussed these kinds of issues at the annual National Mining Association workshops. But, for example, some of the licensees are putting cameras in some areas of header houses to better detect potential spills that may occur from the wells themselves and the piping. Upon inspection, we have discovered that the industry has stepped up their efforts to try to avoid these types of excursions and spills and to take care of them in a more timely manner. So, we are working towards that.

CHAIRMAN JACZKO: Good. Well, I think that's good. It certainly, I think, is valuable information for us. I think the staff put together that document was useful, and it's good to hear that you are

taking advantage of that information and applying it with the newer facilities.

I wanted to touch base to a slightly different topic. I suspect an area that we are going to hear a little bit from some of the stakeholder panels later is on the definition of construction for uranium recovery sites. I think there is a lot of interest. It is an issue I think we discussed at the last meeting as well, about how we should address that issue.

I know the staff has sent us up a paper -- I think, Keith, you touched on that -- to address that. And that's under review by the Commission right now.

One of the things that where there, perhaps, seems to be a difference of opinion right now is on whether or not we can really delineate those aspects of a uranium recovery facility that have public health and safety impacts from those that don't. And those that don't would then more likely fall into that kind what we have called preconstruction activity, which would not necessarily require a full NRC review before that activity could occur.

Is it the sense of the staff that there is a good way to delineate those and we have a good sense of what kinds of things would be safety significant, and therefore, not part of that preconstruction and what would not?

MR. McCONNELL: Yes, I believe we do. We believe we can tie the activities of the in-site recovery facility to that nexus to

safety discussion.

Principally, it's the construction of the wells, the injection and extraction wells, the construction of the mill itself that involves the processing of these fluids.

So I think there is a good basis to move forward in terms of defining what is and what is not in terms of Part 51 construction, because I think there's a fairly clear delineation.

CHAIRMAN JACZKO: So, and perhaps more importantly or most importantly, things like the wells themselves wouldn't necessarily fall under that preconstruction definition?

MR. McCONNELL: Well, we believe because they have to be construction just as you had the discussion with Bill in terms of excursion, because excursions are important in terms of protecting public health and safety, the construction of the wells themselves does have a nexus with safety in our view.

CHAIRMAN JACZKO: Okay. Thanks.

I guess this is a question I will save for our folks from the Environmental Protection Agency.

One of things -- and this is not so much a question as is, perhaps, a comment -- by design, we let some of the guidance documents lapse and I think it is okay at a certain time. Obviously, now, we perhaps would wish we had not done that, but that's perfectly fair and we all make those decisions.

Going forward, do we -- in your sense, Bill, do you have

the resources you need to do the work now to get the guidance documents where we want them to be?

MR. BORCHARDT: Yes. I think there is good progress being made. It won't happen instantaneously, but it is certainly headed in the right direction.

CHAIRMAN JACZKO: Well, I certainly encourage you to continue doing that. And I'm sure giving all the interesting things you can do, updating guidance documents does not always rise to the list of the most interesting, but it is important, and it's certainly, I think, does create some uncertainty with all the stakeholders, because as things are changing, then people don't necessarily have a clear expectation. But I still think it's the right thing to do, to update some of these.

I'm sure some of these guidance documents are probably 30 years old, in some cases. And, so, they can really benefit from our updated understanding of how to approach these issues and how to tackle things.

So, I encourage you to continue to work on that and move forward where we can.

One of the issues in that area of kind of updating guidance and updating the aspects of how we do things really has to do with the so-called Part 41 or the efforts to kind of create an in-situ recovery specific regulation.

Maybe you could -- Keith, I don't know if you're the right



person could touch on where we stand with that activity and what your sense is of how that will move forward?

MR. McCONNELL: Well, as you're probably aware, that activity was, I think, in 2001, the Commission determined not to pursue a complete revision to in-situ recovery facilities, given the state of the industry at that time.

From my perspective, the conditions that existed then are not too different than what exists now in the sense that we only have a few operating licensees. Yes, today we have perhaps a few more on the horizon, but given the uncertainty in the industry, you know, I don't know that right now, the effort to completely revise the regulations to make a separate Part 41 would be worthwhile.

Now, it would have to be based on what your perspective and what our perspective is of the industry in, say, 3 years from now. And I think, as Bill has indicated and as I have indicated, we don't really have a clear crystal ball in terms of what the industry will look like in 3 years.

CHAIRMAN JACZKO: Well, that may be something we can get a better handle on with some of the later panels.

But as I said, Bill, we have all made those decisions to postpone things that perhaps we wish we would have not done. Now, I wasn't actually on the Commission. I don't think anybody here is responsible for that decision, but as a continuing body, we are all responsible for the actions of former Commissions when the

Commission did decide not to pursue the Part 41 at that time.

So, I think it is something to for us to continue to look at. If the issue really comes down to one of a fee structure and ultimately, paying for this activity, that's something that perhaps we can look at to try to address.

As I think we did with some of the other rulemakings that we were doing the -- looking at the groundwater restoration standards, the Commission made a decision at the time that we would deal with that through annual fees rather than changing it specifically to licensees, because I do think in the end, for everyone, it is probably better to have a specific regulation in this area if we can. So maybe it is something we can continue to explore.

With that, I will turn to Dr. Klein for questions.

COMMISSIONER KLEIN: Thanks for a good presentation. You talked at lot about -- I think both Bill and Keith -- of uncertainty. Is the uncertainty due to our regulatory process or the price of uranium?

MR. BORCHARDT: Price of uranium is just the big driver.

COMMISSIONER KLEIN: Just checking. Just checking

MR. BORCHARDT: Well, from our perspective, anyway.

COMMISSIONER KLEIN: Could you remind us, Keith, on what fluid that you used in ISR?

MR. McCONNELL: It's basically just a oxidizing fluid.

It's fairly benign in the sense it's usually sodium bicarbonate or hydrogen peroxide that is injected into ore horizon to oxidize the ore horizon and release the uranium.

COMMISSIONER KLEIN: When I had first heard of ISRs, and Susan, obviously, is familiar with this from the State of Texas, but I had visions of it being some kind of a caustic solution that was pumped down that was going to contaminate everything. I was surprised when I went out to Wyoming and found out that it was a fairly benign activity.

MR. McCONNELL: In other countries, they do use more caustic solutions. In fact, they use acidic solutions.

COMMISSIONER KLEIN: In terms of the uncertainty, in terms of how many ISRs or recovery applications we have, I assume you stay in close consultation with the industry to note what's occurring and what is not occurring?.

MR. McCONNELL: Yes, we do. As Bill mentioned, we have the annual meeting with the NMA, National Mining Association, where we get a lot of our information. But also, we are in contact with them pretty much on a monthly basis. And we do solicit the letters of intent annually to help us with our budget formulation.

COMMISSIONER KLEIN: One thing I was surprised at, I looked at the -- we obviously have a large number of Agreement States, but if you look at the number of Agreement States that handle uranium recovery, it is only about six.

Why is that? Is it due to just the areas in which uranium is recovered or lack of interest for a number of years, or why the difference between the number of Agreement States versus those that handle ISR or uranium recovery?

MR. McCONNELL: Well, Don McKenzie is here from Wyoming, and he can probably address that better than I can.

My interpretation would be that, again, with the state of the industry, it has been largely dormant for 20 years and now picking up. And so there could be an increase from states like New Mexico and the State of Wyoming to become Agreement States for 1182 byproduct material.

But I think from my perspective, it's mostly just the state of the industry and whether the investment by the State would have been worthwhile in terms of the benefit to the industry and the benefit to the public.

COMMISSIONER KLEIN: I was just surprised when I looked at that to see the number of Agreement States that did not handle uranium recovery. That was the surprise.

MR. BURNS: Didn't New Mexico turn it back in --

MR. McCONNELL: In 1986, New Mexico turned their 1182 byproduct material, part of the agreement back to the NRC. And part of the reason was, again, the state of the industry at that time, because most of the mills were closing down.

COMMISSIONER KLEIN: Thanks.

You had talked a little bit, Keith, about the legacy sites. What role, if any, does the NRC have in these legacy sites?

MR. McCONNELL: Well, there are two roles. There are two types of legacy sites. One under the Uranium Mill Tailings Radiation Control Act, there are Title I facilities where the Department of Energy has a responsibility to remediate those sites. They were not licensed on or after 1978. So DOE goes in and remediates those sites. We have a role with respect the Title I, in that we review the long-term surveillance plans and groundwater corrective active action plans for those sites. And then, they become under 40 -- Part 40.27, they became general license sites with the NRC.

Then there is the Title II site, which were the commercial mills that were licensed on or after 1978. We have licensing responsibility for the remediation, so the licensees remediate those sites and we oversee those in the non-agreement states. And basically some of them, and New Mexico as I mentioned, are still in remediation now, even though they shut down, 20 to 30 years ago.

COMMISSIONER KLEIN: Thanks.

Well, Bill, you had a slide number 11 that showed the future workload? How does that future workload compare in the Agreement States that handle this? Do you know what their numbers look like?

MR. VON TILL: For example, Texas is kind of a mirror image of what we are seeing. They have existing operating facilities

and they are seeing applications there.

We also are seeing some new applications in the State of Colorado which is an Agreement State. The Pinon Canyon conventional mill application they received and getting ready to receive their first in-situ recovery application from Powertech called Centennial in which there is a lot of interest in that project, near the Wyoming border.

And also, some interest in you in Utah, which is an Agreement State as well, and so we do have a list of the potential sites and we maintain a lot of coordination with the Agreement States on where they are in the process.

We had a field trip down to Texas about a year ago or so. It was a very good trip to meet with the Texas regulators to see what they are going through to try to learn from our common interest as well.

COMMISSIONER KLEIN: So in terms of just the sheer numbers do the Agreement States have more than we have?

MR. VON TILL: No, not really, I got the list right here. Texas looks like a number of applications maybe Texas can comment on this later but looks like a few applications they are reviewing. The State of Colorado is reviewing one conventional application with some future ones and that's really it right now. I know there is some activity in Utah but not an application yet..

COMMISSIONER KLEIN: So the bulk of them is still

handled by NRC.

MR. VON TILL: The bulk of them is in Wyoming, South Dakota and so forth.

COMMISSIONER KLEIN: you talked on I think one of your Slide 13, you talked about where you're doing some parallel licensing reviews, what kind of impact does that have on facilities that are already licensed?

MR. VON TILL: We are basically juggling a lot of different things in the recovery program as we ramped up since 2006, 2007. First, we have the operational facilities. We have 2 in Wyoming, one in Nebraska that we do inspections on we do a lot of licensing reviews there.

We have the decommissioning facilities that Keith mentioned where we have a lot of activity and we have all these new applications. And in parallel, we are working on the guidance documents so it's been a challenge for us to take care of all these things at the same time and we try to make priorities in doing our work.

COMMISSIONER KLEIN: So probably, communication, communication, communication is important?

MR. VON TILL: Exactly.

COMMISSIONER KLEIN: Well, Patty, you talked a little but the NRC/BLM MOU. How long has that been in effect?

MS. BUBAR: Charlie Miller signed that back in October

so just a few months in effect. So the first 3 supplements SCISs, for public comment were not developed while – they were developed prior to that MOU being signed but we did try to live up to spirit of the MOU for those first 3 SCISs by sharing information. But it was signed, I think the date was in October.

COMMISSIONER KLEIN: So it has not been in effect long enough to see any modifications

MS. BUBAR: No and Frank Martin will talk a little bit about what they are doing to get it out to their field offices but we are just beginning to live under it.

COMMISSIONER KLEIN: Andrea, you talked about a two year time line in that we missed a few? How much did we miss it by? Was it close?

MS. KOCK: Right now, we have the first 3 reviews that are on going and for those 3, we missed by one month and one case, anticipate missing it by one month and in another case, it's about 7 months. So there is a span of a few months there.

COMMISSIONER KLEIN: After we do a few of them, do you think there will be any efficiencies gained where the two years could be reduced with no compromise in safety?

MS. KOCK: Definitely. A portion of the delays we have experienced as I mentioned were due to lack of infrastructure, early in the reviews and what I meant by that, we were really focusing on developing the GEIS and we were looking to get that in place so we



could continue to gain efficiencies.

So some of our effort was taken away from the early reviews to focus on the GEIS. And on the environmental side, a lot of our work is contracted, so we were focusing a lot on putting our efforts into the acquisition strategy that Patty spoke about and now that we have approval to move forward with that. I think those two things are going to help us a lot.

COMMISSIONER KLEIN: Great. Thank you. No further questions.

COMMISSIONER SVINICKI: Thank you for your presentations. I just have a few quick questions. To turn again to Slide 11 we're showing there in projected workload for FY11, it's a bit of a spike there in new facilities. And I would just ask the question, maybe for Keith or Bill. But if uranium prices stay where they are right now, would you agree, there is some uncertainty that there would really be that many new facility applications because isn't it right now the spot market is \$41-dollars or something like that. So it's not very high right now.

MR. VON TILL: you're absolutely correct. As I looked today, it was \$41.75 and that does dictate a lot of when some of these applications come in. The long term price is around \$60 a pound. We've seen this spike kind of shift out because of the economic situation.

COMMISSIONER SVINICKI: Is that what happens with

like the Letters of Intent is that rather than indicating to the NRC that they don't intend to apply ever, do they tend to shift their intent out a year by year adjusting to depending on the prices.

MR. VON TILL: We've seen both. We've seen some come off a list and a lot of them shift. I would say with the in-situ recovery facilities, there is less uncertainty because of the capital investment necessary for those as opposed to maybe a heap leacher conventional. But most of them have been sliding out. But the majority of them, they remain on the list but, slid out a bit.

COMMISSIONER SVINICKI: Okay, thank you.

And we heard a turn of phrase that we use frequently here at NRC, "complete high quality applications." I think Patty, you mentioned that. Bill might have mentioned it as well. And I think there was a point in the slide about based on an acceptance review period, at least a couple of applications were withdrawn and augmented and resubmitted. Was there any commonality in the area there that was either insufficient and needed to be augmented or in general, as we do the acceptance reviews, are there areas of the application that tend to generate the most request for additional information?

And again, we need to keep of course insisting upon complete and high quality applications but I think to the extent where we can let it be known, these are the areas that we tend to find that are thinner than other areas maybe we can avoid even seeing those kinds of issues arise. Was there any kind of pattern?

MR. McCONNELL: The answer is no. One of the applications had issues with respect to meeting a dose standard at the boundary of the facility. The other had issues principally related to groundwater protection and deep disposal wells, and how to dispose of the byproduct material.

I think overall, we would judge the quality of the application as quite high. But I think what is needed is to gain experience and have the dialogue between the staff and Industry. And we did that last year's at National Mining Association meeting, we had a lessons learned discussion.

COMMISSIONER SVINICKI: I was going to ask about that, if applicants that are about to come in, do they look at prior sets of RAIs so they can learn from that and kind of do a cross check. So it's certainly these larger national meetings are an opportunity to repeat that and maybe talk thematically about how to improve the quality of applications. So I appreciate that you're doing that.

Patty, you talked about the fact that efficiency is improved if the plan of operations to BLM and the licensing application are submitted concurrent. Is that what we see happening or were you kind of putting that out as more of an aspirational reminder to folks?

MS. BUBAR: That has not been what we seen happening.

COMMISSIONER SVINICKI: is there some benefit to maybe not submitting them concurrently, say if they can get further

through our licensing review do they then have information that they can use to better develop their plan of operations or maybe vice versa.

MS. BUBAR: There may be a benefit in terms of the completeness of what they submit, but not a benefit in terms of scheduling.

COMMISSIONER SVINICKI: Because it is a trade off for them, really.

And then, we at NRC was in receipt of a letter from the National Mining Association and I think there were similar ones from some of the state mining associations regarding general concerns about the promulgation of the regulatory information summary and some concerns that there was perhaps a change in requirements in the RIS. And I think to be fair to the NRC, I think that there was some routing issues because this was not submitted on any docket or any kind of open rulemaking where we kind of know that mail that comes into the NRC generally, we kind of know where to direct it. So my understanding is there's not been a staff response. And my question would be, do we intend to respond the concerns outlined in that letter?

MR. McCONNELL: As you noted, we have just become aware of this letter today or recently anyway. We have not responded specifically to the issues raised in this letter but similar issues have been raised in other fora. A letter we sent a couple of months ago the law firm of Tony Thompson addressed similar issues in terms of what the appropriate standards for restoration are. So we have addressed

this issue, but we would intend to address this specific letter also.

COMMISSIONER SVINICKI: Thank you for that.

That's the end of my questions. Thank you.

CHAIRMAN JACZKO: Well, thank you for a good presentation and for a thorough answer to the questions, we will now transition our next panel of Federal partners.

Thanks.

#### NEXT PANEL

CHAIRMAN JACZKO: We will now hear from our next panel, Jonathan Edwards, Director of the Radiation Protection Division, U.S. Environmental Protection Agency, Roy Simon, who is the Associate Branch Chief for Prevention in the Drinking Water Protection Division of the U.S. EPA, and then Benjamin Martin, who is the Deputy Chief of the Division of Solid Materials of the U.S. Bureau of Land Management. So we will begin with Mr. Edwards.

MR. EDWARDS: Good morning. I'm Jonathan Edwards, Director of EPA's Radiation Protection Division in the Office of Radiation and Indoor Air. Thank you for the opportunity to appear before the Commission.

Today I'm going to briefly discuss our division's regulatory and environmental protection activities concerning uranium extraction.

EPA's Office of Radiation and Indoor Air derives its environmental authority for uranium extraction facilities from multiple statutes.

ORIA, in accordance with its authorities under the Uranium Mill Tailings Radiation Control Act, or UMTRCA, the Atomic Energy Act, the Clean Air Act, and other governing environmental protection statutes, carries out a number of roles concerning uranium and thorium extraction facilities which are licensed by the Nuclear Regulatory Commission, and NRC's Agreement States, as well as the Department of Energy in its oversight of closed uranium mill tailings impounds - impoundments, excuse me.

EPA has a standard setting role under UMTRCA. Under UMTRCA, Congress directed EPA to establish radiological and non-radiological standards which were to be incorporated into NRC and DOE regulations for oversight of uranium and thorium milling activities and byproduct materials.

In doing so, ORIA's standards for uranium and thorium mill tailings, which are located at 40 CFR Part 192, were originally issued in 1983 and last updated in 1995 for groundwater protection provisions at inactive mill tailings impoundments.

ORIA is currently undertaking a review of its 40 CFR 192 regulations for uranium extraction facilities. These regulations have not been substantially changed to recognize the environmental challenges faced by significantly increased use of in-situ leaching

recovery technology, as well as possible use of heap leaching by the uranium industry. Nor have they been revised to incorporate potentially relevant recent changes in EPA groundwater and drinking water standards, as well as the most recent updates in good science for radon and radiation protection since the rule was last revised.

Environmental justice considerations for potential impacts of extraction facilities on disadvantaged populations, Tribal populations, as well as children's health must now be taken into account and in consideration as a result of executive orders and agency policy.

The regulatory standards will be re-examined in light of the fact that ISL recovery in heap leaching facilities are returned to the public and private use after decommissioning, unlike conventional mills which are overseen by DOE in perpetuity.

Following the lead of the EPA administrator, ORIA has undertaken extensive effort to provide public information and outreach as it reviews these regulations, and will be utilizing a number of web 2.0 public information meetings and hearings and other means to obtain public input to its regulatory process.

