

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
CROW BUTTE RESOURCES, INC. ,	)	Docket No. 40-8943
	)	ASLBP No. 08-867-02-OLA-BD01
(License Renewal for the	)	
In Situ Leach Facility, Crawford, Nebraska)	)	May 8, 2015

**CONSOLIDATED INTERVENORS' AND OGLALA SIOUX TRIBE'S  
JOINT POSITION STATEMENT**

Consolidated Intervenor<sup>1</sup> and the Oglala Sioux Tribe hereby submit this Joint Position Statement on admitted Contentions A, C, D, F, 1, 6, 9, 12, and 14, as set forth by the Board at Exhibit A to its March 16, 2015 ruling LBP 15-11. Consolidated Intervenor and the Oglala Sioux Tribe (the “Tribe”) (collectively, the “Intervenor”) challenge the License Renewal Application, the License Renewal, and the NRC Staff’s Final Environmental Assessment (October 2014) for Crow Butte Resources, Inc.’s license renewal. The Board should uphold the contentions, revoke Crow Butte’s license, and affirm that the NRC Staff has failed to comply with applicable law including the Atomic Energy Act, NRC & EPA Regulations, NEPA and the NHPA.

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<sup>1</sup> Western Nebraska Resources Council (“WNRC”), Owe Aku/Bring Back the Way, Debra White Plume, Beatrice Long Visitor Holy Dance, Joe American Horse & Tiospaye, Thomas Cook, Loretta Afraid-of-Bear Cook & Tiwahe. Debra White Plume, Beatrice Long Visitor Holy Dance, Joe American Horse and Loretta Afraid-of Bear Cook are members of the Oglala Sioux Tribe (the “Tribe”) at Pine Ridge Indian Reservation.

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**I. Introduction**

The issuance of the license renewal violates the Atomic Energy Act as amended ("AEA") and NRC Regulations because it is inimical to the health and safety of the public in violation of 42 USC 2099; 10 CFR 40.32(d) and because the applicant's proposed equipment, facilities and procedures are inadequate to protect health and minimize danger to life or property in violation of 10 CFR 40.32(c).

The Final EA fails to meet the requirements of the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4231, *et seq.*, the National Historic Preservation Act (NHPA), 16 U.S.C. § 470, *et seq.*, and implementing regulations, including NRC regulations in 40 C.F.R. Part 51, specifically including 10 CFR §51.45, §51.10, §51.70, and §51.71, because the Final EA does not provide analyses that are adequate, accurate, and complete in all material respects to either (i) describe the affected area and environment; or (ii) demonstrate that cultural and historic resources within the project area are identified and protected pursuant to Section 106 of the NHPA.

Substantial issues remain concerning undetermined impacts to 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, but is not limited to, the lack of a defensible baseline ground water characterization, the lack of 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, and the lack of the required analysis of proposed mitigation measures.

Regarding cultural and historic resources, the Final EA carries forward serious problems from the application stage. Despite having years to do so, neither Crow Butte nor NRC Staff have provided the Tribe, or those of Consolidated Intervenor's who are members of the Tribe, a meaningful opportunity to be involved in the assessment or determination of the significance of the identified sites, nor a meaningful opportunity to identify additional sites that may warrant evaluation or listing.

The expert opinions detail the lack of scientifically-defensible analysis in the LRA and/or the Final EA regarding potential impacts associated with the mine. Expert opinions further document problems with Crow Butte's approach to cultural resources surveys and tribal consultation.

Procedural Background; Incorporation by Reference. The Consolidated Intervenor's filed their 2008 Petition (INT-001), which is hereby incorporated herein by reference as if set forth at length. The Consolidated Intervenor's filed attachments to their 2008 Petition including the 2008 Abitz Opinion (INT-002), the 2008 LaGarry Opinion (INT-003), the 2008 JR Engineering Opinion (INT-004), the 2008 Paul Robinson Opinion (INT-005), the 1982 NDEQ Baseline Study (INT-006), the 2008 List of CBR Violations, Spills and Leaks (INT-007), the 2008 NDEQ Consent Decree (INT-008) and the 1989 Petersen 'Whistleblower' Letter (INT-009), 1984 HWS Elliot Report (INT-066), each and every one of which is hereby incorporated herein by reference as if set forth at length.

The Oglala Sioux Tribe ("OST" or "Tribe") filed its 2008 Petition (INT-010), which is hereby incorporated herein by reference as if set forth at length. Attached to the 2008 OST Petition was the November 8, 2007 NDEQ Letter to CBR (INT-011), which is hereby incorporated herein by reference as if set forth at length.

In January 2015, in accordance with the Board's Orders, Consolidated Intervenor's filed new contentions based on the Final EA (INT-012), which is hereby incorporated herein by reference as if set forth at length. Attached to the Consolidated Intervenor's new EA Contentions filing were, among other things: 2015 LaGarry Opinion (INT-013), a USGS 2009 study, "'In-situ recovery uranium mining in the United States: Overview of production and remediation issues,'" (INT-014), a USGS Open File Report 2009-1143 "Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain," (INT-015), a 2008 "Report on Findings Related to the Restoration of In-Situ Uranium Mines in South Texas," (INT-016), a 2012 report "On a Wyoming Ranch, Feds Sacrifice Tomorrow's Water to Mine Uranium Today," (INT-017), a U.S. Fish and Wildlife Service letter to NRC 9/5/07 (INT-018), a U.S. Fish and Wildlife Service Contaminant Report Number R6/715C/00 (INT-019), and a Rapid City Journal/Chadron News on November 15, 2011 and attached as Exhibit I to to Jan 2015 filing, "Two Earthquakes Strike Area." (INT-020), each and every one of which is hereby incorporated herein by reference as if set forth at length.

In January 2015, in accordance with the Board's Orders, OST filed new contentions based on the Final EA (INT-051), which is hereby incorporated herein by reference as if set forth at length.

Consolidated Intervenor's and the Tribe and their witnesses will demonstrate that the LRA fails to accurately describe the affected environment and that the Final EA also fails to do the same. Further, we will demonstrate that Crow Butte and its geologists have known about the fracturing and faulting and the potential for the fracture and faults to become contaminant pathways for a very long time - decades in fact. The faulting/fracturing/contaminant pathways issue was brought up in the 1984 HWS Elliot hydro-geology report (INT-066) and again in the 1989 Petersen Whistleblower (INT-009).

At that time, the licensee/applicant was Crow Butte predecessor, Ferret Exploration Co., which mounted a full-throated refutation of the 1989 Petersen Letter in a May 4, 1989 Letter to the NRC (INT-067) and the NRC further mounted its own defense in a response letter to Petersen that purports to refute the HWS Elliot hydro-geology report (INT-068). Then, in 1997 there are no petitions filed to intervene and Crow Butte gets a pass.

Then, in 2007, Consolidated Intervenor's and the Tribe wake up to the danger and file to intervene in the North Trend Expansion Area proceeding referred to herein and in 2008, Consolidated Intervenor's and the Tribe file to intervene in this proceeding. When we obtain expert advice, we find out that Dr. LaGarry (INT-003) and Dr. Abitz (INT-002) share some basic conclusions about the faulting and fracturing as contaminant pathways in 2008 - nearly 20 years after the Petersen letter (INT-009) and 25 years after the HWS Elliot Report (INT-066).

Now, in 2015, Dr. LaGarry's conclusions are reinforced (INT-043) and he has found a 1982 Wyoming Fuels Co. (a predecessor of Crow Butte) Map (INT-044 & INT-045) that indicates that they company knew about the fracturing and faulting this entire time! Turns out

Roy Elliot was right in 1984, John Petersen was right in 1989, Dr. LaGarry and Dr. Abitz were right in 2008 and Dr. Kraemer, Dr. LaGarry and Mr. Wireman concur that in 2015 the fracturing and faulting exist in the area that serve as contaminant pathways.

Meanwhile, the company and the NRC sing the same tune as they did in 1989 - literally 26 years ago - when first publicly challenged on this issue about how the fractures and faults are not substantial and not likely to cause a problem without looking to the details of the hydro-geology in the same way as Dr. LaGarry, Dr. Kraemer and Mr. Wireman have. Now, we see the man behind the curtain and the company and the NRC can no longer play 'wizard.'

## **II. Consolidated Intervenor's Expert Witnesses & Expert Opinions**

A. Dr. Hannan LaGarry. Dr. LaGarry has 25 years' experience studying the geology of northwestern Nebraska and adjacent South Dakota. Following dissertation work on the regional geology from 1988-1995, from 1996-2006 he led teams of geologists from the Nebraska Geological Survey that mapped in detail the geology of most of northwestern Nebraska (a total of 80 1:24,000 quadrangles). The completion of this work frequently required detailed study of equivalent strata in adjacent Fall River, Shannon, and Todd counties in South Dakota. These maps, including digital versions (ArcInfo) and supporting field notes, are available from the University of Nebraska-Lincoln School of Natural Resources (contact Dr. Matthew Joeckel, Director). As a direct consequence of this mapping, Dr. LaGarry has published peer-reviewed articles on the Chadron Formation (Terry & LaGarry 1998), the Brule Formation (LaGarry 1998), the mapping of surficial deposits (Wysocki & others 2000, 2005), and local faults (Fielding & others 2007). Dr. LaGarry has authored or co-authored reports detailing the

preliminary results of studies describing toxic heavy metal contamination of drinking water (Salvatore & others 2010, Botzum & others 2011), characteristics of local aquifers (Gaddie & LaGarry 2010, LaGarry & others 2012), potential uranium contamination risk to communities on the Pine Ridge Reservation (LaGarry & Yellow Thunder 2012), and the transmission of uranium-contaminated water along regional faults (Bhattacharyya & others 2012).

Dr. LaGarry has opined in 2008 and 2015 that:

(1) ISL mining in the area surrounding Crawford, Nebraska cannot be adequately contained. There is a lack of confinement resulting from secondary porosity in the form of faults and joints, the problem of artesian flow, and the horizontal flow of water beyond the uranium-bearing strata. Reports of artesian flow, the acknowledged and prevalent jointing and faulting leading to widespread secondary porosity, along with potentially high horizontal flow through regional faults indicate that during the course of its operation the Crow Butte Resources ISL uranium mine will most likely contaminate the region with unconfined lixiviant. This contamination will pollute and render unusable ground and surface water southwards into Nebraska and surface waters within the White River drainage northeastwards into greater South Dakota.

(2) There are three principal pathways through which contaminated water could migrate away from the uranium-bearing strata through adjacent confining layers (described in detail below): 1) secondary porosity in the form of joints and faults, 2) thinning or pinching out of confining layers, and 3) perforations made by improperly cased or capped wells.

(3) Re: secondary porosity: Secondary porosity, in the form of intersecting faults and joints, is common in all of the rocks north, east, and south of the Black Hills Dome and along the Pine Ridge Escarpment (see Swinehart & others 1985). These faults and joints are generally oriented NW- SE and SW-NE, and are a result of the ongoing uplift of the Black Hills of southwestern South Dakota. Crow Butte acknowledges such secondary porosity in the Brule Formation (but not the faults that create it) in their FINAL ENVIRONMENTAL ASSESSMENT FOR THE LICENSE RENEWAL OF U.S. NUCLEAR REGULATORY COMMISSION LICENSE NO. SUA-1534. This acknowledged secondary porosity, if breached by unconfined lixiviant, would transmit contaminants to the major, mapped faults north of the Pine Ridge in Nebraska in only a few years, and from there into adjacent regions.

(4) Re: secondary porosity/earthquakes: Although many people consider the Black Hills uplift to have ended by the late Cretaceous Period (~65 Ma), the Black Hills were tectonically active in the late Eocene (Evans & Terry 1994), and continued to fault, fracture, and fold the rocks of northwestern Nebraska and southwestern South Dakota into the middle

Miocene (Fielding & others 2007). Based on numerous small earthquakes along the Sandoz Ranch-Whiteclay Fault, the area is tectonically active to this day (McMillan & others 2006).

(5) Re: secondary porosity/earthquakes: These earthquakes are relatively mild, and don't significantly damage surface infrastructure. However, even small earthquakes represent shifting and flexing of the earth's crust, and are continuously creating, closing, and redistributing the secondary porosity of the region's rocks and changing the flow pathways of the region's groundwater. This means that joints incapable of transmitting water one day may be able to transmit water at a later date. These faults and fractures transect all major bedrock units of the region. These faults connect the uranium-bearing strata to adjacent aquifers as well as modern river alluvium.

(6) Re: secondary porosity: Preliminary studies of the interaction of these faults with surface waters in the region show that creeks that provide municipal water supplies can be entirely consumed and redirected by the region's secondary porosity. Chadron Creek, the stream that supplies water to the city of Chadron, Nebraska, went dry for the first time in the city's history. Subsequent study of the creek's water flow rates by Chadron State College students suggested that normal amounts of water are flowing from springs, but the water is disappearing into deeper alluvium or into fractures in the rock (Balmat & others 2008, Butterfield & others 2008).

(7) Re: secondary porosity/faults: a Chadron State College graduate student studied the lineaments of northwestern Nebraska and southwestern South Dakota using data collected by high-flying aircraft, satellites, and the space shuttle, and showed that these represent widespread faults (Balmat & Leite 2008). Many of the faults in northwestern Nebraska and southwestern South Dakota persist for tens of miles (Diffendal 1994, Fielding & others 2007). Also, many of the ancient river deposits of the Tertiary strata, along with the alluvium deposited by modern rivers such as the Cheyenne River, the White River, and Hat Creek, follow fault zones because fractured rock erodes more easily.