We intend to hold regular meetings with the NRC and DOE staff and management as well as with the IS course member agencies to minimize differences as the reviews progress.

Specific efforts will be included to engage the CRCPD, the Organization of Agreement States, non-Agreement States, Tribes,

industry and environmental organizations.

ORIA is also reviewing its NESHAP's radon emissions standards for uranium mill tailings facilities.

EPA was authorized under the Clean Air Act to develop national emissions standards for hazardous air pollutants, and issued it under 40 CFR, Part 61, Subpart W, for radon emissions for uranium mill tailing impoundments in 1989. As a result of the settlement agreement concerning a review requirement for this regulation, ORIA is now re-examining its radon emission standards in this particular regulation, and doing so with recognition of the environmental challenges faced by significantly increased use of ISL recovery technology by the uranium industry.

While EPA moves forward on its reviews and possible revisions of these regulations, the agency will be consulting with the NRC and DOE.

As required under UMTRCA, ORIA will be consulting with both agencies as it moves forward on its review of 40 CFR Part 192, and will provide information to them on the review of the NESHAP Subpart W as well. EPA is pleased to provide advice to the industry as it moves forward to develop new NRC regulations for environmental protection of groundwater resources at ISL extraction facilities. ORIA is concerned about the potential environmental impact of ISL recovery operations and we're dedicated to ensuring they comply with our environmental and radiation production standards,



and in particular, ensuring that there is adequate technical information on which to base rule language concerning post-closure monitoring.

We have not had the opportunity to review the most recent revision of the NRC proposed draft rule, prepared in response to previous comments, so we are unable to discuss our views on them today. Our advice to the NRC, though, through its working group as it develops its draft ISL recovery groundwater protection regulations, should not be construed to imply or confer that the administrator's concurrence has been gained with the rule.

The agency will independently comment on the draft rule when it's released for public comment and separately review the final rule before a decision is made on whether or not to concur on these regulations before their publication.

We have encouraged the NRC staff to move forward in its development of proposed regulations for ISL groundwater protection.

It is our belief that additional public input from publication of a draft rule on this topic will assist both the Nuclear Regulatory Commission and EPA in evaluating regulatory approaches and options for this important issue.

However, the possibility does exist that public input and information developed by EPA in its own separate rulemaking process for 40 CFR Part 192 could result in different standards, which might require the industry to revise its regulations after they've published in

final form.

So communication between all parties will be crucial.

Thank you for this opportunity to speak before the Commission.

I will turn to my colleague from the Office of Water at EPA, Roy Simon.

MR. SIMON: Thank you again for inviting us today. EPA'S Office of Water has authority for the Safe Drinking Water Act's underground injection control program.

We work closely with John in the NRC over the past couple of years for the same goal of improved protection of groundwater at the ISL sites. We at EPA hope and expect this cooperation will lead to improved groundwater rule and analysis at the ISL sites.

Safe drinking water act in 1974 established underground injections control program requiring EPA to determine the need for and promulgate minimum requirements for state and Tribal regulations sufficient to protect underground sources of drinking water. EPA published rules in the early 1980's so that injection wells do not endanger these underground sources of drinking water.

The EPA can delegate UIC primacy enforcement authority to states and Tribes and has done so for 33 states and 2 Tribes, and we have shared primacy with 7 states. EPA directly implements in 10 states. UIC program regulates activities throughout the life of the injection well, including siting, construction, operation,

monitoring and closure.

There's five current classes. Most relevant classes are, class one, deep wells for hazardous and nonhazardous waste, and class 3 wells, that inject fluids that dissolve the minerals in underground rock formations. And I want to be clear that UIC program regulates only injection, not production.

A mining site must have both an NRC license and UIC well permits. All UIC wells will be permitted by either EPA or a state that has UIC primacy authority. Where injection is into an underground source of drinking water, an exemption must also be obtained.

For SCIS activities, the EPA has an obligation to review and comment on the supplemental environmental impact statements for ISL sites. After NRC or BLM develops them, EPA will comment on these SCIS documents, whether they are located in the EPA-UIC EPA direct implementation states, or in the UIC primacy states. EPA's comments are particularly focused on the breadth of the analysis in each SCIS, factual basis and supporting information for analysis, and statements in the document, and the options provided for avoiding adverse impacts of activities at each site.

EPA's analysis and comments are finalized by the affected EPA regions where ISL sites are located in consultation with headquarters.

Thanks again for the opportunity to talk to the

Commission today about the ISL sites and the UIC program. We look forward to continuing cooperation ensuring that these sites protect groundwater.

CHAIRMAN JACZKO: Thank you.

Mr. Martin.

MR. MARTIN: I'm here to discuss BLM's role in uranium in-situ recovery projects on mining claims. The next slide, please.

First, we need to talk a little bit about BLM's role in mineral leasing, which is actually quite complex. We will not be getting into any of the complexities.

Essentially, we manage 750 million acres of Federal minerals, about 29 percent of the surface area of the U.S. BLM manages mineral development in a number of different ways on Federal lands. For instance, on lands which have been acquired after they have previously been patented by government, then citizens or American companies may lease uranium.

They may stake mining claims on unpatented land. And so today, what we're going to be talking about since the focus has been on Wyoming, and that's where the active -- I understand, the active applications are on BLM land -- so we'll just be talking about mining claims. Next slide please.

Again, the BLM manages about 750 million acres of Federal mineral estate, and that is a picture, essentially, of where this mineral estate occurs throughout the country. So we have a pretty

broad sweep in our activities. We manage the minerals that -- whose surface is managed by BLM, as well as all other Federal minerals including those whose surface is managed by the Fire Service, Department of Defense, the various other government agencies, Now, let's go to the next slide.

Mining claim regulation -- surface use. There are three levels of surface use under the mining claim regulation. The first is casual use, which involves a negligible disturbance not requiring mechanized equipment. So they do not have to notify BLM of casual use nor is there any NEPA activity, EAs or EISs.

The second level of use is notice level operations, where less than five acres are disturbed, and they must notify BLM and provide reclamation bonding for whatever disturbances they do create, but no NEPA is done on this, because it's not a Federal action, it's a notice.

And then finally, the plan of operation stage. These are larger surface disturbances -- or surface disturbances with more profound environmental impacts, and they require BLM approval of the mining plan and the reclamation plan, which must be submitted to BLM, called the plan of operations, an EIA or an EIS, and also full cradle to grave reclamation bonding. And next slide please.

Just so that we'll understand, BLM has a more distributed organization in terms of authority than the Nuclear Regulatory Commission does. Authority flows from the BLM director,

on this simplified org chart, down to the State directors. Then down from the State director to the actually, district managers in some states, and through them, where district managers exist, to the field managers, and finally to the NEPA staff.

And so decisions as regards NEPA actions, and for that matter, the decision to permit or approve the plans reside on the shoulders of the field manager. I'm in the minerals and realty directorate, which is a staff function. We manage six solid minerals programs, all of which have a different set of legal requirements, which is why we're focusing here. Next slide please.

Now, as far as the BLM-NRC-MOU, it was a pleasure to work with your staff. I had that pleasure, as well as many of our other staff on this MOU. We had quite a time because the agencies have differing needs and requirements, as you might imagine, but we managed to get a document completed that we feel is most likely to address, as best we were able to come up with, the needs of the regulated community out there, as well as the needs of the public.

We have distributed that MOU as a PDF to all of our offices, through our state deputy directors, the mineral deputy directors who would then distribute it to their mineral staffs and have done so. We have a quarterly mining law conference call in which every one in the mining law program of any rank whatsoever is invited to participate and frequently do and speak up and the MOU implementation is discussed regularly on those conference calls.

We are cooperating with the NRC in a number of industry outreach series of meetings and workshops to be held in Wyoming and Colorado, Colorado because Denver is convenient. We are also providing information -- as a matter of fact this week at our booth at the Society of Mining Engineers, where we are also recruiting for the Federal intern program for the minerals program. So we are sort of killing two birds with one stone there. Next slide please.

The way forward. Well, BLM field offices will be cooperators on future NEPA documents, where possible, and it is their intention that where that is not possible, certainly if there have been NEPA activities that NRC has been involved with, then we will adopt those to the maximum extent that we can and attempt to make sure there is no duplication of effort here and no duplication of cost and to try to make this process as efficient as possible.

To take maximum advantage of cost and schedule efficiencies, and this is probably the most important point that I have to make, to take maximum advantage of these potential efficiencies, the applicants absolutely have to understand the process, and it is not a simple process.

We have got the EPA, we've got the NRC, we've got BLM, we've got the Wyoming DEQ folks, and the various others who regulate this activity in one way or another, and all of those processes have to be clearly understood by the applicant, and it has to be preferred to time, its applications and responses to information

requests and so forth so, as to achieve the efficiencies which are otherwise available to us and, as you all have already discussed this morning, there is a possibility of some schedule slippage as a result of the economics of uranium at the moment, and that's always a possibility.

Let me assure you, we have a lot of experience with this and, in fact, we can expect to see that sort of thing. And it is a key aspect of this, that the applicants, whatever else they do, they stay on top of it, because if they don't, it's going to take them longer and it's going to possibly cost them more money. We will try to keep the money out of it but it certainly will take them longer.

We also have an MOU with the Wyoming DEQ and we work very closely with those folk out in Wyoming, in the Wyoming state office and the field offices. We have a wonderful relationship, I might add, and so they worked with us integrally whenever -- to approve mining plans.

Finally, I would like to say that the Bureau of Land Management is very pleased that we have a MOU with the Nuclear Regulatory Commission, and we look forward to increased coordination and cooperation with the NRC in the future as we work together to deliver, safe, efficient and environmentally responsible energy to America. Thank you.

CHAIRMAN JACZKO: Thank you, Mr. Martin. I appreciate your comments. I just had a couple of questions. Mr.



Edwards, Mr. Simon, maybe I can take advantage of you being here to -- trying to educate me a little bit because, I think, one of the biggest challenges we face in this area is, one, we don't have -- certainly at the NRC we don't have specific regulations for uranium recovery facilities, so we've been taking advantage of other regulations that we've developed, and I think that that's make things a little bit confusing for us and, I think, for the public and for lots of folks in terms of exactly what our requirements are.

So both of you are here, and part of the complication then gets in between the differences between the underground injection control program and then, from our perspective, our licensing program and then how that has an impact on the air and water side of things, so -- or radiation side of things.

So, one, I wanted to ask a question on process first, and maybe you can just give me both your best understanding of how you think all of these things fit together? The first one is on our efforts to put in place a specific in-situ recovery regulation. Right now I think there, my understanding, there is still some discussion between us and EPA about the post-closure monitoring, that that seems to be the area where there is some disagreement. And I actually, I think, was pleased to hear you say that you think we -- that everyone would benefit if we were to continue to move forward, recognizing there might be some differences in our approach versus your approach, and those would eventually be resolved through your rulemaking

ultimately. We've been holding off in the effort to try to get better alignment between the two agencies, but, if that seems to be your position, then that certainly gives us an opportunity to consider moving forward and put it out for public comment. As you said, we will probably only inform your process going forward. Am I understanding that piece of it correctly?

MR. EDWARDS: Absolutely Chairman. It is our belief, and we have been supportive of the NRC staff working on the draft ISO groundwater rule, that it is a good idea to go forward. Of course it isn't the Nuclear Regulatory Commission's call on whether you want to do that because there is that possibility that as we go through our own update of UMTRCA that we will learn things from stakeholders and public hearings and other scientific reviews and analysis that does cause us to change the standards and perhaps differ from where the NRC draft rule may propose, and then ultimately go.

But at this point, we're very encouraged with our discussions with your staff, and we believe that a rule out there probably would lend to better consistency and certainly be a step forward, again, assuming that the rule ends up where we all agree it needs to be, over what we have right now.

CHAIRMAN JACZKO: Well, I appreciate that. Just one more point to clarify, what is your sense of the timing of your effort, is it a 2, 3 year process, or maybe longer than that?

MR. EDWARDS: Absolutely. I'd be more than happy to

share with you a little bit of our thinking on the timing on this.

Typically, EPA rules take about 3 to 5 years to reach ultimate final, and of course, that's sometimes through a pretty elaborate OMB process.

For this particular rule, the last several months, we've assembled a work group to put together the preliminary draft blueprint on where to go with the regulation, briefed our senior management. And were very close to concurrence within the agency on our detailed analytical blueprint that lays all of this out.

It's our projection for about the next year or so, a number of scientific analysis, economic analysis, outreach efforts or whatnot will be undertaken. We have seven task force groups that we put together under the internal work group that are tackling these things and then ultimately go through peer review on the scientific elements of that study. That should take at least a year or so, optimistically, and then we move to where does the rule need to be revised, what are the option selections, and then drafting that rule and then going through the OMB process.

So our best good faith advice to you right now is sometime in 2012, the summer of 2012 optimistically, would be the time we'd have a proposed rule out for public comment, and then depending on the comments we receive there and things we learn from NRC's rule, if you decide to go forward, then, would of course, impact how long it takes to move to final on that. That's our best

guess timing on that though, Chairman.

CHAIRMAN JACZKO: Well, I appreciate that. And we certainly will not hold to you that but it's good to get a sense of what your thoughts are on the timing.

Now, if I could just beg your indulgence to try and explain to me how the underground injection control program fits into our regulatory program and how all that works together.

MR. SIMON: There has to be a license for the UIC wells -- excuse me, a permit, along with the license from NRC. When we looked at the different jurisdictions within the different states, it does get a little complex, depending on if it's an agreement or non-Agreement.

CHAIRMAN JACZKO: Your Agreement, rather than our Agreement State, which makes it even more complicated.

MR. SIMON: The NRC has Agreement States and non-Agreement. We have primacy states and direct implementation. Given the four permutations and putting them together, it requires the different entities within each state have linkages as the permits and license process goes forward.

So as I understand it, I think there's the license process goes forward, then the UIC permit the applications come to UIC and the permits process goes forward. There's one last piece, which is called the opt for exemption process, and that has to go through EPA's review after the, what we call owner-operator, I guess the

business, puts their application forward and puts their information forward to go through the opt for exemption.

When all that gets done, I think the BLM probably has a role, depending on which -- so I'm not exactly sure how BLM plays into it, but when all that gets done, I think then the process gets finished, the permits, the license, and then I guess, mining starts.

CHAIRMAN JACZKO: And the permit -- and your permit is valid while the well exists, and then you have requirements on post-closure, or do you not have requirements there?

MR. SIMON: There is a whole set of post-closure -- the UIC process doesn't end because it protects our groundwater. So that, whether it's excursions during mining or movement after all the mining is done, I mean the UIC program maintains the process. Now the permit is only for the mining. But the UIC program is required under the Safe Drinking Water Act to protect groundwater from the movement of fluid out of the mining zone into any underground sources of drinking water, wherever they may be outside the mining site.

CHAIRMAN JACZKO: So that extends post-closure.

MR. SIMON: Yeah. It goes on, yes. The authority does not change to protect groundwater.

CHAIRMAN JACZKO: Thanks. I appreciate that. And with that, I will turn to Dr. Klein.

COMMISSIONER KLEIN: Well I thank you for your

cooperation. It is good that Federal agencies play well together, so I appreciate the good cooperation I think we've had between both EPA and BLM. I guess the question what could the NRC do to make the process better? In other words, it sounds like the biggest difference now is just post-closure monitoring; is that correct?

MR. EDWARDS: Commissioner, specifically with the NRC's draft ISL rule, we -- we have the latest revision. We just haven't had a chance to look through it carefully and to put the appropriate scientific and technical analysis around it and what not. We will do that and get back with the appropriate staff that are developing that rule here at NRC.

But again, I'm very hopeful and optimistic that we will be able to come to a good understanding of what a draft rule looks like there.

COMMISSIONER KLEIN: In terms of looking at the in-situ recovery, I'd indicated earlier I was surprised when I went out to Wyoming, and seen an actual field that was in place, and it was much different than what I had perceived it might have been. To your knowledge, has there been any problems with ISRs in terms of groundwater issues?

MR. EDWARDS: I would like to take a look at more information before I could say if there really is no lack of concern there, Commissioner. At this point, I wouldn't say that we're not concerned about that issue.

COMMISSIONER KLEIN: But there's no -- you haven't identified any particular issue at this point with contamination from ISRs?

MR. EDWARDS: I'm not knowledgeable.

MR. SIMON: I don't know. I don't have the analysis to give you an answer on any of the current ones or on the future, but I think you were asking about current sites. I just don't have the information, but we are happy to get back to the commission with whatever information we have.

MR. EDWARDS: One thing I will say Commissioner, as I was describing our path forward on the updated UMTRCA rule, this upcoming year, with these task forces working on various scientific issues but that is one of the things we will be looking at and combing through pretty carefully, and so at this point, I apologize, I'm just not well informed enough to give you any feedback on that, but certainly the scientific and technical process we are a undertaking to update 40 CFR 192 will better inform us of those issues.

COMMISSIONER KLEIN: Well, thanks. Well Frank, I noticed -- I'm glad you called that a simplified org chart. I'd hate to see the complicated one. The curiosity -- you talk -- it looks like your field managers have a lot of autonomy?

MR. MARTIN: They do. They have a lot of authority, subject, of course, to the supervision of the district managers and the State directors. They absolutely do.

COMMISSIONER KLEIN: How do you coordinate consistency from field office to field office? We always have a challenge even within the NRC of making sure we are consistent between our four regions. It looks like you have a few more field offices. How do you do your consistency?

MR. MARTIN: Well, you put part of your finger on it. We typically play well together, all of us do. We exist to serve, essentially in my office, we exist to serve these folks with their information needs, with their concerns about legal matters and so forth. But essentially what I haven't shown here is that there is also a deputy director and several associate directors, and the deputy director and the associate directors have other executive leadership team series of conference calls meetings monthly, I believe, if not weekly. And if any issues come up with respect to these matters, we will see to it that they come up at those meetings, so that the State directors have two different independent sources of information from below, you know, upward reporting as well as, you know, reported from headquarters as well. And this way proceeds the BLM by a consensus of these parties. It is typically carried out reasonably promptly.

Another issue that always is impactful is that we have a lot of constituents, there's a lot of interest groups whose interests are quite diverse. Part of what we have to work with and to help people with is coming to some kind of consensus decision, particularly in the more controversial areas, and some of these might be grazing, for



instance., wild horse and burro, if you read the newspapers, have been an issue lately, and of course, mineral development.

And we work through typically a public process, much of it NEPA related but typically there is considerable public input there.

So you might say our field managers are bombarded from all directions with advice and help. Somehow they have to develop a consensus through a process with their staffs, to come up with some rational decision that, as one wag put it, makes everybody equally unhappy. Hopefully that's not the case.

COMMISSIONER KLEIN: That's the consistency, right. Well, I'd like to thank you for your cooperation on the MOU. It was nice to see that come to closure. And as it develops, if there's modifications, you be sure to let us know.

MR. MARTIN: We sure will. We don't anticipate any problems at all. You guys are great to work with.

COMMISSIONER KLEIN: Thank you.

CHAIRMAN JACZKO: Commissioner Svinicki.

COMMISSIONER SVINICKI: Thank you. I'll start out, Mr. Martin, by adding to what Dr. Klein just said, that I have heard only good things from the NRC staff in terms of working with the BLM on the MOU. So your compliments about working with us are certainly reciprocated on this side of table and with the agency at large.