(8) Re: secondary porosity/faults: Crow Butte Resources' license renewal application asserts that fault zones are known in the vicinity of the license area. The most notable of these is the White River Fault, which trends along the axis of the syncline in which the uranium-bearing Chamberlain Pass Formation (being mined for uranium in this case) was deposited (see LaGarry and LaGarry 1997, LaGarry 1998). A review of the scientific literature shows that faults and joints are well known in rocks surrounding the Black Hills, and are known to interconnect major aquifers and the land surface (Swinehart & others 1985, Peters & others 1988, Fielding & others 2007).

(9) Re: secondary porosity/faults: In earlier expert opinions, I described the extensive, detailed geologic mapping of the region conducted by the Nebraska Geological Survey (Table 1), and predicted that faults and joints would be capable of transmitting uranium-contaminated waters from depth onto the land surface. In 2012 my colleagues and I reported preliminary research showing uranium-contaminated artesian springs along the Sandoz Ranch-



Whiteclay Fault in Fall River and Shannon counties (Bhattacharyya & others 2012), supporting those assertions. Based on the numerous studies reported here and the maps cited in Table 1, the absence of joints and faults in the vicinity of the proposed mine is a false perception, because joints and faults are ubiquitous in this region.

(10) Re: secondary porosity/faults: Despite being obvious when viewed from Earth's orbit (Balmat and Leite 2008), these joints and faults are difficult to observe when covered by Holocene surficial deposits. Crow Butte Resources' assertions that hydrologic modeling shows no evidence of faults is misleading, as it is possible to conduct such tests in ways that are unlikely to reveal the presence of a fault.

(11) Re: secondary porosity/faults: In order to demonstrate a lack of containment, faults must be mapped and wells installed along them. Test wells can be configured to determine the hydrologic head along a fault relative to adjacent strata, and measurements of water transmission capacity along faults can be made.

(12) Re: secondary porosity/faults: Balmat and Leite (2008) and the "Whistleblower letter" (see my 2008 opinion) both reported faults intersecting the Crow Butte Resources mine license area (at about the location of the processing plant), and initial testing could be made there and preliminary measurements made. Additional faults could be tested in the vicinity of Red Cloud Buttes north of Crawford in the Smiley Canyon 1:24,000 Quadrangle and at in the Trunk Butte 1:24,000 quadrangle (Table 1). Joints are ubiquitous in the region, and many are available for testing.

(13) Re: CBR Failure to Address Scientific Protocols: Crow Butte Resources continues to use outdated 1960's era concepts and nomenclature in their FINAL ENVIRONMENTAL ASSESSMENT FOR THE LICENSE RENEWAL OF U.S. NUCLEAR REGULATORY COMMISSION LICENSE NO. SUA- 1534. They continue to refer to the uranium-bearing strata as "Basal Chadron Formation" rather than the currently used Chamberlain Pass Formation. If Crow Butte Resources is unable to follow easy to address simple scientific protocols such as using the currently accepted stratigraphic nomenclature, I am concerned about their diligence in addressing challenging issues such as the mapping of faults and joints. Reliance on outdated data, concepts, and assumptions about the geology of the region (including, but not limited to rocks folding, rather than fracturing) will make any and all modeling of the hydrology of the area meaningless.

(14) Re: CBR Failure to Address Scientific Protocols: The recent mapping of the geology of northwestern Nebraska has shown that the simplified, "layer cake" concept applied by pre-1990's workers (and by CBR) is incorrect, and overestimates the thickness and areal extent of many units by 40-60%. Many units' distributions are heavily influenced by the contours of the ancient landscapes onto which they were deposited. For example, when considered to be the 'basal Chadron sandstone,' the Chamberlain Pass Formation was assumed to have a distribution equal to that of the overlying Chadron Formation. However, the Chamberlain Pass Formation is 1-1.5 million years (Ma) older than the Chadron Formation, and has a

distribution determined by the ancient topography weathered into the Pierre Shale prior to deposition of the Chamberlain Pass Formation. Based on my reading of Crow Butte Resources' FINAL ENVIRONMENTAL ASSESSMENT FOR THE LICENSE RENEWAL OF U.S. NUCLEAR REGULATORY COMMISSION LICENSE NO. SUA-1534, no comprehensive review of the geologic literature was conducted despite my criticisms on that issue in the 2008 opinion. The use of outdated scientific literature, or in this case, a general lack of review of recent study, should not be seen as an opportunity to operate in a knowledge vacuum.

(15) Stratigraphy of Water-Bearing Rocks Surrounding CBR:

STRATIGRAPHY OF WATER-BEARING ROCKS IN NORTHWESTERN NEBRASKA

(a) The rocks of northwestern Nebraska range from Cretaceous to Pleistocene in age, and consist entirely of sedimentary rocks. These rocks vary in thickness and geographic extent, and are described as follows (see LaGarry & LaGarry 1997, Terry 1998).

(b) Pierre Shale (aquiclude 1) - underlies all other units, generally 1000'-2000' thick. Contributes small amounts of sulfur and arsenic to overlying surface aquifers (e.g. modern White River alluvium) and water in streams and impoundments. Joints and faults within this unit contain minerals deposited by water movement in the geological past.

(c) Chamberlain Pass Formation (aquifer 1) - *formerly* 'basal Chadron sandstone,' base of White River Group, overlies Pierre Shale, underlies Chadron Formation and modern river alluvium. Channel sandstones within this unit are a local aquifer and are mined for uranium. Water from this unit is typically used for residential and livestock supplies. Unit was deposited in an ancient paleovalley oriented generally from Crawford in the N-NW and Bayard to the S-SE. Joints and faults within this unit contain minerals deposited by water movement in the geological past,

(d) Chadron Formation (aquitard 1) - middle of White River Group, overlies Chamberlain Pass Formation, underlies Brule Formation and modern river alluvium. Generally impermeable, except where fractured. Many faults and joints contain minerals deposited by water movement in the geologic past.

(e) Brule Formation (aquitard 2) - top of White River Group, overlies Chadron Formation, underlies Arikaree and Ogallala groups (High Plains Aquifer) and modern river alluvium. Generally impermeable, except where fractured. Where fractured, has enough water to be included with overlying High Plains Aquifer. Used locally for residential and low-intensity agricultural supplies. Secondary porosity in Brule can transmit water up to 1500' day. Many faults and joints contain minerals deposited by water movement in the geologic past.

(f) Arikaree Group (aquifer 3, lower part) - base of High Plains Aquifer, overlies Brule Formation of the White River Group, underlies Ogallala Group and modern river alluvium. Consists of moderately porous and permeable sandstones and silty sandstones. Coarser

sandstone beds deposited along preexisting fault traces. Unit highly faulted and jointed along Pine Ridge Escarpment. Water supplies springs that feed local creeks, and is used for high-capacity irrigation wells.

(g) Ogallala Group (aquifer 3, upper part) - upper part of High Plains Aquifer, overlies Arikaree Group, underlies modern river alluvium and sand dunes. Consists of highly porous and permeable sandstones and conglomerates. Coarser sandstone beds deposited along preexisting fault traces. Unit highly faulted and jointed along Pine Ridge Escarpment. Water is used for high-capacity irrigation wells.

(h) Modern river alluvium (aquifer 4) - overlies all bedrock units at one place or another. Consists of layers of silt and sand and lens-shaped ribbons of coarse gravel. Unit also overlies major fault zones. Unit is used as aquifer, and supplies water to residences, livestock, and in the case of the White River, supplies water to the cities of Crawford, Nebraska and Pine Ridge, South Dakota, among others. Crow Butte Resources surface operations all occur on this unit.

(16) Contaminant Pathways/White River Alluvium: The White River alluvium can receive contaminants from three sources: a) from surface spills at the Crow Butte mine site; b) from waters transmitted through the Chamberlain Pass Formation where it is exposed at the land surface; and c) through faults. Contaminants within the White River can be transmitted into the areas where the alluvium intersects faults downstream from Crawford. Once into the White River alluvium, every rain event will push the contaminants a little bit downstream. In the case of the White River, downstream is to the N-NE and directly onto the Pine Ridge Reservation. Residential users, agricultural users, wildlife, and the City of Crawford all receive water supplies from the White River alluvium.

(17) Contaminant Pathways/Faults: A second pathway is through faults. These faults can receive contaminants from three sources: a) from surface spills into the White River alluvium; b) from waters transmitted through the Chamberlain Pass Formation; and c) from underground excursions, which can be of either leachate or uranium-laden water. Once into the faults, contaminants could migrate along the groundwater gradient (which is generally eastwards) northeastward towards the Pine Ridge Reservation or southeastward toward Chadron and the majority of the remaining High Plains Aquifer. Uranium could also be drawn upwards into parts of the High Plains Aquifer by high-capacity irrigation wells, some of which are known to be within major fault zones (northernmost Sheridan County, Nebraska).

(18) 1989 Peterson Whistleblower Letter: In May of 2008, I was asked to evaluate the importance of a "whistleblower letter" from Mr. John Peterson, a mining geologist, to Mr. Gary Konwinski of the Nuclear Regulatory Commission. This letter is dated 4 April 1989, and expresses Mr. Peterson's concern that information pertaining to faults was being suppressed so that that Crow Butte Resources (CBR) could mine in an unsafe area. Mr. Peterson's main contention is that the uranium mined by CBR occurs within the faults themselves, and is not a roll-front deposit as CBR maintains. This would be the worst possible situation. If there are

minerals within faults, they are there because flowing water brought them there and deposited them there. If there are minerals along the faults and CBR is mining them, then they (CBR) are progressively "uncorking" the flow pathways along these faults. If this is the true situation, the risk of spilling contaminants into these faults increases with additional mining, and contamination by chemically altered waters is a virtual certainty. Also, mining the Chamberlain Pass Formation could cause these faults to move again. This could create new, unforeseen pathways for contaminants spread through.

(19) Artesian Water Flows: Artesian flow occurs when there is a hydrologic connection, through faults or highly permeable strata, between groundwater sources high on the landscape and the land surface lower down. The weight of water in overlying strata exerts pressure downward into water within the uranium-bearing strata, which can then be released as artesian water flow (like a fountain) where the topographically lower uranium-bearing strata is exposed at the surface, or where it is punctured by drilling. Artesian flow was observed by Crow Butte Resources and was acknowledged in their FINAL ENVIRONMENTAL ASSESSMENT FOR THE LICENSE RENEWAL OF U.S. NUCLEAR REGULATORY COMMISSION LICENSE NO. SUA-1534.

(20) Perforation of Upper Confining Unit: Artesian flow is most likely where the upper confining layer is perforated by secondary porosity (faults and joints), poorly constructed or improperly sealed exploration wells, or thinning or absence of upper confining layers. Artesian flow could transmit lixiviant, the most toxic mineral-laden of waters, onto the land surface (and into White River alluvium) and discharge large amounts of contaminants into connected aquifers or faults in a very short time.

(21) Horizontal Water Flows: Horizontal flows within the uranium-bearing strata and along intersecting faults and joints are also of concern. Such flow can rapidly redirect lixiviant or mine waste away from the mine site and into unexpected breaches in the confining layers.

(22) CBR Reliance on Outdated Parameters for Modeling: Crow Butte Resources' complete and continued reliance of modeling based on outdated and incomplete parameters will never be sufficient to satisfy concerns based on actual mapping and recent published studies.

Dr. LaGarry has also provided an update to his 2015 Opinion (INT-013), which Update (INT-043) states that:

## **THE RECENTLY ACQUIRED RESEARCH REPORTS**

(23) My expert opinions in this case are based largely on my extensive fieldwork and detailed knowledge of past research in the region (mentioned above) ....Furthermore, central to my expert opinions in this case is the prevalence of faults and joints that could plausibly serve as contaminant pathways for unconfined leachate.

(24) Previously mentioned research on lineaments (Diffendal 1994), when combined with recently acquired research reports describing faults and joints by Balmat (2011) and Maher (2012), and a water use map by the Wyoming Fuels Company (1982), allows a clearer understanding of the prevalence of faults and joints than was available earlier (2008, 2015).

(25) *Lineaments*: Lineaments are any unexplained, straight-line topographic feature in remotely sensed imagery (Peter & others 1988). Some lineaments represent fence lines and roads, but many represent faults and joints, which are most obvious when forming parallel sets. Recognition of lineaments is vital as faults and joints are primary pathways for surface and groundwater transmission of contamination away from historically mined areas into adjacent regions. Such pathways must also be considered when evaluating mining activity that requires the containment of contaminant-bearing liquids. Diffendal (1994) described and mapped multiple sets of parallel lineaments oriented generally NW-SE and SW-NE throughout northwestern Nebraska (Fig. 1). These lineaments may or may not represent faults and joints. Such a determination would require extensive fieldwork to check each lineament.

(26) In field checking and statistically analyzing lineaments south of Chadron, Nebraska, Balmat (2011, page 53) concluded that in this part of northwestern Nebraska, lineaments visible from Earth's orbit do, in fact, represent faults and joints identifiable on the ground.