I took some careful notes here. I appreciate, Mr. Edwards, you're going through, I had the same questions as the

Chairman on some of just the timing and path forward on the rulemaking, so I've taken some careful notes. So we don't need to cover that again.

You know, maybe this is just my personal curiosity, but we heard about -- we don't have fish and wildlife service but we heard a little bit from the NRC staff about the Sage Grouse potential listing there, and there has been an issue out west for a long time. I'm not an Endangered Species Act expert, so I don't -- is there some sort of time frame within which there might be a decision about the Sage Grouse? And so I don't - I mean, I'm kind of throwing this out, and I'm looking at my poor BLM colleague here thinking you're the closest, maybe to --

MR. MARTIN: I'm not intimately familiar with all the issues involved with the Sage Grouse but in different parts of the state, I understand that, Sage Grouse population varies considerably, and I'm not sure the extent of which it's, and how well it is understood, but is exactly why pressures occurs.

I have heard different biologists say different things but --

COMMISSIONER SVINICKI: So it sounds like an underactive study, there is still a lot of field work to be done.

MR. MARTIN: My understanding is that the potential for listing the Sage Grouse in various parts of the west has been on the table, probably, for 30 years or so. And it all depends -- everybody, the agency certainly -- the surface management agencies themselves

certainly are working very hard to get those Sage Grouse populations up. If we get the little devils to cooperate with us, and so it's constantly on the radar and it's never far from our thoughts. Those field managers thoughts that I was referring to particular in the Sage Grouse efforts.

COMMISSIONER SVINICKI: I'm tempted to make some bad jokes here, but I will avoid it in the interest of time and other things and so I just close by thanking you, as my colleagues have done, for working together. I think we best serve the American public when regulatory agencies and those with kind of touch points of authority and jurisdiction work together to reconcile issues so that we can do that work and communicate that clearly to the public. I think we serve them well when we coordinate, as is evident here today. So thank you all. Thank you.

CHAIRMAN JACZKO: Well, I want to thank you for your willingness to come and suffer through our questions and some of our comments. If there is any information you want to provide to follow-up, please do that. We appreciate your working with us and our ability to work together on a lot of these important issues. Thank you.

We will have about a five minute break now.

(Break taken)

## NEXT PANEL

CHAIRMAN JACZKO: We will now start the final part of our meeting today. We'll hear from stakeholders. We'll start with Susan Jablonski, who is the Director of the Radiation Materials Division of the Texas Commission on Environmental Quality representing an Agreement State program here. And then we will hear from others after. Susan.

MS. JABLONSKI: Thank you Mr. Chairman, Commissioners. It's nice to be here to talk about uranium recovery. In Texas as well we have experienced the resurgence of uranium mining. It has been several decades since we looked at new applications. I know that we've been talking about statistics, we currently have 3 applications pending technical review right now and have issued the first license in January of this year to a company in about two decades.

One major point of that issuance of license is that it was issued with no public comment on either the final draft license or the site specific environmental analysis that was published associated with that. I'm going to kind of reflect on why we think that is true for this pretty major endeavor in the area of uranium recovery.

In 2007, the Texas legislature looked at the regulatory programs particularly for uranium recovery as well as radioactive waste and management and disposal. And looked at a reorganization

or realignment within the state of how we would gain efficiencies in our programs and look at more regulatory certainty as well as the public input process for those activities.

Included with that was the uranium recovery program and reclamation of former sites, both ISL sites and conventional mining sites, Title II sites. As part of that legislation, to implement it, my agency, the Texas Commission on Environmental Quality, was given additional authorities and formed a new division to focus specifically on radioactive material, and over time has also brought together the underground injection program as an alignment that made sense for our agency to look at uranium recovery as well as other aspect of radioactive materials. As part of the implementation of that legislation, there were two phases of rulemaking. As you can imagine, there was a significant amount of public input into the process and a lot of interest in the reorganization.

We attempted two phases. The first was to take on the applications that were pending in front of us and simply transfer the responsibility from the other agency, the Department of State Health Services, to the Texas Commission on Environmental Quality.

The second phase of rulemaking really looked at more efficiencies and revamping the process to bring us into the decade that we are currently in. And this included a significant revisit of the uranium recovery rules for underground injection as well as some additional changes to our radioactive material licenses.

There were 7 public meetings associated with that second phase of rulemaking and a lot of extensive work and comment that went into coming up with a rule that was consensus building with not only the regulated community, but also the public and the policymakers in our state. There was much focus as we have heard today on groundwater monitoring, aquifer restoration and also how we would handle licensing and permits in the public involvement in this.

As part of the reorganization, the Texas legislature also gave statutory priorities for looking at, first, a disposal site for 1182 byproduct material as statutory priority, as well as new applications for ISL in the reclamation of former sites that had been languishing within our state.

And so to come back on the path towards reclamation, we really have looked at those sites and brought them back into, I would say, active reclamation, which had not been the case for several decades. The State had really back-burnered those issues because of funding and resources, and the legislature provided additional funding and impetus for the agency to look at those sites and get them back toward reclamation.

In the process of updating also guidance and the things that go along with that, we, as you heard from the NRC, have some significant challenges trying to balance both the statutory priorities as well as looking at revisiting guidance and other documents that help us do our jobs. As new rulemaking is looked at from both the NRC

and the EPA, what Texas would like is at least to have some recognition of some flexibility for programs that have fit radioactive material licensing as well as its underground injection program, that is a delegated program, into kind of a unique mix for our state, where the State is administering a full program through a consolidated division.

Just last week, we underwent our IMPEP review by the NRC, including uranium recovery indicators, and for the first time since 2001 our program has closed all pending issues, and I feel like we are finally on the track towards really looking at both new licenses as well as the reclamation of sites that are still in our state.

We have been continuing to work with the Department of Energy and the Title II sites, and working on modeling that would allow to us move those toward transfer. We have contracts in place where we are getting some assistance, and both the renewed interest of uranium applications as well as added workload associated with the program consolidation. So, we feel like we have provided both a protective and transparent regulatory process in our state that is successfully working, and it's taken a lot of effort and about two years in the making of creating rulemaking that we have both confidence of our licensees and applicants, as well as the public to provide that regulatory oversight.

So I'm very encouraged by the discussions between the EPA and the NRC as working together and ongoing, so that those rulemakings doesn't provide unintended consequences in our state

and for the program that we are already implementing.

And thank you for the opportunity to speak today.

CHAIRMAN JACZKO: Well, thank you. We'll now turn to Donald McKenzie, who is the Administrator of the Land Quality Division at the Wyoming Department of Environmental Quality. Mr. McKenzie.

MR. MCKENZIE: Chairman, Commissioners: In the time allowed, I have chosen to give you an update on four items that were raised by Wyoming in December of 2008. The first would be the presence of NRC in the west; second would be the role of Wyoming and the Environmental Impact Statement assessments; the third would be with respect to privacy or Agreement State status; the last was the interest of Wyoming to enter into an agreement with the NRC.

What a difference a year makes. With respect to a presence by NRC in the west, I no longer feel that's warranted. There are two reasons for that. One is the level of activity that we have seen, and the other is the continued success, I believe, we have had with the NRC in communicating with my staff.

I commend Bill von Till for his commitment to the communications that we have on a regular basis as well as his recent efforts to bring out one of your hydrologists to speak to my hydrologists, which I felt was a very beneficial meeting, and I hope we can do more of that as necessary in the future.

The role of Wyoming and what are now the



supplemental EISs began with the State expressing an interest to be a cooperating agency. We had multiple discussions with Patty Bubar in our governor's planning office, and after about 6 months, the decision was made that Wyoming would withdraw its request to be a cooperating agency. So we have commented on the drafts of supplemental EISs just like every one else. Those were submitted yesterday.

With respect to what I would call primacy and you would call an Agreement State, you know, Wyoming, I understand looked at this some time ago, and as things tend to go, we are back in a cycle where I have been asked to consider that again. I made that request probably over a year ago but I think I need to hookup with someone like Keith McConnell and see what criteria is required as part of that status and see what the options may be for Wyoming.

The last issue that I raised in 2008 was the idea of an agreement between the State of Wyoming and the NRC. As Mr. Martin alluded to, Wyoming is very proud of our success with the BLM and entering into what we call an MOU. We think that's been a great success. I believe it promotes understanding between the different agency staff as well as providing a framework for industry and the public as far as how the two agencies interact in the State. I don't know what would be amenable to the NRC in terms of what you call an Agreement but I do see a benefit in pursuing this. And I believe Mr. McConnell has expressed an interest to at least begin dialogue

with me on that topic.

An item that was raised during the last session of this meeting was Sage Grouse in Wyoming. I was not planning on speaking to that, but I think I can. Just so you know the determination of listing or not to list is scheduled for March 8. There is also, I understand, an intermediate designation between being listed and not being listed. The terminology escapes me right now. But I believe if there's an intermediate category determination, then there would be a year where that listing would still be evaluated and the state management program would be reviewed. Sage Grouse is a huge issue for our state. It affects not just in-situ uranium, of which we have at least two in-situ applications in the door that are in what are called core Sage Grouse areas, but it involves bentonite, oil and gas development. So it has huge repercussions for our state and energy development. I will conclude my updates, and I'm certainly going to answer any kind of questions or comments you have later. Thank you.

CHAIRMAN JACZKO: Well, thank you Mr. McKenzie. Sounds like progress has been made, so that is always a good update in some areas. We'll now turn to Jeff Fettus, who is the senior project attorney at the Natural Resource Defense Council.

MR. FETUS: Thank you very much for having Mr. Chairman and Commissioners. Thank you very much for inviting me back. I'm glad I kept my computer open because I quickly rewrote my

comments to respond to several matters here, so hopefully I'll be brief and concise for you.

First, aside from appreciating being here, I am disappointed that I find so little has changed since we were last here about a year and a half ago. Since 1999, the Commission, and this was a different Commission than the 3 of you at that point, has acknowledged that the rules and requirements for ISL mining have been essentially gerry-rigged and ad-hocked from another time and place, for another set of processes. And the Commission even made that acknowledgment explicitly in one of its decisions.

It's time to move forward. In fact, it's past time to move forward. Nearly 2 years ago when I was last here, I requested that the draft groundwater rule be made public. I do so again, I am pleased to hear that I guess it's coming out next month. So I understand, and I hereby renew my request that the draft groundwater rule be made public because I think, again, it is past time for the public to understand where the NRC is going.

I understand in the first set of very helpful comments from staff on where things are that industry has expressed frustration with the potential for not knowing regulatory stability. I can assure you that the public feels the same way. The licensing rules have been splintered and inadequate. You have seen my filings before on the Commission on those issues. They remain the case. We are going to, hopefully in the very near to future, provide some significant

analysis of what has happened with groundwater restoration. We will provide that to the Commission as soon as we are able. We have funding issues as well. And we will hopefully be moving forward on that.

But, if I could respond to one thing from Commissioner Klein, we've actually found quite to the contrary, ISL mining has been anything but benign in terms of its impact on groundwater resources for the west. Those are preliminary conclusions and we hope to have them in the very near future and be able to share them with the NRC as well as all interested parties.

Procedurally, let me go to a couple of comments on the NEPA issues. The final GEIS was issued last summer, and it has finally come into full effect through the Supplemental Environmental Impact Statements that have their comment period closing tomorrow.

We will be commenting on them. I'm not done with my comments, of course, because I'm a lawyer. If you wait until the last minute, it only takes a minute. You're going to receive a whole host of comments that you may not be surprised to find that we have found the documents lacking on a host of fronts. And to quickly touch, I only have a minute and 45 seconds, so I'm quickly moving through them. The failure of comprehensive analysis of groundwater protection and what has transpired, the July 2009 document in our estimation confirmed most of what I said to the Commission in our last meeting in December of 2008, I believe those are the correct dates, that

essentially the groundwater was never restored.

The Commission can make an assessment that it won't be a problem for the future, but for all intensive purposes, those groundwater resources were never restored to baseline and they will essentially be sacrificed, and we have seen this repeatedly with ISL mining sites.

Regarding cumulative impacts, the failure of the agency to address the cumulative impacts either in the final GEIS or in the tiered documents, many of the questions that were posed in the -- that we posed to the draft GEIS, sorry to use the acronym, many of the question that we posed, I believe we posed over 90, from our estimation, only 16 were even addressed. Essentially the can was kicked down the road into supplemental EISs, and we were disappointed to find that the supplemental EISs don't answer, and again, I'm still doing the final count of most of our questions. And what's most disspiriting is a lot of our questions certainly challenge a lot of the conclusions but a lot of our questions were also technical, serious, how does the process work questions.

And we felt they were an opportunity for the agency to address a whole host of technical issues that could aid public confidence. That opportunity was not taken. And we will detail those in comments to the Commission tomorrow.

And finally, on the cumulative impacts, I think the Sage Grouse issue is a very good example of, again, where the agency had

an opportunity to be more forward-looking on how it analyzed its wider environmental impacts of these mining sites and the SEISs note the issue but don't go into nearly the detail and perhaps should have been held off to look at where the BLM is going to be going, where the Department of Interior is going to be making its final conclusions. And I also have the same estimation of what I have understood, that it was March 8 for the Sage Grouse determination, and I concur with everything there. Okay, thank you.

CHAIRMAN JACZKO: Well, thank you Mr. Fettus. And now, we have our final speaker, Katie Sweeney, who is the General Counsel of the National Mining Association.

MS. SWEENEY: Thank you very much, Chairman Jaczko. Commissioner Svinicki and Commissioner Klein. I appreciate the opportunity to be here today to provide some industry perspectives on NRC's regulation of uranium recovery. And I will say, I did not see the staff's presentation in advance or anything, but I was very interested to note that we have a lot of the same issues on our list of things that we consider successes and the some of the same challenges.

So one of industry's biggest challenges is regulatory certainty. It's hard to plan, it's hard to attract the investment dollars that are needed to bring projects on line without regulatory certainty. Companies need to know the rules of the game. It's great to know what the permitting time frames are, what are the regulations, policies,

procedures that need to be followed. Consistency in application of regulations and policies is also critically important.

Changes to regulations need to be done and compliance with the Administrative Procedures Act, so that everybody knows and understands what's being proposed, what the changes will be, and has the opportunity to comment on those. And strong agency defense of its programs and regulations, or as one of the staff earlier said gaining public confidence in licensing actions is also very important.. A wise Commissioner once reminded me that it wasn't the NRC's job to promote nuclear power or the use of domestic uranium.

CHAIRMAN JACZKO: Was that me?

MS. SWEENEY: It may have been. Sound familiar? And it's not. While there are many reasons that it's in society's interest to promote nuclear power and to wean ourselves off foreign sources of uranium, that is not the jurisdiction of NRC. So where do and should the NRC and industry's interests overlap. I think it is this regulatory certainty issue.

It's in the interest of the industry, NRC and the public to have a strong, protective regulatory program for uranium recovery. The industry's need for certainty actually fits very well with the NRC's commitment to risk-inform, performance based regulation. Underlying NRC's commitment is when NRC proposes a new regulation, the alternatives considered must include a performance-based alternative that enhances the focus of the effectiveness of the agency's

regulatory program, and I think we talked a lot today about the effectiveness. And I wanted to just mention a couple of examples where we think that the NRC has made a lot of progress and has moved forward very efficiently, and the industry appreciates that and our opportunity to be involved in these efforts.

And the first one, which has been mentioned several times today, and I'm just going to go straight for the acronym, is the GEIS for in-situ uranium milling facilities. NMA was very supportive of the development of this document. We believe it is an efficient use of NRC's resource. It will allow NRC to address the multitude of applications that may be coming in while still adequately, protecting health, safety, and the environment.

Another example is the BLM-NRC MOU, which we've talked about earlier today. And one thing I did want to emphasize, and Patty Bubar said this earlier, the GEIS isn't a path to circumvent environmental regulations or review or scrutiny of individual projects, and as she discussed, you know, with the SEISs, NRC has gone the extra step to make sure the public has additional information and additional opportunity to comment.

Okay, uncertainty example is the standards for groundwater protection at in-situ recovery facilities. I think that there is some question, and this was raised in that letter that was referenced by Commissioner Svinicki, what are the standards today? What is the NRC's view on the current standards that apply? Are they UMTRCA



groundwater standards, the EPA standards of 40 CFR Part 192? Are those currently applicable, or is that the goal of the rulemaking? And there certainly some confusion on industry's part, and there were some discussion earlier about some of the slower responses to request for additional information by applicants. And this is one of the issue that the applicants didn't know how to respond to, and one of the delays was they were trying to get some additional feedback from NRC on NRC's legal view. As a matter of law are these applicable now or is this something that's going to be addressed in the rulemaking? Are these applicable as a matter of Commission policy?

Our view is that we need the rulemaking to make these standards applicable as a matter of law, and we thought NRC shared that view until the RIS came out, and as discussed earlier, we do have some questions on how that's being interpreted and whether that RIS imposes new requirements and should have been given -- the public should have been given an opportunity to comment on the RIS.

We appreciate NRC's willingness to attend and initiate meetings to promote communications, to go over the lessons learned, and I think to identify challenges and possible solutions. That's one of the purposes of that NMA workshop, and we think that's been great assistance to the licensees and to the public.

And I think I'll just end there because my time is up. But we have some questions about the revisions to the Reg Guides, too -- some of which are really that old, like the Standard Review Plan for

in-situ uranium recovery operations. It's only 2003. So not all them are 30 years old.

CHAIRMAN JACZKO: Well, thank you for those comments, and thank all of you for your presentations.

Certainly I think what's clear is that there is lots of room for lack of clarity here. I think it's one of the simplest things I've heard is the -- or the area where there's the most commonality, probably the best way to do regulatory change. I think the Commission got pretty far in 1999 with the so-called Part 41, which would establish a new regulatory framework, and I think it's something, as we perhaps conclude this meeting, my fellow Commissioners could chime in on whether or no they think that's something worth exploring the Commission reviving that rulemaking and moving that forward.

We perhaps took it more piecemeal to just try and look at groundwater restoration standards and that's the rulemaking I think the Commission has been involved in right now and I certainly think it would be a good thing for to us put that out there publicly. I think we heard from EPA that is something they would be comfortable with. So that would at least establish where we are. I think, on this issue of the groundwater restoration and where we are for current licensees, my understanding, and I will limit this to my understanding, which is limited in its scope to how I put the facts together, is that I think for a while we've been fairly consistent in our approach to groundwater protection, that ultimately this comes from a combination of statutes,

regulations and policy decisions by the Commission that essentially leave us with three criteria for groundwater restoration, the primary one being restoration to initial -- or to initial condition.

The second one being some kind of alternate or some kind of deviation from that. And the third then, I forget where we get to the third one, but it's less restrictive than the first two -- the middle two.

But that's in my understanding, that's where the big concern is, whether we go to -- and the staff has approved alternate concentration limits, which is kind of the second step in there, in some cases. But the goal is always restoration to the initial standard. That's been my understanding of where we are, and as I saw, the RIS that we issued, and Katie which you referenced, I think referenced in the letter, the staff reiterated that that's a position which follows from a series of essentially statutory requirements and then, following that Commission decisions about how we would regulate ISL facilities as 1182 or the waste from those as 1182 would fall into 1182 by-product material.

So that's where the Part 40 standards come in and get captured. That's my understanding. I'm sure everybody in the room here, probably, has a different interpretation of what exactly that means and at some point, OGC will have to kind of tell us exactly what they think the legal interpretation is. So I have not really gotten to a question yet.

But, you know, I think from the standpoint of what the

agency did with the RIS, I think the intention of the RIS was to clarify that position so that we have a good understanding for applicants. As they come forward, they know what they need to do to respond. That may not be something every one agrees with. I think there is a logical decision or logical basis for coming to that conclusion and how we get there. So, I'm certainly, if anybody wants to comment on, that I'm certainly open to hearing.

MR. FETTUS: Mr. Chairman, thank you. First, the way I understand the regulatory process for restoration is as follows: first, restoration to background; second, restoration to MCLs; third, the third step is alternative concentration. So --

CHAIRMAN JACZKO: I think I got MCL and then the ACLs confused.

MR. FETTUS: And second, I'm not familiar with the staff's, with what elicited the NMA's recent letter, so I would like to request that we get a copy of that, if that's possible.

CHAIRMAN JACZKO: We can provide that. Part of the problem is that it hasn't gotten enough public notice but that's certainly something we can do to facilitate some of the understanding about this.

MR. FETTUS: And is there a change in that understanding? Maybe Katie can -- is there a change in what I said? Was I basically right as far as how you understand the law too?

MS. SWEENEY: Yes. We have the same confusion. I

guess our question is why do we need this ground water restoration rulemaking if NRC is, as a matter of law, saying that the EPA 192 standards apply right now? For us, we have always been kind of a Commission policy, where it's been tailored to address ISR facilities because, obviously, it was an invention for conventional mining and milling, it was not for in-situ recovery.

So we always thought it had been kind of gerry-rigged and kind of made to fit the in-situ recovery through some tailoring, through policy but now the RIS, the way we were reading it anyway, was that it applies -- the 192 standards apply right now as a matter of law, and that has a lot of practical implications, particularly as it concerns point of compliance and point of exposure issues, because they are different in in-situ recovery facilities than they would be at a conventional.

CHAIRMAN JACZKO: And I appreciate that, and I'm sure I'm going to make everybody nervous because I'm going to try and give more of my thoughts on this. I'm making Larry nervous. I think the, and as I have always understood this issue, I agree, I think that has always been the legal standard, which is why we were exploring a change because I think there had been some interest that maybe that was not an appropriate standard and that may be something that could be reconsidered and re-evaluated. And so I think, and moreover, I think as you said, accurately, it has been pieced together because we had UMTRCA, and we then had our Part 40,

which was really designed initially for traditional uranium mining, but we have to figure out a statute and framework on which to make the licensing decisions that we have made with regard to ISR or for at the time ISL facilities. So I think we have done that. I'm looking at Larry, and he's not too nervous so far. You know, we have done that, and it's been a consistent legal basis all along. That does not mean we can't improve it with more specific regulations because this is not the only issue in which there is some deviation. I think there are other pieces of Part 40 that don't necessarily directly apply to ISR facilities, so one, having a full regulatory framework designed that is designed around -- or for ISR facilities would be the best preference.

I think the groundwater was a piece of that, to try and just clarify what is our current interpretation, but I think it's all based on what is currently the prevailing -- I mean, in the end, it has to be the prevailing legal position, and we have to issue these license under some authority, and that's been our interpretation, that the authority is the 40.192 standards do apply.

I mean, I think you heard that is the EPA's position, that's the provisions they intend to be revising that would be impacted by groundwater provisions. So I think those have generally been the standards that folks have understood. So, I've probably spent far too much time on this and, again, I don't know if anybody wants to have any comments. I didn't hear from this end of the table. But you'd rather stay out of it, I can understand.

MR. MCKENZIE: Well Mr. Chairman, I can at least share that in Wyoming our restoration definition is pre-mine quality or better, and the statutes also provide for an alternate restoration but that has to go through another oversight body above my Department for that to happen.

MS. JABLONSKI: And in Texas, we've taken a combination of those approaches, but it is consistent with what's been repeated here today, and it's both the permit working under UIC in concert with the license, and so one is not independent of the other. They are very much working in concert. And so that's why we are watching closely how that would be impacted with some kind of requirement to have one exclusively, either in the license and one exclusively in the permit would cause us to revamp the system that we have worked out in our own state.

CHAIRMAN JACZKO: Can I just ask for one clarification. You're an Agreement State under our program. Are you a -- was that primacy -- so you are a primacy under EPA. So you have both the EPA and the NRC piece at the state level.

MISS JABLONSKI: Yes, Mr. Chairman.

CHAIRMAN JACZKO: And Wyoming, you are not an Agreement State under our program. Are you a primacy under EPA program?

MR. MCKENZIE: For the UIC, yes.

CHAIRMAN JACZKO: For the UIC you are. So you're

kind of a slightly different combination.

Well, again, I appreciate your comments. I didn't really get too many questions in there, but Dr. Klein.

COMMISSIONER KLEIN: In terms of the activity that you see both in Texas and Wyoming, I assume that you saw the spike of activity when the price of U-308 went up. Are you seeing now a decrease in intensity now that the price has come down.

MISS JABLONSKI: I think us, as well as the NRC have reported that there is kind of a longer lag time than anticipated that's occurred. But still definitely an interest. We've got folks coming in on a regular basis talking about when they might make application. So we are still seeing the spike, it's just now the period of those applications has been extended over a couple of years as opposed to a year and 18 months which was originally projected. .

COMMISSIONER KLEIN: So maybe stretched out as opposed to canceled.

MISS JABLONSKI: Yes.

COMMISSIONER KLEIN: What about Wyoming?

MR. MCKENZIE: In Wyoming the expiration has dropped off considerably. We were very active with drilling projects throughout the state. In terms of applications, all I can say is for the Ludeman application which I believe is now in with the NRC as well as the State of Wyoming, that there seems to be some delay as to when that was proposed to come in. But I can't speak to the other



applications because I'm only aware of one other that may be coming down the road here.

COMMISSIONER KLEIN: Well, Susan, you probably heard that we have a timeline of two years. You know, once we sort of get organized -- once you get organized, what is your target for the license review time?

MS. JABLONSKI: We plan to do it under two years, about 18 months is the projected timeline. So I'm sure my licensees and applicants are listening to me right now but that is our plan to get it on a more consistent time basis. Part of the transfer was that problem, that things were left languishing and really weren't on a predictable time schedule. And so that's one of our big pushes right now. We are actually tracking that on a regular basis, and have a structure to get us in that timeframe, so about 18 months.

COMMISSIONER KLEIN: Thanks. Well, I guess Donald, I will have a question for you. Did I hear you say that Wyoming, might want to be an Agreement State?

MR. MCKENZIE: Well, I was at least asked to look into that possibility. I hear all kinds of things from different areas, but it's one of those items I was asked to look into, yes.

COMMISSIONER KLEIN: You'd commented that, Jeff, that you had some examples of groundwater issues with ISRs. Could you just kind of tell me in general what they were and what states it occurred in?

MR. FETUS: We looked at -- we had a hydrologist look directly at some sites in Wyoming, and some of the sites that are undergoing restoration, or where restoration even concluded. And we've come to preliminary assessment that the sites were permanently contaminated.

COMMISSIONER KLEIN: So mainly Wyoming?

MR. FETUS: Mainly Wyoming, yes..

COMMISSIONER KLEIN: Katie, normally when we do things like regulatory guidance and RISs, it's to make things more understandable. Would you prefer that we did not issue IRS 2009?

MS. SWEENEY: Just that one. No we actually in our -- in NMA's letter, we actually requested that you rescind the RIS and put it out for comment because we believe it does represent a change from the way NRC's long-standing policy has been, which is implementing those standards through license conditions and not as a matter of law, the EPA regulations. Not that we're opposed to those standards because when we talked to EPA and NRC about the standards that should apply, I know there was a lot of discussion about what role does the UIC program play? And what about the UMTRCA standards? And I think there was general agreement at the end that the UMTRCA standards made the most sense and, of course, NRC has to conform with the EPA general applicable standards anyway. But it's really -- there are a lot of practical differences between saying it applies now and having a rulemaking

come along that formalizes that process.

COMMISSIONER KLEIN: Thank you. No more questions.

COMMISSIONER SVINICKI: I want to thank you all for your participation today. I think I've enjoyed the dialogue and the Q & A of my colleagues. I think this will be an odd comment in terms of the transcript, but I think had the clearness of head today to sit in a chair and form a quorum, but I'm not sure I had the clarity, given my coughing and sneezing over here. A lot of complex issues have been raised, and so Mr. Chairman, last night, in preparing for the meeting and today, I've learned a lot about the fact that there was movement towards a Part 41 and there was apparently a reconsideration of that. So I would like to acquaint myself a little bit better with the history of kind of why that was considered and why it was decided. I think some of it had to do with wanting to get reconciled with EPA, and that always sounds like kind of a good idea to me, but certainly we heard from our EPA participants here today not to wait for them.

So I think what the EPA stated we should move forward and then we could elicit public views on what we put forward. But I think he said, "Well, then, EPA will move forward with its rule making and ultimately, we would determine the issue." So I'm not sure in terms of clarity. I guess I don't know the answer. I need to do more thinking about what it means for to us move forward with something if ultimately a different rulemaking by somebody else has the potential,

and I didn't know if they were telegraphing something in terms of saying they will stick to their view on post-closure and other things. So it seems to me to kind of reconciled and align that upfront, and maybe some of the thinking on why we didn't move forward.

But I will study that, and again as we're hearing from a number of participants, the one thing they are owed is some clarity, and we need to work with our Federal partners. It was the reason I asked about the NRC staff responding to the concerns that were raised about the RIS and how we move forward, because we don't owe any particular answer, but we owe an answer. And I noticed that our General Counsel was also taking notes. So when things are stated as a question as a matter of law, I would like to get some legal advice on that question as well. So I don't have any additional questions, but it was a good meeting. Thank you.

CHAIRMAN JACZKO: Well, I just want to say, thank everybody for their participation. I think it is always -- you have great meetings with the staff and it's rare that we all get to sit down with groups of stakeholders like this and hear from all of you. I think it always leaves us with some important lessons. Certainly this was one of those meetings where I think we did a lot of listening. I don't think we really did any deciding. And I think but that's always never a bad thing. sometime just to listen. We got a lot of good information. So we appreciate your being here. The other people who came and provided information and staff as well. Thank you for the meeting.

We are adjourned:

(Whereupon, the meeting was adjourned)

**Mendiola, Doris**

**From:** Hanley.James@epamail.epa.gov  
**Sent:** Wednesday, March 03, 2010 5:59 PM  
**To:** LostCreekISRSEIS Resource; MooreRanchISRSEIS Resource; NicholsRanchISRSEIS Resource  
**Cc:** Bubar, Patrice; Swain, Patricia; Hsueh, Kevin  
**Subject:** NUREG – 1910, Supplements 1, 2, and 3 [Draft SEIS for three Wyoming Uranium ISR Projects]  
**Attachments:** DSEIS comments\_CEQ#20090421.pdf  
**Importance:** High

Greetings Patrice Bubar, Kevin Hsueh, and Patty Swain:

EPA is submitting comments on the subject reports for consideration by the NRC staff. I look forward to working with Kevin and Patty to discuss the response to comments.

(See attached file: DSEIS comments\_CEQ#20090421.pdf)

Respectfully,

James Hanley  
 US EPA Region 8  
 NEPA Compliance and Review Program  
 303.312.6725 (direct)  
 720.279.4125 (pager)

10/11/09

74FR 65804 - (19) 40-9068

74FR 65806 - (13) 40-9073

74FR 65808 - (17) 40-9067

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RULES AND DIRECTIVES  
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 USNRC

SUNSI Review Complete  
 Template = ADM-013

F-RIDS = ADM-03  
 Call = A. Bjornsen (9665)  
 F. Yu (IWY1)  
 B. Shroff (bps2<sup>182</sup>)



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 8**

1595 Wynkoop Street  
DENVER, CO 80202-1129  
Phone 800-227-8917  
<http://www.epa.gov/region08>

**MAR 03 2010**

Ref: 8EPR-N

Michael Lesar  
Chief, Rulemaking and Directives Branch  
U.S. Nuclear Regulatory Commission  
Mail Stop TWB-05-B01  
Washington, D.C. 20555-0001

Re: NUREG – 1910, Supplements 1, 2, and 3  
Draft SEIS for three Wyoming Uranium ISR Projects  
Lost Creek ISR Project CEQ# 20090425  
Moore Ranch ISR Project CEQ # 20090421  
Nichols Ranch ISR Project CEQ# 20090423

Dear Mr. Lesar:

The United States Environmental Protection Agency Region 8 (EPA) has reviewed the Draft Supplemental Environmental Impact Statements (SEISs), prepared by the U.S. Nuclear Regulatory Commission (NRC), for each of three new source material licenses proposed for the following in-situ uranium recovery (ISR) facilities: (1) Lost Creek ISR, LLC in Sweetwater County, (2) Energy Metals Corporation for Moore Ranch in Campbell County, and (3) Uranerz Energy Corporation for Nichols Ranch in Campbell-Johnson Counties, Wyoming (Projects). NRC determined that some impacts would be generic or essentially the same for all in-situ uranium recovery (ISR) facilities, while other impacts would be facility-specific, thus requiring further site-specific analysis. The 2009 Generic Environmental Impact Statement (GEIS) provided a starting point for these SEISs. EPA's review and comments are provided in accordance with our responsibilities under the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321, et seq., and Section 309 of the Clean Air Act (CAA), 42 U.S.C. § 7609.

During 2009, EPA participated in multiple teleconferences with NRC regarding the draft SEISs. Throughout EPA's review of these projects, we have emphasized the critical need for the SEISs to adequately assess an appropriate range of reasonable alternatives for disposal of contaminated wastewater. EPA also stressed the need for site specific information in the analysis of all potential environmental impacts associated with these projects. We remain concerned that, individually, the draft SEIS for each project does not provide adequate information to effectively address these key issues.

The primary concerns EPA has with the draft SEISs are the following: (1) the narrow range of the wastewater disposal alternatives analysis along with the limited discussion regarding waste management impacts; and (2) the lack of information regarding air pollutants and the impacts of those emissions. These concerns are the basis for the EPA rating at the conclusion of

this letter. Additional concerns include the potential establishment of alternative concentration limits (ACLs) as groundwater restoration targets prior to completion of adequate restoration efforts, and the information concerning climate change and greenhouse gas emissions.

### Wastewater Disposal Analysis

Generally, liquid waste from these projects will be composed of process water, production bleed water, and restoration water. These wastewaters are classified as "byproduct material" under the Atomic Energy Act. Most of these wastes will be contaminated with metals and radionuclides. Under the Underground Injection Control (UIC) program, byproduct material falls under the definition of "radioactive waste," but not under the definition of "hazardous waste," even though it can contain constituents in quantities ordinarily qualifying as hazardous waste. See 40 C.F.R. § 144.3. Consequently, disposal of wastewater from these projects has the potential for significant environmental impacts.

For each of these projects, deep Class I injection well disposal is the only wastewater disposal method analyzed. For example, the draft SEIS for the Lost Creek project states that impacts from Class I wells are small because of the depth of the geologic formation receiving the injected wastewater and proposes that four Class I injection wells be constructed to inject the wastewater at a depth of approximately 8,400 feet. The Safe Drinking Water Act's UIC regulations require that Class I wastes be injected below the lowermost underground source of drinking water (USDW). 40 C.F.R. § 144.6(a). This may be difficult for these types of projects located in Region 8.

In many areas of Wyoming, USDWs are known to occur at great depths, which can significantly limit the areas where injection below the lowermost USDW is feasible. In the area of the Lost Creek Project the Great Divide Basin contains up to 20,000 feet of sedimentary rocks, including two major aquifers which occur below 8,400 feet (the proposed Class I injection depth), the Tensleep Formation and the deeper Madison Formation. Both are known to be USDWs in parts of Wyoming and are currently used as public water supply sources in some areas of the state. Formations below the Madison generally have very low hydraulic conductivity and, therefore, are not likely to be suitable for injection of the volumes of fluids associated with the proposed facility. In order to inject into a Class I well, the injection zone cannot be a USDW, and all underlying formations cannot be USDWs. This situation is very similar for the Moore Ranch and Nichols Ranch project areas. Moore Ranch proposes injection in the area of the Teapot-Teckla-Parkman formation at a depth of 7,916 to 9,610 feet. Waste is also expected to be injected into the Lance formation at depths ranging from 3,700 to 7,500 feet. Nichols Ranch also proposes to inject into the Lance formation several thousand feet below the production zones occurring between 300-700 feet below ground surface.

Determination of USDW/non-USDW status can be difficult and proposed aquifer exemptions are subject to public comment, with final approval by the EPA. Based on these factors, there is significant uncertainty whether Class I injection well disposal will be available at these sites. Consequently, the fact that these draft SEISs evaluate only Class I UIC injection wells as the waste disposal method is inadequate.



Wastewater disposal alternatives that EPA believes need to be analyzed include the following: (1) treatment and disposal via a Class V injection well<sup>1</sup>; (2) treatment and discharge to surface waters under an NPDES permit; and (3) other potential methods such as land disposal and evaporation ponds.

In a related matter, the Lost Creek draft SEIS does not accurately estimate the amount of wastewater that will be generated by the project. A better estimate of the total volume of liquid waste that will require disposal is needed. The GEIS states that ISR facilities operate at a flow rate of 4,000 to 9,000 gpm and that approximately 2 to 3% (80 to 270 gpm) (7 to 138 million gallons per year) of this flow rate will be disposed of as bleed water. The draft SEIS states that only bleed water and elution circuit bleed would be disposed of via Class I wells. There is no information regarding how the other liquid wastes will be disposed of, nor is there an estimated annual volume for the other liquid wastes. This is also an issue with each of the other draft SEISs.

Potential impacts from disposal of non-radioactive contaminants (barium, cadmium, mercury, selenium) in liquid wastes are not adequately addressed given the anticipated volumes and available methods. An analysis should be presented that includes discussion of the following: (1) treatment of the waste stream to applicable Wyoming Groundwater Class of Use standards (i.e. quality) prior to injection or discharge, (2) evaluation of radioactive contaminant removal, (3) arrangements for off-site commercial, licensed land disposal of the treatment residual, (4) use of evaporation ponds with double-liners and leak detection systems, and (5) costs to remove other potentially harmful constituents such as metals, oxides, and chlorides before injection to mitigate or prevent subsurface environmental degradation of any nearby USDWs or cause surface water impacts.