(27) *Faults and joints*: Based on my earlier opinions, I consider faults and joints to be the primary concern for the migration of unconfined leachate away from the Crow Butte Resources site. Faults and joints can plausibly allow contaminants to flow vertically and come into contact with drinking water in overlying alluvial aquifers or react chemically with carbon, arsenic, and selenium in the subjacent Pierre Shale. Faults and joints also could plausibly allow mining fluids to migrate laterally into adjacent areas. Also, faults and joints in this region are frequently mineralized, showing conclusively that such mineral deposits (potentially uranium minerals) do occur (see discussion in Sibray & Carlson 2010).

(28) While working with a student on a related research project in March 2015, a detailed literature search uncovered a poster presentation by Maher and Schuster (2012). This poster presentation used extensive detailed fieldwork in northwestern Nebraska and southwestern South Dakota to describe the regional structural fabric (a term used to describe faults and joints, as well as other structural features, on a regional scale. Maher and Schuster (2012) mapped faults and joints in: 1) the vicinities of Toadstool Park (Crawford) and Whitney, Nebraska, 2)

along the Nebraska-South Dakota border near Whiteclay, Nebraska and Pine Ridge, South Dakota, 3) at Badlands National Park in South Dakota, and 4) in Harding County South Dakota. In each location the found faults and joints were ubiquitous and pervasive and generally followed an ESE trend. This corresponds to the NW-SE trend (just in a different way) described by Diffendal (1994), supporting his assertions about the structural origins of the lineaments he observed from orbital photography. Their observations also support by expert opinions based on detailed geological mapping in northwestern Nebraska (2008, 2015) in which my field crews and I observed countless faults and joints having the same NW-SE, SW-NE, and ESE trends.

(29) I did locate a map I acquired in 2004 from Vernon Souders of the Nebraska Geological Survey at about the time of his retirement. This water resources map (Wyoming Fuels Company 1982) shows the distribution of the potential ore area for the Crow Butte Project (Fig. 2). The wells marked on the map may be useful in other contexts. However, what caught my attention was that the area marked as the potential ore body is a generally NW-SE trending lineament similar to the trend noted by Diffendal (1994). Also, the depiction of the ore body shows two closely spaced variations ("kinks") in the linear trend that offset it in opposite directions as if by two closely spaced SW-NE trending faults (red). Such faults were observed by Diffendal (1994) and are portrayed on his map due east of Fort Robinson.

(30) If these offsets are the result of faulting, then they confirm the observations first made by Balmat & Leite (2008), confirms the assertion by Balmat (2011) that lineaments observed from orbit are in fact faults, and supports my earlier assertions that the uranium being mined at Crow Butte Resources may be from mineralizations in faults as described in the "whistleblower letter" (2008, 2015).

## SUMMARY

(31) The research described herein supports the consolidated interveners' contentions regarding the plausibility of unconfined leachate in that: 1) it establishes that SW-NE and SW-NE trending lineaments are pervasive in northwestern Nebraska in the areas in which Crow Butte Resources is currently mining or intends to expand into (Diffendal 1994), 2) there is a high degree of statistical probability that these lineaments represent faults along which unconfined leachate could plausibly migrate (Balmat 2011), 3) detailed field work in northwestern Nebraska and adjacent South Dakota supports my earlier (2008, 2015) assertions that faults and joints are ubiquitous throughout the region, and that 4) my previous assertions that faults visible from space directly impact the mined area are supported by the configuration of the mined uranium deposits (Wyoming Fuels Company 1982).

(32) I herein reiterate my earlier (2008, 2015) assertions that Crow Butte Resources' complete and continued reliance on modeling based on outdated and incomplete parameters will never be sufficient to satisfy concerns based on actual mapping and recent published studies.

B. Dr. David Kraemer. Dr. Kraemer has been involved in hydrogeological studies and reviewed contaminated waste and pollution challenges for over 35 years, has served as an expert witness, and testified before the U.S. Congress on issues of uranium mining. Dr. Kraemer serves as a professor in the Department of Geoscience at the University of Nevada, Las Vegas, President of the Universities Council on Water Resources, and Vice President for North America for the International Association of Hydrogeologists. Dr. Kraemer has published over 50 professional publications and is currently writing a new edition of the text, "Contaminant Hydrogeology".

Dr. Kraemer has opined in INT-046 that:

- (1) There is inadequate hydrogeological site characterization associated with In Situ Leaching (ISL) operations at Crawford, Nebraska.
- (2) Complete and appropriate hydrogeological characterization of the uranium extraction operations has not been accomplished. In particular, secondary permeability has not been sufficiently addressed, and simplifying assumptions in the site hydrologic conceptual model ignore reported field results, and could provide misinterpretations of actual conditions and subsurface flows.
- (3) A generalized and inadequately supported assumption of both the CBR and NRC hydrogeologic conceptual site models is that the groundwater system can be treated as a series of relatively horizontal, isolated, hydrostratigraphic layers, with each layer having hydraulic conductivity which can be assumed to be homogeneous and isotropic. A key factor involves calculation of the potential of horizontal and vertical groundwater migration during operations, restoration, and post-closure. Particularly, CBR has conducted limited groundwater modeling and data analysis to support claims of restricted natural vertical flow (exclusive of any added effects of emplaced arrays of invasive boreholes). These [NRC and CBR] models and data analysis methods use assumptions of formation uniform thicknesses, homogeneity, isotropy, and the justification for the use of these assumptions is not reported in the EA. Also not reported is model validation, model numerical stability, uniqueness of solutions, grid intervals, and evaluation of more realistic scenarios beyond testing a single fault.
- (4) The licensee calculates the potential for vertical flow using inappropriate and overly simplified techniques, with a high potential for misinterpretation. Old data and research is presented when more current research is available. The licensee admits using

analysis techniques on aquifer testing and recovery data, which have restricted application to a homogeneous, isotropic, series of horizontal layers of unvarying thickness, although the field geological data not only do not support this, the data indicate the opposite is the case. Specifically, the licensee admits to using the Theis, Jacob, Cooper Jacob, Hantush, and Neuman and Witherspoon methods, which are all inappropriate for the stated field conditions. The use of these inappropriate approaches impacts interpretation of potential vertical flow and the extent of the influence of well pumping and injection.

(5) The recent literature on the number and nature of the geologic faults, noted discontinuities, varying formation thicknesses, and the geologic history of the area does not rigorously support this conceptual model. Specifically, inadequate characterization of secondary permeability is presented on the faults and folds associated with the Black Hills uplift and the Chadron Arch.

(6) There is indication of post Chadron faulting (LRA, Section 2). Additionally, any effects of future or past earthquakes, tectonic activity, or large pulses of infiltrating precipitation from intense storm activity, is not adequately addressed.

(7) Reported conditions of the subsurface geology indicate lack of uniformity, heterogeneities, and non isotropic subsurface conditions. However, crucially important analysis of the data by CBR and NRC assumes the opposite, and/ or are limited in considering reported field conditions. Modeling modifications by CBR and NRC of this generalized operating assumption, of horizontal strata that are homogeneous and isotropic, do not simulate multiple fractures beyond either a single fault, or isolated and non interconnected faults in the system.