### Air Quality Impacts

The SEIS analysis of air quality impacts associated with these projects is not adequate to allow the assessment of the environmental impacts of the projects. These projects will likely result in deterioration of air quality due to emissions from drill rig engines, fugitive emissions and emissions from processing operations, yet these emissions are not presented in the draft SEISs. They lack emission inventories for construction and operational sources and fail to analyze the potential sources of air emissions associated with these projects. Additionally, without a detailed emission inventory we cannot evaluate the proposed CAA determinations made in the NEPA documents, including the emissions sources included in these projects, and whether they comply with applicable CAA permit requirements. Projects similar in scope to these facilities require hundreds of injection/production wells and multiple deep injection wells. Without a complete air quality analysis, EPA's experience from the review of similar projects has shown that these projects are likely to have significant adverse local air quality impacts and also may adversely impact nearby Federal Class I areas, which require special protection of air quality and air quality related values (AQRVs), such as visibility. Of particular concern are the

<sup>1</sup> Class V disposal wells are those not included in Classes I, II, III, and IV. Most relevant for ISR disposal purposes, Class V disposal may include disposal into shallower formations than those below the lowermost USDW if the waste meets certain criteria.

air-emissions that will result from the truck-mounted diesel drilling rigs and the drilling of hundreds of wells in each project area. This level of development may have cumulative emission rates in excess of several hundred tons per year of NO<sub>x</sub>, PM<sub>10</sub> and other priority air pollutants. These levels of emissions could adversely affect the AQRVs in Class I and sensitive Class II areas and increase nearby ambient concentrations of ozone, PM<sub>10</sub>, NO<sub>2</sub>, and other pollutants. Detailed emission inventories for the proposed projects need to be included in revised SEISs. We also request that a near field air analysis be conducted to determine direct air impacts. A screening analysis should also be conducted on emissions from the projects to identify far field impacts including visibility parameters for Class I and sensitive Class II air sheds. Prior to any modeling, a draft air quality modeling protocol should be circulated among the interested air quality stakeholders for comment. Finally, with respect to the potential use of evaporation ponds for uranium by-product material, the NEPA analysis needs to estimate radon emissions, and analyze compliance with applicable CAA requirements for such emissions, which could be significant.

### **Additional Issues**

#### **Groundwater Restoration Targets**

The draft SEISs do not fully assess the operational requirements and constraints associated with the restoration activities that are critical for achieving groundwater restoration goals. Although they appropriately state that the water quality goal in the portion of the aquifer where extraction occurs is pre-ISR baseline conditions, the same paragraphs conclude with a statement that there will be a demonstration of restoration that complies with the requirements of 10 C.F.R. Part 40, Appendix A. Appendix A allows for restoration target values which can fall short of the pre-ISR baseline. Data from the ISR Christensen Ranch Mine Unit 2, for example, indicate that NRC has approved target restoration values for groundwater constituents as alternative concentration limits (ACLs). Although EPA standards for uranium extraction facilities in 40 C.F.R. Part 192 do allow NRC to utilize this practice, ACLs are above baseline or MCL values.

Without further elaboration in the final GEIS and these SEISs on how often NRC, or its Agreement States, approve ACLs, or the ACL concentrations which have been approved previously by NRC or its Agreement States, this raises an issue of whether the draft SEISs' characterization of the potential permanent degradation of groundwater quality as "small" is accurate. As such, the draft SEISs do not evaluate the potential effects that non-attainment of baseline groundwater restoration would have on surrounding USDWs.

Studies cited in the GEIS<sup>2</sup> concluded that, for sites that were reviewed, aquifer restoration took longer and required more aquifer pore volume flushing than originally planned. The draft SEISs should evaluate the alternative methods that could be used to meet restoration goals of baseline conditions for all constituents mobilized during ISR recovery operations; and whether

<sup>2</sup> (USGS Open File Report 2009-1143 Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain, and Report on Findings Related to the Restoration of Groundwater at In-Situ Uranium Mines in South Texas)

the six month post-restoration 'stability period' proposed for these projects is sufficient to achieve baseline values or MCLs and prevent any long-term remobilization of contaminants. There should also be an explanation concerning at what point in the process NRC would make the decision to set ACLs, as well as a discussion of whether there will be a further public process associated with any decision by NRC to approve ACLs.

The Lost Creek draft SEIS section 4.5.2.1.2.2 only briefly describes the excursions of lexiviant or chemical tracers that have occurred at NRC-licensed ISR facilities. It does not provide adequate detail about the cause of these excursions and how they affected the SDWA-protected aquifers outside the exempted uranium recovery zones. The uranium ore body at Lost Creek occurs within the Battle Springs/Wasatch Formation, which is an important aquifer /USDW. Each of the SEISs have similar discussions and therefore should provide a thorough analysis of the potential environmental impacts that an excursion may present, including effects on groundwater restoration estimates.

#### Climate Change and Greenhouse Gas Emissions

EPA suggests that the SEISs include an expanded discussion of greenhouse gas (GHG) emissions and climate change, including the following:

1. Discuss projected regional climate change impacts relevant to the action area, consider any future needs and capacity of the proposed action to adapt to projected climate change effects, and if appropriate, identify effects from the action that may be exacerbated by projected climate change.
2. Characterize and quantify the expected annual and total project lifetime cumulative GHGs.
3. Briefly discuss the link between GHGs and climate change and the potential impact of climate change.
4. Discuss potential means to mitigate project-related emissions.

#### EPA's Rating

Based on our review of the draft SEISs and consistent with our responsibilities under NEPA and section 309 of the Clean Air Act, EPA is rating each of the draft SEISs as "Inadequate" (Category 3). This rating indicates EPA's belief that these draft SEISs do not meet the purposes of NEPA and should be formally revised and made available for public comment in a supplemental or revised SEIS. If we are unable to resolve our concerns, this matter would be a candidate for referral to the Council on Environmental Quality for resolution.

We will be contacting you to resolve these significant concerns. EPA will also be providing you with detailed comments regarding each of the SEISs. If you have any questions

before that time, please contact Larry Svoboda, Director of the EPA Region 8 NEPA Compliance and Review Program. Mr. Svoboda can be reached at (303) 312-6004.

Sincerely,

A handwritten signature in cursive script that reads "Carol L. Campbell for".

Carol Rushin  
Acting Regional Administrator

Enclosure: Summary of EPA Rating System

cc: Patrice Bubar (NRC)  
Andrea Koch (NRC)

## SUMMARY OF EPA RATING SYSTEM

### Rating the Environmental Impact of the Action

- LO (Lack of Objections) The review has not identified any potential environmental impacts requiring substantive changes to the preferred alternative. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposed action.
- EC (Environmental Concerns) The review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact.
- EO (Environmental Objections) The review has identified significant environmental impacts that should be avoided in order to adequately protect the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). The basis for environmental objections can include situations:
  1. Where an action might violate or be inconsistent with achievement or maintenance of a national environmental standard;
  2. Where the Federal agency violates its own substantive environmental requirements that relate to EPA's areas of jurisdiction or expertise;
  3. Where there is a violation of an EPA policy declaration;
  4. Where there are no applicable standards or where applicable standards will not be violated but there is potential for significant environmental degradation that could be corrected by project modification or other feasible alternatives; or
  5. Where proceeding with the proposed action would set a precedent for future actions that collectively could result in significant environmental impacts.
- EU (Environmentally Unsatisfactory) The review has identified adverse environmental impacts that are of sufficient magnitude that EPA believes the proposed action must not proceed as proposed. The basis for an environmentally unsatisfactory determination consists of identification of environmentally objectionable impacts as defined above and one or more of the following conditions:
  1. The potential violation of or inconsistency with a national environmental standard is substantive and/or will occur on a long-term basis;
  2. There are no applicable standards but the severity, duration, or geographical scope of the impacts associated with the proposed action warrant special attention; or
  3. The potential environmental impacts resulting from the proposed action are of national importance because of the threat to national environmental resources or to environmental policies.

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
POWERTECH (USA) INC.,	)	Docket No. 40-9075-MLA
	)	
(Dewey-Burdock In Situ Uranium Recovery	)	
Facility)	)	

Declaration of Wilmer Mesteth

1. My name is Wilmer Mesteth. I am the Tribal Historic Preservation Officer ("THPO") for the Oglala Sioux Tribe of the Pine Ridge Reservation. In my activities as the THPO, I regularly review cultural resource reports and surveys, including the survey and reporting methods.
2. The Oglala Sioux Tribe is a body politic comprised of approximately 41,000 citizens with territory of over 4,700 square miles in the southwestern portion of South Dakota. The Oglala Sioux Tribe is the freely and democratically-elected government of the Oglala Sioux people, with a governing body duly recognized by the Secretary of Interior. The Oglala Sioux Tribe is the successor in interest to the Oglala Band of the Teton Division of the Sioux Nation, and is a protectorate nation of the United States of America. The Oglala Band reorganized in 1936 as the "Oglala Sioux Tribe of the Pine Ridge Indian Reservation" ("Oglala Sioux Tribe" or "Tribe") under section 16 of the Indian Reorganization Act of June 18, 1934, ch. 576, 48 Stat. 987, 25 U.S.C. § 476, and enjoys all of the rights and privileges guaranteed under its existing treaties with the United States in accordance with 25 U.S.C. § 478b. Its address is P.O. Box 2070, Pine Ridge, South Dakota 57770-2070.
3. In 1992 the U.S. Congress adopted amendments to the National Historic Preservation Act (P.L. 102-575) that allow federally recognized Indian tribes to take on more formal responsibility for the preservation of significant historic properties on tribal lands. Specifically, Section 101(d)(2) allows tribes to assume any or all of the functions of a State Historic Preservation Officer ("SHPO") with respect to tribal land.
4. I am familiar with the license application recently submitted to the Nuclear Regulatory Commission (NRC) by the Canadian company Powertech Uranium Corp., doing business as Powertech (USA) Inc. ("Powertech" or "Applicant") for the proposed Dewey-Burdock in-situ leach uranium mine in southwest South Dakota.
5. The lands encompassed by the Powertech proposal are within the Territory of the Great Sioux Nation, which includes the band of the Oglala Lakota (Oglala Sioux Tribe)

aboriginal lands. As a result, the cultural resources, artifacts, sites, etc., belong to the Tribe. By enacting NEPA (42 U.S.C. § 4330 *et seq.*), NAGPRA, (25 U.S.C. 3001 *et seq.*), NHPA (16 U.S.C.S. § 470 *et seq.*) and other statutes, the United States Government has assured that the cultural resources of a tribe will be protected, even when they are not within reservation boundaries. Since there are cultural resources identified in the license application, and there may well be more that only the Tribe can identify and ensure that they are properly protected, the Tribe has a protected interest here. Any harm done to these artifacts, perhaps because the Applicant did not properly judge the significance of certain artifacts or other resources, will be an injury to the Tribe, caused by the actions of the Applicant, and condoned by the NRC, the Tribe's trustee. While only the federal government can actually *consult* with the Tribe, the Tribe maintains that the application's determination of cultural resources in the area may not be fully comprehensive.

6. In any case, the discovery of an Indian camp and prehistoric artifacts in the Tribe's treaty and aboriginal territory at issue in this application implicates important tribal interests such that the Tribe's rights are threatened by the Applicant's mining activity in its aboriginal territory.
7. The Oglala Sioux Tribe is taking the necessary course of action to participate fully as a party in this proceeding in part in order to safeguard its interests in the protection of cultural and historic resources at and in the vicinity of the mine site.
8. Included within the territory the Powertech application contemplates are current or extinct water resources. Such resources are known to be cultural resources itself and been known as favored camping sites of indigenous peoples, both historically and prehistorically, and the likelihood that cultural artifacts and evidence of burial grounds exist in these areas is strong.
9. While the Powertech application includes some evidence of a cultural resource study, the Tribe cannot verify that a comprehensive study identifying all such resources has been adequately conducted. No such study has been conducted by the Tribe.
10. Powertech's Environmental Report accompanying the license application indicates that personnel from the Archaeology Laboratory at Augustana College ("Augustana"), Sioux Falls, South Dakota, conducted on-the-ground field investigations between April 17 and August 3, 2007. To my knowledge, the Tribe was not involved in this study, and has not made a similar study of the proposed mining area.
11. As stated in the Powertech Environmental Report, at 3-179, the Augustana study found that "the sheer volume of sites documented in the area [was] noteworthy," and the area proposed for mining was found to have a "high density" of cultural resources. As also recognized in the environmental report, this indicates that use of the area by indigenous populations was, and has been, extensive.

12. The Powertech Environmental Report also states, at 3-178, Augustana documented 161 previously unrecorded archaeological sites and revisited 29 previously recorded sites during the current investigation. Among these were some 200 hearths within 24 separate sites. Significantly, however, twenty-eight previously recorded sites were not relocated during the current investigation.
13. Powertech asserts in its Environmental Report, at page 2-9, Table 2.11-1, that impacts to cultural resources will be “none.” However, the Memorandum of Agreement (with amendments) entered into between Powertech and the Archaeological Research Center (ARC), a program of the South Dakota State Historical Society, reproduced in the Environmental Report at Appendix 4.10-B, specifically recognizes that “Powertech has determined that the Project may have an affect on archaeological or historic sites that contain or are likely to contain information significant to the state or local history or prehistory....”
14. Significantly, Powertech has not entered into any such Memorandum of Agreement with the Tribe, or sought the Tribe’s participation in the development of any stipulations purported to result in the diminishment of impacts to the Tribe’s cultural and historic resources at the site. Nor has Powertech sought to include the Tribe in any of the “Dispute Resolution” procedures through which it purports to remedy disagreements regarding the significance of cultural resources on the site, or the impact of any mining operations on these cultural resources. As a result, Powertech has failed to adequately include the Tribe in this process, and leaves the Tribe’s cultural resources at risk.
15. I have also reviewed the official Transcript of Proceedings In the Matter of Consideration of Petitions to Place Proposed Powertech (USA), Inc., In Situ Leach Mining Area On The Preliminary List of Special, Exceptional, Critical, and Unique Lands, held Thursday, February 19, 2009 before the State of South Dakota Department of Environment and Natural Resources, Board of Minerals and Environment where substantial issues related to the cultural significance of the historic resources in the area of the proposed mining operations were discussed through testimony given by witnesses first being duly sworn. (Attached). Also discussed in detail at the hearing were the April 17 and August 3, 2007 Augustana studies, relied upon by Powertech in its Environmental Report as the exclusive evidence of the impact of the proposed project on cultural resources.
16. At the February 19, 2009 hearing, Oglala Sioux Tribe member Garvard Good Plume testified after being duly sworn that he and his familial relations, including his great grandfather, his mother and father had used, dwelled, and camped on the lands subject to the Powertech mining proposal. Transcript at p. 86 and following. Significantly, he also testified that his grandparents and their relatives were buried in those areas.
17. Also at the February 19, 2009 hearing, trained archaeologist Mr. Ben Rhodd identified significant defects in the process employed by Augustana in its cultural survey, including the failure to conduct an inquiry into or an evaluation of the ethnographic information available for the site. This information includes consultation with members of the




indigenous community, the elders who have been in the area, medicine people, oral historians, and others who are familiar with the area. Transcript at p. 108-109.

18. Appearing at the hearing, and testifying after being duly sworn, was the Assistant State Archaeologist, Mr. Michael Fosha, employed by the State of South Dakota, State Historical Society, Archaeological Research Center (ARC). Mr. Fosha asserts in his testimony that he contracted Augustana to conduct its study in 2007, and asserts that additional studies were conducted in 2008. Transcript at 173. There are no references in Powertech's Environmental Report to any studies or any information collected in 2008. Mr. Fosha admits in his testimony that no Native American Tribes, including the Oglala Sioux Tribe, were contacted or consulted with regarding the Augustana survey.
19. As part of the Augustana study, Mr. Fosha indicates that there were some 217 sites identified, and that some 81 had not been fully evaluated during the 2007 or 2008 Augustana evaluation. Powertech's Environmental Report does not refer to 217 sites, but rather some 190 sites (see Environmental Report at 3-178). This discrepancy and the failure of a full evaluation of some 81 sites within the proposed mining area evidence a potentially serious failure to conduct a proper cultural resources study.
20. Overall, the numbers and density of cultural resources at the site proposed for mining demonstrate that the mining activity is likely to adversely impact the cultural resources of the Oglala Sioux Tribe. The failure to involve the Tribe in the analysis of these sites, or to conduct any ethnographic studies in concert with a field study further exacerbate the impacts on the Tribe's interests as a procedural matter in negatively affecting the Tribe's ability to protect its cultural resources. If the project were to not go forward as planned, the interests of the Oglala Sioux Tribe would be protected as the potential for impact to the Tribe's cultural resources would be diminished or outright eliminated.

This Affidavit is submitted in accordance with 10 C.F.R. Section 2.304(d) and 28 U.S.C. Section 1746. I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 1, 2010 at Pine Ridge Indian Reservation.

  
 Wilmer Mesteth

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )

POWERTECH (USA) INC., )

Docket No. 40-9075-MLA

(Dewey-Burdock In Situ Uranium Recovery )  
Facility) )

Declaration of Denise Mesteth

1. My name is Denise Mesteth. I am the Director of the Oglala Sioux Tribe Tribal Land Office. In my duties as the Director of the Tribal Land Office, I oversee the management of Tribal lands, including evaluation, issuance, and administration of all leases on Tribal land. The Oglala Sioux Tribe relies on Tribal land leases for revenue on an annual basis. Revenue from these leases is critical to the essential governmental functions of the Tribe.
2. I am aware of the license application recently submitted to the Nuclear Regulatory Commission (NRC) by the Canadian company Powertech Uranium Corp., doing business as Powertech (USA) Inc. ("Powertech" or "Applicant") for the proposed Dewey-Burdock in-situ leach uranium mine in southwest South Dakota.
3. Among the lands the Tribe grants leases for are lands potentially affected by the Dewey-Burdock in-situ leach uranium mine site. The Tribe grants leases to land in proximity to the lands proposed for mining, for domestic purposes and for agricultural purposes, including ranching, stock raising, and conservation. The lands subject to leasing support water development activities including the beneficial use of both groundwater and surface waters for domestic and agricultural purposes. Even where not leased, the lands are valuable to the Tribe. The spiritual, cultural, and socioeconomic well-being of the Tribe and its members requires that activities which affect these lands be conducted consistent with Tribal beliefs and values. Whether leased or not, these lands provide the Tribe, its members, and its lessees with the benefits of water, wildlife, air, solitude and quiet, and natural beauty.
4. Should any of the lands owned or leased by the Tribe, or any of the lands or waters in the vicinity of or associated with Tribal lands, become threatened in any way with surface or ground water, land, or air contamination as a result of in-situ leach uranium mining, the value of these lands, and the leases, would be diminished. As a result, not only would the long-term value of the Tribe's lands be threatened, but also the Tribe's ability to maintain the leased condition of any lands affected.

5. The proposed mining activity may adversely impact the valuable land and water resources of the Oglala Sioux Tribe. If the project were to be halted, or the project be made subject to the strictest environmental controls, the interests of the Oglala Sioux Tribe would be protected, as the potential for impact to the Tribe's land and water resources would be diminished or outright eliminated.

This Affidavit is submitted in accordance with 10 C.F.R. Section 2.304(d) and 28 U.S.C. Section 1746. I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 2, 2010 at Pine Ridge Indian Reservation.

Denise M. Mesteth  
Denise Mesteth

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD PANEL

In the Matter of )  
POWERTECH, INC. ) Docket No. \_\_\_\_\_  
(In Situ Leach Facility, Dewey-Burdock, SD ) License SUA- \_\_\_\_\_

STATE OF SOUTH DAKOTA )  
 ) SS:  
COUNTY OF FALL RIVER )

AFFIDAVIT OF DAYTON HYDE

I, Dayton Hyde, hereby state as follows:

1. I make this affidavit in connection with a Petition to in the Application of Powertech, USA, d/b/a Powertech (a Canadian corporation), a/k/a The Dewey-Burdock Project concerning *in situ leach* uranium mine near Edgemont, South Dakota (the "Mine"). My physical address is 12165 Highland Road Hot Springs, South Dakota 57747. The mailing address for me is Box 932, Hot Springs, SD 57747.
2. I have authorized attorneys Bruce Ellison, David Frankel, and other attorneys working with the Clean Water Alliance to represent me in this matter. I am fully familiar with the facts stated in this affidavit, and where opinions are expressed, I am competent to state such opinions based on my training, knowledge, experience and expertise. If sworn as a witness, I am competent to testify to the contents of this affidavit.
3. My home address is The Black Hills Wild Horse Sanctuary, 12165 Highland Road, Hot Springs, SD 57747 which is also the place of my business.
4. I have lived on the Sanctuary property for twenty-two years. My assistant Susan Watt moved to South Dakota in 1996 and also resides on the Sanctuary. The Black Hills Wild Horse Sanctuary consists of several thousand acres of privately owned land and another large acreage leased from the Oglala Sioux Tribe.

5. Twenty two years ago I left my Oregon ranch with a dream to seek a large acreage where I could give freedom to captured wild horses. The late governor of South Dakota, George Mickelson flew me over a fascinating wilderness area which had been donated to the South Dakota Community Foundation by Honeywell Corporation, which had intended the land for a weapons testing area. The Governor feared that the land might fall into the wrong hands, and this unique wilderness with spectacular scenery and great religious significance to the Native Americans be lost to the wrong kind of development. As I promised Governor Mickelson, I formed the Institute of Range and the American Mustang (IRAM) a 501 c 3 non profit registered in the state of South Dakota. I bought land and set up what is known now as The Black Hills Wild Horse Sanctuary. Several hundred captured wild horses were shipped in by the Bureau of Land Management.

6. The early years were a financial struggle, but eventually, by giving tours and by donations from caring individuals who believed in my dream, the project was successful. Recently, the Black Hills, Badlands, and Lakes Association awarded me their Lifetime Achievement Award, for creating a major tourist attraction which attracts people from all over the world. The movie *Hidalgo* which was filmed here brought in over two million dollars to the community. Each year the Sanctuary visitors spend thousands of dollars through out the state and local area. Just like other ranches, IRAM pays property taxes.

7. The land is protected by a Conservation Easement which forbids development, and visitation to this irreplaceable wild land is only by guided tours, ensuring good behavior by thoughtless individuals. Movie and television crews love not only the spectacular beauty of the land but the fact that the area is essentially road less and looks the way it did thousands of years ago.

8. The Cheyenne River, which flows through the Wild Horse Sanctuary, is the primary water source for the wild horses, domestic horses, cattle and wildlife protected on our land. The Sanctuary is currently home to over 500 wild horses, 150 domestic horses and 80 head of cattle. If this water becomes contaminated, we will have no way to water the horses and the land will become useless as one of America's greatest private wilderness areas and wild horse sanctuaries.

9. The Cheyenne River flows through our land downstream from where the Beaver and Pass Creeks flow through the Dewey-Burdock project area and into the Cheyenne River. It is thus down stream from any surface or surface impacting spills or leaks of mine waste or other contaminates containing toxic and/or carcinogenic heavy metals and arsenic by the proposed Powertech mining operation;

10. Now the dream of providing a Sanctuary for unadoptable wild horses, preserving

the undomesticated land and holding sacred the Native American Ceremonial Sites may become a nightmare due to the attempt by certain companies to revive uranium mining in neighboring areas and even on the Sanctuary itself. Water is a precious commodity in this area. Our eleven thousand acres are watered by five wells and several miles of the Cheyenne River. Part of the Inyan Kara aquifer flows through the Sanctuary and beyond. The mining companies propose to drill a series of wells into the uranium deposits located in the underground aquifers, pump down thousands of gallons of water, and pump up uranium water to be processed for mineral content, then flush the resulting water back down into the wells.

11. The land here is highly fractured and there is no way the mining companies can guarantee that the Inyan Kara, the Madison, and the other major aquifers will not become polluted and unusable to Man and animals. Our horses and cattle can sicken and die, along with the people. This whole area could become a cancer ridden death zone.

12. There is no way the uranium can be extracted safely. Present mining operations have a history of accidents and spillages. In the early fifties, Edgemont was severely contaminated and required millions of tax payer dollars for clean up. It will be impossible to clean up our wells and aquifers once they are contaminated. There will be no one living in the area once our water is polluted. The two million year old Cheyenne River itself stands to be polluted.

13. The companies are cultivating the locals, talking about the supposed millions they will bring into the area and the jobs they will create. It is the same old story and people have short memories. Bear in mind, these are largely Canadian companies and the market for uranium yellowcake would be China and India. In the US the bonds for clean up are notoriously low. Too often the operators take their profits and skip out, leaving cleanup cost to the public. All the money in the world and the best of intentions won't clean up a poisoned aquifer, and such pollution can travel far from the mining areas. It is far better leave uranium and the other poisons locked up where Nature put them.

14. I have worked hard and long to create the Black Hills Wild Horse Sanctuary. Daily flights of helicopters hunting for minerals drive our wild horse herds back and forth in panic. The sight of survey stakes driven into our private land is a grim reminder that we face troubled times. Uranium deposits ring the Black Hills up thrust. We should not let Uranium Mining to get a foothold. I happen to love South Dakota. I don't want it to become the Leukemia capitol of the world.

15. Future generations will only see a deathscape instead of a place that has kept its beauty since the last ice age. Land that represents what the West was in the times of

Native dominance, trappers and mountain men and when wild horses thundered in freedom across the plains.

This Affidavit is submitted in accordance with 10 C.F.R. Section 2.304(d) and 28 U.S.C. Section 1746. I declare under penalty of perjury that the foregoing is true and correct.

*Dayton O. Hyde*

Dayton O Hyde  
President and Founder  
Institute of Range and American Mustang  
Black Hills Wild Horse Sanctuary  
P.O. Box 932  
Hot Springs, South Dakota 57747

Sworn and subscribed to this 26 day of February 2010.

*Cheryl Ann McClain*  
Notary Public

My Commission Expires:  
(SEAL)

My commission expires:  
September 8, 2012



UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
POWERTECH (USA) INC.,	)	Docket No. 40-9075-MLA
	)	
(Dewey-Burdock In Situ Uranium Recovery	)	
Facility)	)	

**DECLARATION OF DR. ROBERT E. MORAN**

I, Dr. Robert E. Moran, do hereby swear that the following is true to the best of my knowledge:

**Professional Qualifications and Introduction**

1. I am a hydrogeologist/geochemist with more than 38 years of domestic and international experience in conducting and managing water quality, geochemical, and hydrogeologic work for private investors, industrial clients, tribal and citizens groups, NGO's, law firms, and governmental agencies at all levels. Much of this technical expertise involves the quality and geochemistry of natural and contaminated waters and sediments as related to mining, nuclear fuel cycle sites, industrial development, geothermal resources, hazardous wastes, and water supply development. Much of this experience has involved uranium mining, processing, and related environmental impacts. I have significant experience in the application of remote sensing to natural resource issues, development of resource policy, and litigation support. I have often taught courses to technical and general audiences, and have given expert testimony on numerous occasions. Countries worked in include: Australia, Greece, Mali, Senegal, Guinea, Gambia, Ghana, South Africa, Iraqi Kurdistan, Oman, Pakistan, Kazakhstan, Kyrgyzstan,



Mongolia, Romania, Russia (Buryatia), Papua New Guinea, Argentina, Bolivia, Chile, Colombia, Guatemala, Honduras, Mexico, Peru, El Salvador, Canada, Great Britain, United States.

2. My services have been contracted to supply comments on the Powertech (USA) Inc. Dewey-Burdock (D-B) In Situ Recovery NRC License Application for the express purpose of aiding the Oglala Sioux Tribe, and others, in the drafting of contentions to be submitted to the NRC. My CV is attached.

### **Literature Reviewed**

3. In addition to my professional experience, the opinions and comments that follow are based on review of all, or significant portions of the following documents:

Powertech Application for NRC Uranium Recovery License, Dewey-Burdock Project, Feb. 2009:

- Technical Report (TR)
- Environmental report (ER)
- Supplement to Application, Aug. 2009

Abitz, R.J., 2003 (Mar. 3), Declaration of Dr. Abitz, Before U.S. NRC, Atomic Safety & Licensing Board Panel, Administrative Judges, in Matter of: HYDRO Resources, Inc., Crown Point, NM; Docket No. 40-8968-ML.

COGEMA, 2003, Irigaray Project (IR), Quarterly Progress Report of Monitor Wells on Excursion Status, License SUA-1341.

Crancon, P., E. Pili, and L. Charlet, 2010, Uranium facilitated transport by water-dispersible colloids in field and soil columns: [Science of The Total Environment](#), Vol. 408, No., (1 April 2010), Pg. 2118-2128.

Davis, J.A., G.P. Curtis (U.S. Geological Survey), 2007, Consideration of Geochemical Issues in Groundwater Restoration at Uranium In-Situ Leach Mining Facilities: U.S. NRC, NUREG / CR-6870.

Ecometrix Inc., Nov. 2008, A Review of Environmental Criteria for Selenium and Molybdenum: prepared for The MEND INITIATIVE; MEND Rept. 10.1.1.

Faillace, E.R. , D.J. LePoire, S.-Y. Chen, and Y. Yuan, May 1997,

MILDOS-AREA: An Update with Incorporation of *In Situ* Leach Uranium Recovery Technology: Letter Report, Argonne National Laboratory, Environmental Assessment Division, Argonne, IL.

Freeze, R.A. and J.A. Cherry, 1979, Groundwater; Prentice-Hall, 604 pg.

Galloway, W.E., 1982, Epigenetic Zonation and Fluid Flow History of Uranium-Bearing Fluvial Aquifer Systems, south Texas Uranium Province; Texas Bur. Econ. Geology, Rept. of Investigations No. 119, 31 pg.

Gott, G.B., R.W. Schnabel, 1963, Geology of the Edgemont NE Quadrangle Fall River and Custer Counties, South Dakota, USGS Bulletin 1063-E.

Gott, G.B., D.E. Wolcott, C.G. Bowles, 1974, Stratigraphy of the Inyan Kara Group and Localization of Uranium deposits, Southern Black Hills, South Dakota and Wyoming; U.S.G.S. Prof. Paper 763, 57 pg.

Hall, Susan, 2009, Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain: U.S.G.S. Open-File Report 2009-1143, 36 pgs.

Harshman, E. N., 1972, Geology and Uranium Deposits, Shirley Basin Area, Wyoming; U.S.G.S. Prof. Paper 745, 82 pg.

Hem, John, 1985, Study and Interpretation of the Chemical Characteristics of Natural Waters, 3<sup>rd</sup> Edit.; U.S.G.S. Water-Supply Paper 2254, 264 pg.

Henry, C.D. and R.R. Kapadia, 1980, Trace Elements in Soils of the South Texas Uranium District: Concentrations, Origin, and Environmental Significance; Texas Bur. Econ. Geology, Rept. of Investigations No. 101; 52 pg.

Henry, C.D., W.E. Galloway, G.E. Smith, C.L. Ho, J.P. Morton, J.K. Gluck, 1982, Geochemistry of Ground Water in the Miocene Oakville sandstone—A Major Aquifer and Uranium Host of the Texas Coastal Plain; Texas Bur. Econ. Geology Rept. of Investigations No. 118; 63 pg.

Kuipers, J.R. (2000). Hardrock Reclamation Bonding Practices in the Western United States: National Wildlife Federation. Boulder, Colorado, U.S.A., 416 pgs. [This document and a summary can be obtained at:  
[http://www.mineralpolicy.org/publications/pdf/Bonding\\_Report\\_es.pdf](http://www.mineralpolicy.org/publications/pdf/Bonding_Report_es.pdf) ]

Kuipers, J.R. and A. S. Maest, et. al., 2006, Comparison of Predicted and Actual Water Quality at Hardrock Mines: The reliability of predictions in Environmental Impact Statements, 228 pages. Available at: <http://www.mine-aid.org/> and  
<http://www.earthworksaction.org/publications.cfm?pubID=213>  
<http://www.earthworksaction.org/pubs/ComparisonsReportFinal.pdf>

Longmire, Patrick, Dale Counce, Elizabeth Keating, Michael Dale & Kim Granzow, Aqueous Geochemistry of Uranium and Arsenic: Los Alamos and Surrounding Areas, New Mexico.

[www.unm.edu/~cstp/Reports/H2O\\_Session\\_4/4-1\\_Longmire.pdf](http://www.unm.edu/~cstp/Reports/H2O_Session_4/4-1_Longmire.pdf)

McCarthy, J.F. and J. M. Zachara, 1989, Subsurface Transport of Contaminants: mobile colloids in the subsurface environment may alter the transport of contaminants. Environ. Sci. Technol.. Vol. 23. No. 5. Abstract available at: [http://pubs.acs.org/cgi-bin/abstract.cgi/esthag/1989/23/i05/fpdf/f\\_es00063a001.pdf?sessid=600613](http://pubs.acs.org/cgi-bin/abstract.cgi/esthag/1989/23/i05/fpdf/f_es00063a001.pdf?sessid=600613)

Moran, R.E., 1976, Geochemistry of Selenium in Groundwater near Golden, Jefferson County, Colorado. Abstracts with Programs, Geological Society of America. 1976 Annual Meeting. November 8-11, 1976. 8(6):1018.

Moran, Robert E., 2000, Is This Number To Your Liking? Water Quality Predictions in Mining Impact Studies, p. 185-198, in Prediction: Science, Decision Making and the Future of Nature. D. Sarewitz, R. Pielke, Jr., and R. Byerly, Jr., eds., Island Press, Washington, D.C., 405 pg.

[http://www.unc.edu/~mwdoyle/riverretreat2009/Moran\\_2000.pdf](http://www.unc.edu/~mwdoyle/riverretreat2009/Moran_2000.pdf)

Mudd, Gavin, 1998, An Environmental Critique of In Situ Leach Mining :*The Case Against Uranium Solution Mining*; Research report prepared for Friends of the Earth (Fitzroy) with The Australian Conservation Foundation, 154 pg.

[www.sea-us.org.au/pdfs/isl/no2isl.pdf](http://www.sea-us.org.au/pdfs/isl/no2isl.pdf)

Otton, J.K., & S. Hall, 2009, In-situ recovery uranium mining in the United States: Overview of production and remediation issues.

IAEA-CN-175/87

[www-pub.iaea.org/mtcd/meetings/PDFplus/2009/.../08\\_56\\_Otton\\_USA.pdf](http://www-pub.iaea.org/mtcd/meetings/PDFplus/2009/.../08_56_Otton_USA.pdf)

O.H. Pilkey & Linda Pilkey-Jarvis, 2007, Useless Arithmetic: Why Environmental Scientists Can't Predict the Future; Columbia Univ. Press, 230 pg.

Ramirez, P. & B. Rogers. 2000. Selenium in a Wyoming grassland community receiving wastewater from an in situ uranium mine. U.S. Fish and Wildlife Service Contaminant Report # R6/715C/00. Cheyenne, WY. Sept. 31.

Ramirez, P. Jr. and B.P. Rogers. 2002. Selenium in a Wyoming grassland community receiving wastewater from an *in situ* uranium mine. Arch. Environ. Contain. Toxicol. 42:431-436.

Ramsey J.L., R. Blaine, J. W. Garner, J. C. Helton, J. D. Johnson, L. N. Smith and M. Wallace, 2000, Radionuclide and colloid transport in the Culebra Dolomite and associated complementary cumulative distribution functions in the 1996 performance assessment for the Waste Isolation Pilot Plant. Reliability Engineering & System Safety, Vol. 69, Issues 1-3, September 2000, Pages 397-420.

Smith, R.B., 2005, Report on the Dewey-Burdock Uranium Project, Custer and Fall River Counties, South Dakota, prepared for Denver Uranium co., LLC, 41 pg.

Staub, W.P., N.E. Hinkle, R.E. Williams, F. Anastasi, J. Osiensky, and D. Rogness, 1986, An Analysis of Excursions at Selected In Situ Uranium Mines in Wyoming and Texas,; NUREG / CR-3967, ORNL / TM-9956, Oak Ridge Nat'l. Lab, TN.

U.S. EPA, 2007, TENORM Uranium Occupational and Public Risks Associated with In-Situ Leaching; Append. III, PG 1-11.

US EPA, 2008, Technical Report on Technologically Enhanced Naturally Occurring Radioactive Materials from Uranium Mining, Volume 1: Mining and Reclamation Background: Previously published on-line and printed as Vol. 1 of EPA 402-R-05-007, January 2006, Updated June 2007 and printed April 2008 as EPA 402-R-08-005, Pg. 3-10.

<http://www.epa.gov/rpdweb00/docs/tenorm/402-r-08-005-voli/402-r-08-005-v1.pdf>

U.S. Energy Information Administration (U.S. DOE), 2005, U.S. Uranium Production Facilities: Operating History and Remediation Cost Under Uranium Mill Tailings Remedial Action Project as of 2000

<http://www.eia.doe.gov/cneaf/nuclear/page/umtra/title1map.html>

<http://www.eia.doe.gov/cneaf/nuclear/page/umtra/background.html>

U.S. Energy Information Administration (U.S. DOE), 2005, Edgemont Mill Site, Fall River County, South Dakota

[http://www.eia.doe.gov/cneaf/nuclear/page/umtra/edgemont\\_title1.html](http://www.eia.doe.gov/cneaf/nuclear/page/umtra/edgemont_title1.html)

U.S. Fish & Wildlife Service, 2007, Comments (FWS/R6 FR-ES) on Generic Environmental Impact Statement for Uranium Milling Facilities (GETS); prepared for U.S. NRC, Wash., D.C.

U.S. NRC (Lusher, J.), 2003, Standard Review Plan for In Situ Leach Uranium Extraction License Applications, Final Report: NUREG-1569.

U.S. NRC (R.C. Linton), 2006(?), Evaluation Report, Review of COGEMA Mining, Inc., Irigaray Mine Restoration Report, Production Units 1 Through 9, Source Materials License SUA-1341.

Wyoming DEQ, 2008, Settlement Agreement with Power Resources / Cameco Resources, regarding Highland and Smith Ranch Uranium projects.

<http://deq.state.wy.us/out/downloads/LQ%20SA%204231-08.pdf>

### **Summary of Comments.**

4. As discussed in detail below, the Powertech application is technically deficient and not well organized. The application fails to include and analyze sufficient data to justify the conclusions asserted that the proposed mine will protect water quality, the environment, and human health. In particular, the application is deficient with respect to the baseline ground water, surface water, and hydrogeological characterizations. These aspects are critical to providing a defensible demonstration that mining fluids and mobilized constituents can be contained within the mine production zone and that impacted ground water can be restored to acceptable standards. The application fails to provide an adequate presentation of the potential impacts associated with waste disposal from the proposed mining operations, whether disposal by deep well injection or surface land application. Lastly, the application neglects to provide sufficient discussion of financial assurance calculations or amounts, a critical component for protection of natural and human resources.