(8) Information is not made available on projected future groundwater use from alluvial sources, nor is the potential for horizontal translation of groundwater along ephemeral stream courses explicitly quantitated. Any surface spill would have the potential to reach and infiltrate into the alluvium, and become a long-term source. Any transmission of contaminants through faulted regions, or from surface expressions of the Chamberlain Pass Formation to the alluvium could also serve as a long term source.

(9) The EA and CBR (2011) note that the Brule Formation is "significantly jointed" in several places, allowing appreciable groundwater flow in those "jointed" areas. The number, orientation and aperture size of these "joints" is not mentioned in the EA.

(10) The EA notes discontinuities in the Brule formation, and the lack of horizontal consistency, of this water bearing unit. Permeable regions of this formation are said to be of limited horizontal extent, although geophysical evidence to support this claim is not presented.

(11) The EA notes that the Basal Chadron Sandstone (now called the Chamberlain Pass Formation) varies in thickness from a minimum of 12m and doubling to 24m



in places, indicating inconsistent horizontal thickness. The depth to the mineralized zone also varies greatly. This indicates significant heterogeneity, not considered in modeling efforts.

(12) The EA treats “fold” features and “fault” features, such as the White River feature, as mutually exclusive, whereas folds can include many faulted regions. Little hydraulic testing of the upper confining unit is reported. Tests for the possibility of vertical migration of contaminants between formations have been restricted to limited pressure testing/ hydraulic response trials, which emphasized quick response, as opposed to any other sort of testing for the possibility of long-term vertical communication of contaminated groundwater. Past testing was not spatially or temporally extensive. Dating of groundwater age from various formations and depths, which might support the idea of vertical hydraulic isolation has not been prominently reported. Available scientific evidence shows heterogeneous conditions and a geologic history of faulting that would allow vertical migration of fugitive contaminants. In particular, CBR does not supply sufficient scientific evidence to support the claim of no vertical or horizontal hydraulic connection via faulted or jointed subsurface strata.

(13) Projected future use and migration of deep groundwater (including the Morrison and Sundance Formations) in the areas of mine waste injection is not adequately presented and or/considered.

(14) Restoration goals for the site are inappropriate.

(15) The sampling during stabilization/ cleanup efforts at Crawford, that is used to establish parameter-by-parameter comparison with restoration goals (“baseline” values), is very restricted and artificially constrained compared to monitoring that is more typical of industry elsewhere. In comparing monitored constituents with “restoration standards” during ongoing and post-restoration, averaged values for each parameter are used rather than comparison with a fuller and more appropriate groundwater quality data set. Additionally, a proposed “restoration” strategy is the short-term sequestration (stabilization) of contaminants by the addition of reductants. This effort is temporary, and is likely to be reversed with time, allowing the future release of contaminants.

(16) Efforts to achieve primary restoration goals for in situ leaching (ISL) are based on returning groundwater to “baseline” water quality concentrations, as calculated on a mine unit average. This cleanup objective, a mine-averaged “baseline”, also referred to as a “restoration standard”, has several inherent weaknesses. Demonstrable and verifiable regional background concentrations are a more accepted remediation goal than artificially contrived and averaged “baseline” restoration standards. The restrictive and potentially unrepresentative use of average of mine unit values to establish baseline goals, rather than using more complete background values from surrounding sources of groundwater, and more robust averages, has the potential to misdirect restoration efforts. Averaged values from the mine site can perhaps be used to spot trends, but are essentially meaningless as restoration standards.

(17) The calculation of “baseline” values, and therefore restoration goals, relies on early measured values and groundwater attributes. These values and attributes, that were used to establish “restoration standards”, were not exclusively sampled and measured in a pre-mining, pre-drilling, and unperturbed environment. The potential mining influence on the creation of “baseline”, coupled with the relative paucity of spatial and temporal monitoring in groundwater adjacent to the mining area, leads to the high probability that “baseline” values of individual parameters are non representative of typical background conditions. The potential for perturbation of the groundwater system by typical mining activities such as increasing oxidizing conditions, and addition of lixiviants, and/or mobilizing agents can have the added effect of artificially raising the “baseline”, creating a less stringent and less appropriate cleanup objective.

(18) Part of the proposed short-range restoration strategy is reductant addition to the subsurface, as well as the addition of other stabilizing materials. Complete reductant life-cycle and distribution-efficiency calculations, detailed descriptions of reductant and stabilization chemistry, and potential side effects such as biocidal impact on groundwater microbiology, are not adequately addressed. Importantly, addition of reductant to sequester pollutants can be reversed with time and the continual, natural flow of more oxidized groundwater through the site.

(19) Site monitoring has the potential to provide information that does not accurately reflect levels and spatial orientation of any potential pollutant release, synergistic effects of multiple contaminants, and does not provide early warning of contaminant migration.

(20) EPA monitoring well guidelines emphasize short screened intervals and several adjacent, nested monitoring wells with screens at different and restricted vertical depths to reduce the common problem of concentration dilution, and those guidelines never suggest averaging of concentration around a site to serve as a restoration goal.

(21) At Crawford in particular, groundwater sampling during restoration has a likelihood of “false negatives” through dilution in monitoring well bores. This is manifest with mixtures of low concentrations of aqueous parameters of concern, in regions or sections of a borehole that should not be sampled, with zones of deleterious high concentrations in other sections of a borehole. False negatives can occur through misplacement of monitoring wells, inappropriate screened intervals, vertical migration of fluids in the annular space due to failed packers or shale traps, poor well construction, migration in the aquifer material outside the borehole due to fracturing of the surrounding medium during the drilling process. Alternatively, placement of a monitoring well outside the path of a projected contaminant plume would also produce a false negative, and when averaged with correctly functioning monitoring, producing higher concentrations would mislead restoration efforts.

(22) The monitoring program investigates a very limited number of potential pollutants and water quality parameters, atypical of most rigorous monitoring programs. This leaves no solid basis for assessing the potential migration and impacts of potential groundwater contaminants, both radiological and non radiological, nor for assessing their potential synergistic

health impacts. Increased monitoring contingencies and plans for any future, identified spills are not well addressed by CBR. In addition, mining activities release potential "tracers" that can be used to determine the potential influence of ISL on groundwater, often sequentially in advance of the arrival of any contaminants. Use of these indicators of mining's influence on groundwater are potentially very beneficial and can act as an early warning system, but are largely ignored in stated future efforts at the site.

(23) There is insufficient evidence to support the industry's estimates of the impact of current and future water use.

(24) The basic equations used to describe the impacts and drawdown of water tables and piezometric surfaces in the mining area are inappropriate for the indicated heterogeneous, anisotropic conditions. Coupled with the lack of detailed description of future water use and consumption, including uses for restoration and decommissioning, these impacts are not reasonably projected.

C. Mickel Wireman. Mike Wireman has been professionally engaged in hydrogeology and ground-water management issues for more than 35 years. He is recently retired from the US EPA where he served as a National Ground-Water Expert for US EPA Region VIII in Denver, CO. In this position he provided scientific and technical support to EPA programs, other Federal agencies, International programs and ground-water protection / management programs in several western states. He has extensive experience in hydrogeology and remediation of hardrock mine sites (including uranium ISR mining), hydrology of mountain watersheds, DNAPL sites, fractured rock settings, nutrients in ground water, ground-water monitoring, ground-water sensitivity /vulnerability assessment, and source-water / wellhead protection. His position involved working closely with policy makers, decision makers and attorneys. He also teaches classes for the National Ground -Water Association and Geological Society of America and has developed and taught workshops in Eastern Europe and the Middle East. He serves as an advisor to the World Bank and has significant international experience in

Eastern Europe, the Middle East and China. He has served numerous times as an expert witness and advisory witness in federal court, State court, State Water Quality Control Commission and State Water court.

Mr. Wireman has opined in INT-047 that:

(1) Characterization of the local / regional hydrogeology and groundwater flow is inadequate at the Crow Butte ISL facility. An appropriate characterization program aimed at determining to what extent the secondary permeability that exists in the rocks that comprise the upper confining unit (UCU) and the overlying aquifer, controls ground water flow in these formations has not been completed.

(2) CBR and NRC define the UCU as including the middle & upper members of the Chadron Fm and the lower member (Orella) of the Brule Fm. The overlying aquifer is comprised of the upper member of the Brule (brown siltstone) and the underlying Whitney member. Given the structural setting in which these formations and the uranium ore body occurs, there is a potential for unwanted fluid (lixiviant/ groundwater mixture) migration upward from the ore bearing Basal Chadron (Chamberlain Pass Fm) thru the UCU into the upper Brule aquifer.

(3) A number of NW-SE trending faults have been identified within and near the CBR license area, including the White River fault. Souder (2004) reports that fractures may increase Brule / Chadron permeability in some areas. The NRC Final Environmental Assessment (2014) reports that structural features sub-parallel to the Cochran Arch have been recognized by CBR drill hole data. CBR reported in the 2007 LRA that there was approximately 200-400 feet of displacement on the White River fault and approximately 60 feet of displacement on the Toadstool Park fault (T33N R53W). These understandings clearly indicate a significant likelihood of extensive secondary porosity.

(4) It is clear from the 2007 LRA and the 2014 SER that the nature of the White River fault / fold that occurs about 2 miles north of the CBR facility (and between the current mining area and the proposed North Trend expansion) is very uncertain. The current CBR explanation that the feature is a fold in the post-Pierre Shale rocks is not rigorously supported by data. The modeling analysis completed by the NRC and described in the 2014 SER is a poor substitute for empirical data from drilling and has too much uncertainty.

(5) Because there has been no rigorous, appropriate investigation of the hydraulic properties and groundwater flow in the UCU and the Brule aquifer, there are significant uncertainties that constrain the ability to assess unwanted fluid migration. These uncertainties are evident in the 2007 LRA, the 2014 SER and the 2014 EA.

(6) Regarding the Brule aquifer: There is uncertainty regarding direction of groundwater flow – the LR (page 2-140) reports a N-NW flow direction; the LRA (page 2-153) reports an E-NE flow direction; the SER (p22) reports a NW flow direction; Souder (2004) reports a N-NE flow direction.

(7) Regarding the Brule aquifer: Groundwater in the aquifer is hydraulically connected to the White River and likely to Squaw Creek and English Creek. It is important to identify the location of gaining and losing reaches of the White River and the temporal nature base flow and stream loss to the shallow aquifer.

(8) Regarding the Brule aquifer: The four aquifer tests that were reported in the 2007 LRA were clearly focused on characterizing the hydraulic properties of the Basal Chadron (Chamberlain Pass Fm.)...Results and data from these tests are not adequate for assessing the hydraulic properties and groundwater flow in the Brule aquifer. To better estimate hydraulic properties of the Brule aquifer, a series of time-drawdown / distance drawdown aquifer tests should be conducted in areas where well yield is known to be high and in areas that have been mapped as having significant fracturing / faulting.

(9) Regarding the Brule aquifer: CBR needs to better explain significant (4.5 m) water level rise in the Brule aquifer in the northern part of license area and increase in gradient from 0.012 to 0.043 that occurred between 1983 and 2008. NRC's explanation that this is an artifact of the number of measuring points in 2008 compared to 1983. This is not an acceptable explanation.

(10) Regarding the UCU: Only two of the four aquifer tests performed between 1982 and 2002 included an UCE monitoring well. Given the size of the mined area and the spatial heterogeneity of the UCU lithologies, this is not adequate for characterizing hydraulic properties of the UCU rocks.

(11) Regarding the UCU: Analysis of hydraulic properties for UCU were based on consolidation test on core samples –not time drawdown or distance drawdown data. These types of tests are not representative of field conditions and do not account for secondary permeability.

(12) Regarding the UCU: CBR's analysis of the risk of fluid migration upward through the UCU was based on properties of the red clay that immediately overlies the BC. However there is no data that indicates if the red clay occurs over the entire extent of the mined ore body and CBR did not adequately assess the possibility for very anisotropic conditions due to secondary permeability

(13) Regarding the UCU: On page 2-161 of the LRA it is reported that the UCU monitoring well for the aquifer test conducted in 1987 showed a response to barometric pressure during the test. This conclusion needs to be further supported. If this was truly a UCU monitoring well (constructed in the lower Brule / upper Chadron) the hydraulic pressure

(potentiometric surface) should not be affected by barometric changes as the groundwater in the UCU is isolated from surface pressures.

(14) Regarding the UCU: The LRA (p 2-162) acknowledges some minor leakage from UCU to BC during tests. This indicates that inter-formational flow can occur.

(15) Regarding the Basal Chadron (Chamberlain Pass Fm.): Not enough attention has been given to monitoring the magnitude and extent of the lowered potentiometric surface that results from consumptive use of the production bleed water. The pre-mining potentiometric surface is at or above the land surface over most of the area. CBR estimates that the potentiometric surface has been lowered by about 60 feet beneath the mine units. CBR (Page 3-20 LRA) also concludes that the BC potentiometric surface near the City of Crawford could decline by 20 ft due to consumptive use of BC water. The NRC EA (page 75) indicates a 30-50 ft decline at Crawford.

(16) Regarding the Basal Chadron (Chamberlain Pass Fm.): There should be a BC monitoring well located near Chadron to monitor the decline as a lowering of the potentiometric surface will affect well yields. This data should be reported in the EA.