### **Specific Comments**

#### **Powertech's Application is Technically-deficient and Disorganized**

5. Powertech D-B Application is so disorganized and technically-deficient that it does not comply with the terms of NUREG-1569 and other relevant NRC regulations and should be revised. The various portions of the D-B Application total almost 6000 pages and are composed of:

- Technical Report (TR)-- 3103 pages;

- Environmental Report (ER)-- 2615 pages;
- Supplement to Application-- 66 pages.

The relevant information, if compiled in a direct, transparent manner using predominantly maps, tables and graphs, could easily have been summarized in 150 pages for the main volume. Instead, the Application is so duplicative and poorly-organized that it makes informed review by both the regulators and general public largely impossible. The Table of Contents for both the TR and ER provide no page numbers for the masses of information presented in the Appendices. The Appendices, in places, seem to have been thrown together with little or no logic to the organization. The authors of the main portions of the ER and TR, whoever they are, have made the review process unnecessarily convoluted, for both the NRC and the public. To that point, for numerous sections of the Application, it is not possible to discern whose opinions are being stated – Powertech's, one of their consultants, or some other source.

6. What follows in paragraphs (6-10) are a few examples of the disorganized nature of these documents: For both the ER and TR, the tables of contents present basic titles, but no page numbers for the thousands of pages of appendices. As it is the Appendices that contain much of the corroborating data, such careless organization makes document review and substantiation of claims written in the text unnecessarily difficult. The headings of the appendices, figures, and tables often are far too vague to be useful. For example, regarding ER Append. 3.4-A, the title simply says: WELL LOCATION DATA. This is an inadequate presentation and several questions are evident. Data compiled by whom? When was the data compiled? For what types of wells (domestic? agricultural?)? Are those wells still in use? Are those wells monitored?

7. There are several other similar examples. One title says: Wells in Dewey-Burdock Database. Was this database originally compiled by Powertech? TVA?
8. Surface water sites discussed on pg. 2-192 through 2-194 of the TR have no specific names; they are simply labeled BVC01, BVC04, CHR01, CHR05. The field data for these sites are not integrated with the lab data from the same samples.
9. Application documents fail to provide summary tables and figures where they are most necessary. For example, the ER, pg. 3-39-40 provides no summary of the wells discussed, their uses, water-bearing units / formations, etc.; such tables should be included in the text where the discussions are taking place.
10. Water-related discussions / data are scattered throughout the ER and present inconsistent findings. For example, a reviewer (NRC or public) of water-related issues must search through the following sections:

3.4 Affected Environment [WQ and Q discussions not integrated];

4.6 Potential WR Impacts

6.1.8 GW Sampling

6.2 Physiochemical GW Monitoring

7.4.3 Potential GW Impacts

8.1 Summary of Env. Consequences

Appendices:

3.3A, D

3.4A, B, C, D, E

3.5I

6.1B, C, D, E, F, G

Given the need for the applicant to submit supplemental information, these deficiencies should have been resolved at that time.

### **An Independent Review of the Application Is Necessary**

11. Given the inherent conflict of interest in having the Application preparation directed, partially-prepared, and paid for by the project proponent, some independent party needs to take a more assertive oversight role, including in oversight of actual monitoring methods in the field. This is especially evident in the biased decisions made throughout these Application documents regarding baseline water quality and quantity decisions, as discussed below.

### **Water Use: The D-B Project will use and contaminate tremendous volumes of ground water**

12. The D-B project area is semi-arid, having an average yearly precipitation of about 12 to 13 inches. While the application documents fail to report yearly evapotranspiration (ET), estimates of ET are roughly 70 inches per year, about 5 times the yearly precipitation (ER, pg. 3-176 and 177; Fig. 3.6-27). Because the project is presently expected to operate for between 7 and 20 years, it will require the use of tremendous volumes of local ground water.

13. Unfortunately, the Application documents present conflicting estimates of the volumes of water actually needed to operate the project. The ER, pg. 4-25, section 4.6.2.7.2 Water Requirements for the Proposed Action Facilities states:

“Water requirements of the CPP and other facilities are estimated to have a maximum requirement of **65 gpm**. As this requirement is relatively large, it is expected that most of this water will be derived from a water supply well in the Madison formation. Some of this water may be withdrawn from the Inyan Kara formation, but if so, it will not occur in



a fashion to affect any well field operations.”

While the last sentence is totally unclear as to specific details, the greater problem comes on reading ER pg. 8-2 (Table 8.1-1), which states that ground water consumption will be **320 gpm**. Aside from the obvious lack of consistency, both of the estimates translate into massive amounts of ground water when considered over the full life of the project.

The water usage data for the conflicting water usage numbers referenced in the Application result in total water consumption over the life of the project as follows:

**65 gpm = 34.2 Million gpy (gals / yr).**

**After 7 yrs = 239,148,000 gallons, or 239.15 Million gals.**

**After 17 yrs = 580,788,000 gals or 580.8 Million gals.**

**320 gpm = 168.2 Million gpy (gals. / yr).**

**After 7 yrs = 1,177,344,000 = 1.2 Billion gallons**

**After 17 years = 2,859,264,000 gallons = 2.86 Billion gallons.**

14. The TR, pg. 2-181, also says water requirements will be 65 gpm, but the subsequent discussion (pg. 2-181 and 2-182) indicates great uncertainty. These inconsistencies need to be rectified to enable effective public and NRC staff review. Clearly, both of these estimates indicate that vast quantities of ground water will be extracted from these aquifers over the long-term, and it seems overly-optimistic to simply state that no significant impacts will occur. At a minimum, Powertech should be required to construct a credible project water balance and to more seriously investigate the potential that such large-volume water use might impact local / regional ground water levels. At present, I see no evidence that the Application contains a reliable compilation of baseline water

level data for the surrounding domestic and agricultural wells (see discussion below).

Without such reliable, summarized data, there will be no viable method to demonstrate that ground water levels (and related pumping costs) have not been impacted by project-related activities.

15. The public must assume that Powertech will pay no cost for the actual water (the commodity) used during operations---while numerous other users do. The specifics of this issue should be addressed by Powertech in writing.

### **Baseline Water Quality**

16. The Powertech Application fails to define pre-operational baseline water quality and quantity—both in the ore zones and peripheral zones, both vertically and horizontally.

Without adequate baseline water quality data (both ground water and surface water), there is no reasonable method for either the public or the NRC to evaluate the success or failure of either fluid containment or aquifer restoration. The Powertech Application documents repeatedly attempt to convey the impression that the D-B ground water quality is already degraded, rather than compile statistically-defensible data from both the ore zones and non-mineralized zones. This approach contradicts NRC guidance, which requires that pre-mining baseline conditions be defined before licensing (NRC, 2003, pg. 2-24).

17. Clearly the Powertech ground water baseline data should include, as a minimum, the chemical constituents listed in Table 2.7.3.1 of the NRC's Standard Review Plan (NRC, 2003, pg. 2-25). It seems only logical that the actual list of baseline constituents should be based on analyses of pregnant solutions resulting from leach testing of the D-B ores and lixiviants—not on theoretical assumptions about what might be the chemical

composition.

18. Frequently, uranium roll-front ores will also mobilize significant concentrations of additional constituents, such as antimony, lithium, and strontium (Moran, 1976). In addition, it is common to detect elevated concentrations of aluminum, sometimes as the result of well-drilling and completion techniques. Thus, it is recommended that these constituents be included in routine determinations of baseline water quality. In fact, standard lab analytical scans, such as ICP (inductively-coupled plasma spectroscopy) routinely report all (or most) of these metals and metalloids at the same cost. It should be noted that almost all of these constituents were included in the data in Appendix 3.4-C of the ER. I suggest that ammonia determinations be included to preclude future disputes regarding impacts (ammonia may enter the aquifer via numerous agricultural or industrial activities) along with ion balances, to assist in evaluating the reliability of the analytical data (Hem, 1985).

19. Section 2.7 of NRC (2003) is unclear whether applicants shall provide water quality data from unfiltered (Total concentrations) or 0.45-micrometer-filtered samples (“dissolved”). Much of the D-B data in the Application Appendices include both. It is recommended that unfiltered samples be collected and analyzed, as a minimum, for baseline ground water evaluation. These provide more *conservative* characterization of the ground waters, and waters used in rural areas (human and livestock consumption from wells; other agricultural uses; irrigation; fisheries) are not filtered. Furthermore, contaminants carried in particulate form are ingested by humans and other organisms when consuming unfiltered waters. These particles / colloids are dissolved by the extreme biochemical conditions found in the guts of such organisms, mobilizing the contaminants

into the blood and other tissues. In addition, many trace constituents are mobile in ground waters as colloidal particles (McCarthy, 1989; Ramsey, 2000), which would be removed by filtration, generating unreasonably-low concentrations.

20. The D-B baseline data should include statistical comparisons of the field and lab determinations of pH, and S.C. for the same samples. See section....below for further discussion.

21. The D-B 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 past impacts to water resources, and the success of future containment or aquifer restoration.

22. No coordinated, statistically-sound data set for **all** Baseline Water Quality data (both surface and ground water) is presented in these documents—as is required in NUREG--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 TR Section 2.7, there are no tables that actually statistically summarize 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 TR, 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.

23. 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. Even should averaging of water quality data over a portion of the aquifer be acceptable, the methodology employed in the Application of discounting relevant data points is untenable.

24. 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 it appears that the Applicant intends that 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**. It is imperative that baseline data for the non-ore zone ground waters be collected and summarized separate from those of the ore zones. Lastly, the Application should already contain a statistically-reliable database of baseline ground water quality data from all known wells within at least a one-kilometer radius of the project boundary.

**Surface Water Quality Baseline Data: Application fails to include statistically-reliable summaries of detailed data.**

25. The D-B Application casually dismisses the possibility of any significant impacts to surface water resources [ER, Pg. 4-14: 4.6 Potential Water Resource Impacts.] Page 4-16 of the ER states: “ISL operations do not involve the consumption of surface waters. Nor do the operations proposed require a long- term discharge to surface waters. For these reasons, no significant impacts to surface water quantity and use are anticipated.”

26. On ER, pg. 4-16 (Section 4.6.1.2 Potential Surface Water Impacts from Operations) it further states: “Potential impacts from accidental spills or permitted temporary discharge to surface water may include the release of process materials into the environment or a release or spill from the operation or well field (e.g., handling of fuels, lubricant, oily wastes, chemical wastes, sanitary wastes, herbicides, and pesticides). Surface water monitoring and spill response procedures will limit the impact of potential spills to surficial aquifers.”

These statements are far too simplistic and self-serving. They fail to mention that all such operations generate short-term discharges to surface waters, as a minimum. More importantly, the Application fails to provide a summarized, statistically-reliable surface

water quality baseline database. As such, there will be no defensible method for verifying whether impacts to surface water quality have or have not occurred.

27. ER pg. 4-16 also states: “Most ISL operations extract slightly more groundwater than they re-inject into the uranium bearing formation. *The groundwater extracted from the formation could result in a depletion of flow in nearby streams and springs if the ore-bearing aquifer is hydraulically connected to such features.* However, because most, if not all ISL operations are expected to occur where the ore- bearing aquifers are confined, local depletion of streams and springs is unlikely, and potential impacts would be anticipated to be SMALL (NUREG-1910, 2008).”

28. As stated above, there is ample evidence to suggest that portions of the impacted water-bearing zones are, in fact, in hydraulic connection with each other and are also likely to be hydraulically-connected with local surface waters, springs, and seeps, especially when **long-term operating conditions** are considered. More importantly, Powertech has failed to provide a reliable baseline spring and seep survey. Hence there would be no way to verify whether future impacts were the result of the D-B operations. The Application provides no support for such statements. Thus, it is imperative that reliable surface water quality baseline data be made public and that a viable seep and spring survey be performed, prior to the issuance of any licenses.

**The presence of high-quality ground waters within the D-B Project boundary have not been adequately defined.**

29. Much of the Application discussion concerning ground water quality seems focused on showing that the site waters are already contaminated. This would not be surprising given the presence of the uranium mineralization and the past mining and exploration activities---all of which would have caused increased concentrations of numerous

chemical constituents above true pre-mining baseline. However, based on statements made in the ER, pg 1-16, Powertech has not adequately defined whether zones peripheral to the D-B ore-bearing geologic formations and bounding formations (above and below) also contain zones of high-quality, possibly potable ground water. Such zones should already have been defined as part of the Application documents.

**The Application documents fail to present an adequate database and summary of Baseline Ground Water Levels, both within the project boundary or outside.**

30. ER, pg. 4-18: states that “Background water levels will be monitored in regional wells.” Such monitoring of water levels should already have been completed for numerous episodes over at least a one-year period prior to issuance of any permits. The Application also fails to provide a map and detailed program describing which wells will be included in such water-level monitoring.

31. Rather than presenting actual water level data, the Application (ER, pg. 4-21 through 4-23: Drawdown Estimates) attempts to substitute predictions of future water levels, all of which are based on unrealistic, theoretical assumptions. The public and regulators need to see actual baseline water-level data.

32. Also, the public and regulators should note the great range of uncertainty the ER presents for predictions of water level declines after 8 years of continuous pumping:

- at the nearest domestic well in the Fall River Aquifer, located 15,075 feet from the approximate center of pumping is **9.9 to 42.8 feet** (Pg 4-23);
- at the nearest domestic well in the **Lakota Aquifer**, located 10,915 feet from the approximate center of pumping is **4.9 to 12.6 feet**.

With such uncertainty, it is quite possible that some neighboring wells will be negatively impacted.



**A Baseline Spring and Seep Survey is not presented in the Application.**

33. The Application ER, pg 3-58 states that the region surrounding the D-B project contains numerous springs in both the Madison and Minnelusa formations.

Baseline surveys of springs and seeps are crucial in studies where large volumes of ground water are to be extracted. The flows of such seeps and springs often decline or stop after large-scale, long-term ground water extraction begins, especially in arid or semi-arid regions, such as the D-B area. If such impacts begin to occur, disputes will arise as to the possible roles of the project water extraction and overall climate change, for example. Hence, it is imperative that such a survey be performed prior to issuance of any licenses, and such a survey should include, as a minimum:

- locate and survey all springs and seeps within some reasonable radius of the project boundary;
- measure and record flow / discharge quarterly for at least one year prior to issuance of any licenses;
- during all field episodes, make field measurements of in-situ pH, water temperature, and S.C.(specific conductance) and collect samples for laboratory analysis. Samples should be analyzed for the same list of constituents noted in the Baseline water Quality comments above. Spring and seep water quality data should be interpreted as representative of local ground water quality (Freeze and Cherry, 1979; Hem, 1985).

**Chemical Analyses (Detailed) of Ores, Pregnant Leach Solutions, Liquid Wastes are not presented in the Application.**

34. The Application fails to provide actual, detailed chemical analyses (numerous) of representative pregnant leach solutions (ore reacted with lixiviant), both before and after undergoing ion exchange treatment. Such data would routinely include both in-situ

measurements of fluid temperature, pH, specific conductance, possibly D.O. (dissolved oxygen) and Eh (redox). Similar representative, detailed data should also have been included for the detailed chemical composition of liquid wastes to be disposed of via deep-well injection or land application.

35. Because most mining projects at a similar stage of advancement have already conducted extensive laboratory testing and prepared Feasibility Studies to present to potential investors, such detailed chemical composition data would be available. It is not sufficient to present theoretical / expected chemical compositions, as has been done on ER, pg. 4-83. Smith & Assoc. (2005), pg. 5, reports that TVA, one of the previous mineral right holders, had a “pre-mine feasibility study” prepared, probably in the late 1970’s or 1980’s. If TVA had obtained such detailed data in earlier decades, certainly Powertech would have / should have also. Clearly some information in Feasibility Studies is considered proprietary, but detailed chemical composition data on the pregnant solutions and liquids / wastes described above should be included in any complete Application.

**The D-B water-bearing units are hydrogeologically interconnected.**

36. The application presents overly-optimistic conclusions about the isolation of the ore-bearing zones, aquifers, and the lack of fluid excursions that will occur, both vertically and horizontally. Powertech’s description and evaluation of possible water-related impacts [ER pg. 8-2 (Table 8.1-1)] are unreasonably optimistic. It is unlikely that the process waters can be contained within the project boundaries given the following sources of the evidence.

37. The D-B uranium deposits occur in subsurface, fluvial channel, sandstone deposits in the Lakota and Fall River formations (Smith, 2005). These sandstones inter-finger with finer-grained silts and shales, often associated with lignites and coals, which form the typical lithologic sequences often seen in classic sedimentary uranium deposits (Abitz, 2005; Gott, 1974; Henry, 1982; Galloway, 1982; Henry, 1980; Harshman, 1972).

38. Hydraulically, such sedimentary packages typically allow ground waters to flow between the inter-fingering facies, both vertically and horizontally, when the coarser-grained sediments are stressed by long-term pumping. The hydraulic inter-connections are verified by conducting long-term aquifer tests integrated with sequential water quality sampling and in-situ measurement of field parameters (Henry, 1982; Galloway, 1982; Moran, R.E.—hydrogeochemical research activities, U.S.G.S., Water Resources Div., 1973—1978).

39. Thus, ore-bearing sandstones in typical sedimentary packages associated with roll-front uranium deposits do not routinely behave as hydraulically-isolated bodies.

Numerous specific lines of evidence from the D-B Application documents indicate that the project sediments possess various pathways for the migration of water and contaminants from the ore zones into neighboring sediments, both vertically and laterally. For example, thousands of exploration boreholes have been drilled since the 1950's at the D-B site (Smith, 2005; TR, ER), many of which were not correctly plugged and abandoned (TR, Pg. 2-157; Append. 2.7-B, sub-Appendix D, pg. 1484; TR, Append. 2.6-A, pg. 972-1111). In addition, several sources (Smith, 2005, pg. 9; ER, pg. 3-106) report that the area contains historic shallow mine workings, both open pits and short tunnels that would provide additional flow pathways.

40. There are numerous old and existing water wells and old oil test wells in the D-B area, many with rusty and leaky casings, often unplugged or partially-plugged, drilled through several formations which act as potential pathways for flow between water-bearing units (ER, pg.3-40; TR, Append. 2.2-A, pg. 740-779; 2.2-B, especially pg. 864-902).

41. The TR, pg. 2-153-154, states that hydraulic connections between local D-B aquifers often result because confining units thin or are absent in many areas (ER, pg.3-56-57). In addition, Gott (1974) and others have mentioned the presence of breccia / evaporite pipes (collapse structures), which create vertical permeability pathways between aquifers. Gott (1974, pg. 27-29) and others discuss the common presence of faults and joints throughout the region, which could easily act as flow pathways.

42. Vertical and lateral hydraulic connectivity between the ore zones and the neighboring facies / formations are also indicated by the aquifer test results conducted in both 1979 and 2008 (ER, pg.3-56-57; TR, pg. 2-170 & 2-180, for example; TR Append. 2.7-B, Knight-Piesold Pumping Test Report, pg. 1290).

43. It seems obvious that the aquifer testing already performed demonstrates leakage between the various formations / facies bounding the ore zone. However, it seems equally likely that longer-duration aquifer tests conducted at even higher pumping rates would demonstrate even more clearly the leaky nature of these site sediments.

44. Repeatedly throughout the Application, Powertech states that the project will bleed 0.5 to 3% of leachate to maintain a cone of depression, which will prevent flow of leachate outwards (i.e. ER, pg. 1-14). Rather than supporting this allegation with long-term, technical data from other operating sites, Powertech has inserted a public relations

statement from the mining industries' lobbying group, the National Mining Association (NMA, 2007).

45. D-B Application Supplement, pg. 5-5 describes an aquifer exemption boundary, which acts as an additional buffer zone outside the monitor well rings **“to provide protection to adjacent water from the excursions that occur in the normal course of operations.”** Page 5-6 of the Supplement further states that the aquifer exemption boundary is proposed to be up to 1200 ft. outside the monitor well ring, and **would be considered the point of regulatory compliance. Apparently simply pumping to create an inward flow direction is not adequate to control “excursions.”** It appears this aquifer exemption boundary is actually an expanded ground water sacrifice zone.

**Potential hydrogeologic pathways to nearby wells have not been adequately investigated and documented.**

46. The discussion above presents ample evidence that the D-B area sediments contain numerous possible subsurface pathways for project leach fluids to migrate vertically between water-bearing units and outside the project boundaries. Unfortunately, as noted above, Powertech has not adequately defined the baseline water levels or water quality conditions of neighboring wells within a 1 to 2 mile radius of the D-B project. In addition, the TR, pg. 2-180, states that no public data are available on the use of aquifers in Fall River or Custer counties. Such data should have been compiled by Powertech as part of the Application, and should be required before any licenses are given.

**Potential impacts to ground waters have been unrealistically minimized and inadequately characterized.**

47. Powertech has failed to provide adequate baseline data to demonstrate that portions of the ore-bearing zones do not contain high quality ground water. On pg. 4-18 of the ER

they misleadingly state that all D-B ore zone ground water quality is degraded by natural mineralization processes. They have failed to provide the data to support this allegation and in many similar situations it is simply not true. Furthermore, many ground water-bearing zones in mineralized areas do not contain elevated concentrations of metals, non-metals, etc. until they have been exposed to air and bacteria---often as the result of previous mining or exploration drilling—as has occurred here. Even following exploration and mining activities, some portions of ore-bearing formations continue to contain high-quality ground water.

48. Hence, it is not defensible for Powertech to state, as they do in Sect. 4.6.2.2 (Potential Impacts of Production on Ore Zone Groundwater Quality) that: “Potential environmental impacts to groundwater are changes to water quality in well fields within the exempted aquifer. The impact, in and of itself, it is of limited significance, due to the fact that the groundwater quality is very poor prior to ISL operations; due to the presence naturally occurring radionuclides, heavy metals, and other constituents that exceed EPA and/or state drinking water limits. Accordingly, the exempted aquifer is not and can never serve as a USDW (HRI, 1997; NMA, 2007).” The citations provided here by Powertech do not pertain to the specific D-B situation and one, the NMA citation, is simply a routine public relations statement made by the industry’s lobbying group.

49. The public relations statements continue on ER, pg 4-18, where they state: “Powertech (USA) has proposed to use gaseous oxygen and carbon dioxide lixiviant. The interaction of the lixiviant with the mineral constituents of the exempted ore zone results in a slight increase in trace elements and primary constituents of sulfate, chloride, cations and TDS above pre production levels. There is no introduction of non-naturally occurring

constituents from the leach fluids into the ore body.”

50. To support these unsubstantiated statements, Powertech needs to supply actual, detailed chemical analyses of the pregnant leach solutions (multiple analyses)--solutions resulting from the chemical interaction of the proposed lixiviant and the ore zone rocks. All responsible parties knowledgeable about ISL operations are aware that the introduction of these lixiviants drastically changes the local ground water chemistry, routinely producing significantly-elevated concentrations of many major and trace metals and metalloids, plus other constituents: i.e. arsenic, antimony, molybdenum, selenium, vanadium, uranium, strontium, iron, manganese, lead, lithium, nickel, chromium, sulfate, chloride, etc. It is a total “red-herring” to claim that: “There is no introduction of non-naturally occurring constituents.....”

51. In addition, there is ample evidence in the technical and regulatory literature to show that the leached aquifers at most, if not all ISL operations, have never truly been restored to their pre-operational, baseline water quality.

**Land application is not an approved method of radioactive liquid waste disposal.**

52. Powertech has proposed that various liquid wastes may be disposed via land application. However, US EPA (2008) guidance states that such land application is not an approved method for disposal of such wastes. Equally importantly, Powertech has failed to supply detailed chemical analyses of these proposed wastes (see discussion above) to clarify the chemical nature of the materials being disposed.

53. It is ironic that the Supplement to the Application states on pg. 4-7 that irrigation pivots have been used to dispose of non-hazardous wastes via surface application “ with no deleterious effect on the environment” at Hobson, Mount Lucas, and Highland. In

2008, the operators of the Highland and Smith ISL mines in Wyoming were forced into a settlement agreement with the WY Dept. of Environ. Quality, because land application of liquid wastes containing elevated concentrations of selenium had contaminated soils. Part of the settlement agreement required the operators of Highland to immediately pay \$8 million to accelerate reclamation activities and to increase their financial assurance bonds for these two sites to \$80 million (WY DEQ, 2008). Furthermore, Faillace and others (1997) report that release of such waters will contaminate the soil at the land application areas. Radionuclides adsorbed by the soil will become a source term for radioactive release through wind erosion processes.

**Deep Well Injection of Liquid Wastes. The Application fails to provide necessary details on the chemical composition of the wastes and water treatment specifics.**

54. ER, Pg 4-21 (4.6.2.6 Potential Impacts of Groundwater Consumption During Operations and Restoration) states: “The majority of groundwater used in the ISL process will be treated and injected.” However, no details are provided on the (actual) chemical composition of either the untreated or treated liquid wastes. Instead, ER, Pg 4-83 states: “The physical and chemical properties of the wastes will be similar to the estimated quality of wastes provided in **Table 4.15-1 for land application**. The process waters for deep well injection will meet the regulatory provisions in 10 CFR 20.2002 and be within the dose limits in 10 CFR 20.1301.” Table 4.15-1 lacks many of the constituents for which water quality standards / criteria exist. Powertech should be required to provide actual, detailed analyses for such wastes.

55. In addition, the Application presents no details on the specific methods of water treatment that would be used prior to injection. As discussed above, such details are routinely known at this stage of a project.



**Ground water sampling results presented in ER, section 6.1.8 (Groundwater Sampling, pg 6-62) should be combined and integrated with those in ER, Chapter 3.**

56. ER, pg 6-69 states: “A groundwater quality constituent list was developed based on NUREG-1569 groundwater parameters, NRC 4.14 parameters, and added parameters from a constituent-list review with SD DENR.” It is recommended that the constituent list be expanded to include all constituents for which any water quality standards or use criteria exist.

57. Which specific personnel performed the actual field activities (sampling and measurement)? Do field sheets exist to demonstrate that samples were preserved in the field?

**The technical and regulatory literature amply documents the numerous failures to restore aquifer water quality at other ISL sites. Thus, it is reasonable to assume that portions of the D-B ground water surrounding the leached zones will have degraded water quality and may be unfit for future uses.**

59. Powertech repeatedly makes optimistic statements about aquifer restoration such as: “Powertech (USA) will restore GW in each depleted well field consistent with pre-operational or baseline WQ conditions.....” ER, pg. 1-1. However, there is no demonstration as to other in-situ operations that have been able to do so. Indeed, the historical reality from other operating or closed ISL sites demonstrates an inability to restore to pre-operational or baseline WQ conditions for all constituents. (Otton, 2009; Hall, 2009).

**The Application fails to adequately describe the common names (in addition to commercial names) and quantities of chemicals, fuels and explosives to be used and stored per year at the D-B site.**

60. The ER, pg. 1-32, presents some information on the chemicals to be used, but no quantities are given. ER, pg. 1-34, Sect. 1.4.7.9 presents a very limited mention of the

fuels to be used, but again no details on the quantities. All categories of chemicals, explosives, fuels, and any other potential environmental contaminants need to be summarized in a simple table including estimated quantities to be used per year. *Equally importantly, all categories of baseline monitoring should determine chemical constituents that will indicate the possible presence of these compounds (organic and inorganic) in the environment.*

### **What Commercial Products will be Extracted?**

61. Does Powertech intend to produce only uranium yellowcake as a commercial product or will other products be generated? [Any molybdenum, selenium, etc. products anticipated?]

### **Improper Technical Conclusions.**

62. The Application is inadequate in its attempt to demonstrate that the ground water quality data are of suitable quality, as on ER pg. 3-61, 62. Here they state that a comparison of field and lab pH and specific conductance data “are within reasonable limits.” Despite the vagueness of the language, this statement / section demonstrates a failure to understand the basics of applied water quality. Ground water chemistry routinely changes between the time a water sample is lifted from a well--where field pH and S.C. measurements should be made immediately--and much later when investigated in a laboratory. Hence, it is inappropriate to argue that, for example, the highest measured field pH was 12.67 and it “was verified by the contracting laboratory which reported a pH of 12.4 in the sample” (p. 3-62). Of course the chemistry changed as the temperature and pressure of the sample changed, the sample de-gassed, and various chemical reactions occurred. However, the authors failed to comment on the significance of the actual

reported pH of 12.67. In such a hydrogeologic setting, a site that had been previously drilled by thousands of exploration boreholes, and possibly previously mined, the logical conclusion is that such a pH represents evidence of some form of contamination -- possibly from the incorrect completion of a well with cement and / or bentonite grout, a spill of some alkaline chemicals, or from some past attempts to test the leachability of these ores using an alkaline lixiviant. The same is true for the insufficient discussion of the field versus lab specific conductance values at well 677, which were reported to be 12,220  $\mu\text{S}/\text{cm}$  versus 11,000  $\mu\text{S}/\text{cm}$  (pg. 3-62). The authors ignore the more reasonable conclusions that some form of contamination has occurred.

63. However, someone preparing the Powertech ER knows that water quality data should be summarized statistically, as is evidenced by the format of ER Table 3.4-4, for all Powertech field parameters. Unfortunately, the Powertech documents fail to summarize the *laboratory data* in the same fashion. Nowhere else in the body of the ER is a similarly-detailed, statistical summary of water quality data presented. Also, they fail to include the previous water quality data from the historic TVA and other data in these summaries. Worse, they have chosen to leave out of their water quality summaries all lab data that have *qualified values* -- that is, values reported as “less than” some concentration. This approach totally biases the various data sets, because it neglects to include all determinations that had very low concentrations.

**Compliance: The actual regulatory role of US EPA here is unclear.**

64. Application Supplement, pg. 5-6 states: “EPA Region 8 has stated that they want to limit the distance outside the monitor well ring to minimize potential environmental impact. There is an idea that if there is an excursion out to the aquifer exemption

boundary, operations will be shut down.” This description does not provide a sufficient description of the EPA’s regulatory program. The application should define these specifics, including a full description of “the idea that if there is an excursion out to the aquifer exemption boundary, operations will be shut down.”

**UCL Parameters should be approved by NRC.**

65. Application Supplement, pg. 5-6, Sect. 5.2.7 states: “Powertech management has always used Chlorides, Sulfate, and Uranium as Upper Control Limit (UCL) Parameters. Sometimes Total dissolved Solids is used.” This statement seems disingenuous as Powertech has never operated an ISL mine. Once a reliable baseline ground water database has been approved (for the various zones described above, not simply the ore-bearing zone), the NRC should approve the constituents designated as UCL parameters.

**Powertech’s proposed ALARA goal for limiting uranium concentrations in site soils**

66. The ER, Pg 4-80 states: “Powertech (USA) Uranium USA proposes an ALARA goal of limiting the natural uranium concentration in the top 15 cm soil layer to 150 pCi/g averaged over the impacted areas. Subsurface soil (greater than 15 cm) natural uranium concentrations should be limited to 230 pCi/g averaged over the impacted area based on chemical toxicity.” NRC should make public its opinion on this proposed goal prior to the issuance of any licenses.

**Soil contamination (radiation and metals / metalloids) from past mining and exploration should be incorporated into determining baseline**

67. ER, pg. 6-13 (Monitoring Programs--Surface Mine Area) states: “In the surface mine area, the gamma-ray count rates ranged from 5,550 to 460,485 cpm and the median was 12,717 cpm. In general, clusters of higher readings are associated with un-reclaimed open pit uranium mines, waste rock, rocky outcrops, and drainages in the surface mine area.”

“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. In addition, gamma-ray count rates in the anomalous north area also are clearly distinct from those in the wider main PAA. **The precise sources of the differences are not relevant in the context of this investigation since they are part of the baseline or background radiological characteristics of the site.**”

68. The site is clearly contaminated from past activities, and no reclamation has been required. Powertech has a conflict of interest if allowed to determine which data are relevant here. The NRC should make public its opinions on these matters prior to issuance of any licenses.

**Baseline soil and stream sediment databases should include data for a broad suite of other chemical constituents (metals, organics, etc.) besides simply selected radiochemical constituents.**

69. The ER, pg 6-21 and 22 (6.1.3 Soil Sampling) states: Soil samples were analyzed for radium-226 while two were also analyzed for natural uranium, thorium-230, and lead-210. Baseline soil data should include data for a many additional chemical constituents, especially those that are routinely considered to be potentially toxic at hazardous waste sites. Similar comments pertain to stream sediment samples, which are described on ER, pg 6-41.

#### **Financial Assurance.**

70. The NRC and the general public know several general facts about the usefulness of most company-generated financial assurance estimates:

1-They generally are based on overly-optimistic assumptions about future water quality, thereby under-estimating costs. Kuipers (2000) conducted a survey of bonding practices at metal mines throughout the western U.S. and found that the bond amounts available were hundreds of millions of dollars below that necessary to conduct actual clean-ups. Many of the “problem” sites have been foreign-owned entities, especially those with their corporate headquarters and assets based in Canada.

2-Aquifer restoration at most, if not all previously-licensed and operated ISL sites fail to actually return ground water quality to baseline conditions [Hall (2009); Otton and Hall (2009);

3-Predictions of future aquifer restoration success made by the project proponents seldom use truly conservative assumptions. Calculation of financial assurance amounts made by representatives of the party that stands to profit from project licensing represent an extreme conflict of interest.

4-The technical literature is filled with documentation that quantitative predictions of future water quality at specific sites cannot be done reliably [Sarewitz, et. al. (2000); Moran (2000); Pilkey & Pilkey-Jarvis(2007); Kuipers & Maest (2006)], and the general failure to restore aquifers back to pre-operational baseline concentrations supports this. At an academic level, this approach must be totally rejected because it assumes one can make accurate and precise *deterministic* predictions.

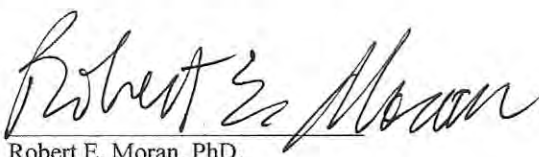
71. For these reasons, the financial assurance calculations should be made by some independent party, not paid or directed by the project proponents. These calculations should also consider the actual reclamation and restoration costs incurred, long-term, from a statistical sampling of the previously-licensed ISL sites. Furthermore, these

financial assurance amounts and mechanisms should be made public prior to award of any licenses.

72. To ensure protection of the general public, such financial assurance vehicles (bonds, etc.) should be made with the parent corporation, not simply the local operating entity.

Pursuant to 10 C.R.F. § 2.304(d) and 28 U.S.C. § 1746, I declare under penalty of perjury, that the foregoing is true and correct to the best of my knowledge and belief.

Signed on the 4<sup>th</sup> day of April, 2010,

A handwritten signature in cursive script that reads "Robert E. Moran". The signature is written in dark ink and is positioned above the printed name.

Robert E. Moran, PhD.

## National Weather Service Weather Forecast Office Rapid City, SD

### Severe Thunderstorms & Tornadoes

Thunderstorms are an almost-daily occurrence in the Black Hills region during the summer; they occasionally spawn tornadoes, strong winds, large hail, and lightning. Have a storm safety plan and follow safety guidelines to protect yourself from these hazards.

#### At home and work:

- Identify safe places to go during storms. A basement or interior room on the lowest floor such as a closet or bathroom without windows is best. Mobile home residents who do not have a community shelter should make plans to go to the nearby home of a friend or relative before storms develop. If you are building or remodeling a home, consider adding a "Safe Room" to serve as a tornado shelter. The Federal Emergency Management Agency (FEMA) has [Safe Room](#) plans.
- Assemble emergency supplies, including: Flashlight and extra batteries, battery-powered radio, weather radio receiver, corded telephone, nonperishable food and water (three gallons per person), first-aid supplies, extra clothing, and bedding. Don't forget special items for family members such as diapers, baby formula, prescription or essential medications, extra eyeglasses or hearing aids, and pet supplies.
- Know how to shut off electric, gas, and water utilities.
- Know the county in which you live, surrounding counties, and nearby towns. Have a map available so you know where storms are and if they are moving toward your location.
- Know how to get warning information; such as NOAA Weather Radio, local radio and television stations, and cable TV (storm warnings are not broadcast on satellite TV unless you are watching local stations). Learn if your community has warning sirens and when they are used and remember they are an outdoor warning system and are not intended to be heard indoors.

#### When traveling or outdoors:

- Plan outdoor activities for the morning or early afternoon when thunderstorms are less likely. Check the weather forecast before a trip or going outside. Postpone outdoor activities if severe thunderstorms are forecast or a watch is in effect.
- Check if a shelter is available or locate buildings in which you can take cover quickly.
- Start at the farthest or most remote location and move toward a shelter so you will be closer if storms develop.
- Monitor NOAA Weather Radio or a local radio station for updated forecasts, watches, and warnings.
- Keep track of the counties, towns, and major highways along your route so you will know if you are heading toward a storm.
- Watch the skies.

Thunderstorms can intensify rapidly and tornadoes can develop quickly-you may not have much time to escape. When a storm approaches or a warning is issued, take cover quickly.

- Go to the basement or a small interior room on the ground floor. Get under the stairwell or a heavy table and cover yourself with pillows or blankets. Stay away from windows and exterior walls!
- Do NOT open windows! Strong winds and flying debris may injure you.
- If you live in a mobile home, go to your designated shelter or a permanent structure. If you don't have time, lie flat in a ditch or ravine away from the home and protect yourself with pillows or blankets.
- Leave large rooms with high ceilings, large windows, and skylights; such as gymnasiums, church sanctuaries, or industrial buildings. Go to an interior room or hallway on the lowest floor. Use the stairs, not the elevator.
- Do not try to drive away from a tornado or take cover under a highway overpass. If there are no buildings nearby, find a low area away from your vehicle clear of potential debris like trees and power lines and not likely to fill with water from heavy rain. Lie flat and cover your head. Learn more about the [dangers of overpasses](#).
- When heavy rain, hail, and strong winds reduce visibility; stop driving. Protect yourself from flying debris or hailstones that can break your car windows.
- If you are on a lake, head for shore immediately!

Download the color brochure "[Thunderstorms, Tornadoes, Lightning...Nature's Most Violent Storms](#)" published by the American Red Cross, Federal Emergency Management Agency, and National Weather Service.

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National Weather Service  
Rapid City, SD Weather Forecast Office  
300 East Signal Drive  
Rapid City, SD 57701-3800  
605-341-9271  
Page Author: UNR Webmaster  
Web Master's E-mail: [w-unr.webmaster@noaa.gov](mailto:w-unr.webmaster@noaa.gov)  
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