(17) Regarding the Basal Chadron (Chamberlain Pass Fm.): There is no discussion of recharge and discharge to the BC. The recharge area for this aquifer should be described and or/ mapped. Pre-mining discharge mechanisms and locations should also be identified.

(18) Regarding the Basal Chadron (Chamberlain Pass Fm.): Additional hydrogeologic mapping and hydraulic testing needs to be completed to help determine the magnitude and orientation of secondary permeability resulting from the structural deformation of the rocks comprising the Basal Chadron (Chamberlain Pass Fm.), the Chadron and the Brule Formations. The hydraulic properties of the Brule Formation (both the UCU and the overlying aquifer should be estimated based on more appropriate , more empirical methods which use data from outcrops (fracture frequency, orientation, aperture width). It would be useful to introduce a conservative tracer into the lixiviant mixture. Tracing is a highly empirical, recognized tool for characterizing flow in fractured rock settings and, if an appropriate, compatible, conservative tracer can be used, subsurface flow paths could be more clearly identified.

(19) Restoration of groundwater in mine units where mining is complete is inadequate.... The geochemical reactions that are induced by the injection of a lixiviant into uranium bearing aquifers result in significant mobilization of metals, uranium and radium 226. Key reasons for the failure to meet restoration standards include: (a) the mining companies do not conduct restoration activities for a long enough time period and (b) restoration programs do not include sufficient water treatment. Groundwater restoration conducted by CBR pursuant to NRC, EPA and NDEQ regulations has been inadequate to date.

(20) As indicated in Table 6.1-12 (LRA) CBR failed to achieve the restoration standards for seven parameters at MU 1 – radium 226, uranium, cadmium, chloride, manganese, sulfate and TDS. It is assumed that CBR requested ACLs for these parameters. CBR is currently conducting groundwater restoration at mine units 2-5 which have been in restoration since 1996, 1999, 2003, 2005 respectively....As of May 2011 uranium concentration at mine units 2-5 were still well above the restoration standard –even though restoration has been underway for years. CBR reports (SER) that more than 11 pore volumes may need to be removed from a mine unit before restoration is successful. Apparently CBR has significantly increased water treatment at MUs 2-5 in an effort to complete restoration.

(21) Very little information is presented in the LRA or SER as to the details of restoration efforts at mine units 2-5.

(22) NRC has recently determined that the secondary restoration goals (State of Nebraska Class of Use) are not consistent with 10CFR Part 40, Part 40, Appendix A, Criterion 5B(5). CBR has apparently committed to meeting the requirements in Criterion 5B(5); however the potential conflict between State of Nebraska and NRC restoration standards will provide CBR with support for establishment of alternative concentration limits. The CBR permit allows for requesting ACLs if they can demonstrate that they have used best practicable effort. However there is no definition or guidelines for defining and evaluating best practicable effort.

(23) The groundwater monitoring program intended to detect offsite migration of ISL mining related contaminants is inadequate and poorly reported.

(24) CBR currently includes 19 domestic water supply wells in the groundwater monitoring program. These wells are sampled quarterly for uranium and radium 226 only. Neither the LRA nor the SER include any information on the location, depth and screened interval for these wells. Trend data should be presented for these and other monitoring wells and there should be a more complete analyte list that includes metals, TDS and selected anions. (NRC plans to add to this sampling via a condition in renewed license).

(25) Most of the background and offsite groundwater sampling has been focused on the basal Chadron. The Brule Fm, especially the lower Brule is under represented as is the alluvial aquifer along the floodplains of White River. CBR should review the offsite (non-excursion) groundwater and surface water monitoring programs and make modifications necessary to accommodate new understandings and new mining units and satellite ore bodies. This information should be included in license renewal documentation.

D. Linsey McLean. Linsey McLean is an environmental biochemist working with toxic exposures in both animals and humans for the last 40 years. To date, Ms. McLean has one

(1) Canadian and seven (7) U.S Patents for products and protocols addressing health

compromises from environmentally driven diseases in both humans and animals. Ms. McLean has served as an expert witness in Michigan state courts concerning environmental pollution and dumping cases and as an expert witness in South Dakota in state and federal (NRC) hearings in the Powertech/Azarga - Dewey Burdock case.

Ms. McLean has opined in INT-048 that:

(1) Contaminants associated with the current mining operations produce non-radiological health effects on humans, animals and plants.

(2) Inorganic forms of minerals, especially selenium and uranium, as well as other heavy metals, which consistently test high in aquifers post mining, have shown to be toxic to living systems of plants, animals and humans in very low levels.

(3) Uranium toxicity at low levels has shown in population statistics of exposed population such as Native Americans on contaminated and exposed reservations downwind and downriver from old exposed uranium mines to be more predisposed to chronic conditions such as: metabolic syndromes, diabetes, behavior and sleep problems, obesity and heart disease, fertility, and morbidity and mortality compromises. These are non-radiological effects of uranium discussed, in that uranium as a metal actively incorporates itself into the biochemistry of the body.

(4) **Uranium is known to travel through the blood to virtually every tissue and organ system in the living body through active transport by blood.** It will reduce and for solid precipitates in the hard tissues of the body like bone and also cause kidney stones and kidney disease and the precipitates enlarge with time and chronic exposure. Binding with bicarbonate in the body will also compromise the body's ability to neutralize acids, predisposing to gastric ulcers as well as various muscle pains, cramps and spasms. Highly acidic bodies with compromised acid neutralization abilities, such as contamination with compromising uranium ions, will have higher agitation levels and volatility of behavior. Uranium ions in the liver will compromise blood sugar regulation, causing increased cravings for sugars in the diet, leading to diabetes, metabolic syndromes and obesity, as carbohydrate metabolism is compromised. Further, as blood sugar lacks internal regulation, alcohol and drug use is elevated in statistics, as the body struggles to "just feel good for a little while". Increased cancer rates are observed with uranium exposure as well as reproductive toxic effects with DNA breakage observed. Compromise to the connective tissues of the body, that cover virtually every surface in the entire body, produce autoimmune diseases such as crippling Lupus. This is exactly what we are seeing in population health statistics on the reservations affected. Further, the toxic effects of uranium are greatly enhanced in the presence of calcium ions, which are known to be generated in ISL



mining as well as in runoff waters of the Rocky Mountains over old uranium open pit mines. The Rocky Mountains are high reservoir of calcium carbonate, so ISL mining waters containing uranium as they are known to do, will have even more toxic effects in synergy than what would be expected and predicted of each separately.

(5) All metals/minerals have a relationship to each other in Nature. They balance each other. Too much of one will have a negative effect on the other. For good health, they all need to be in proper balance. Heavy metals generated from mining are many, and will compromise many essential minerals for health. When one mineral or metal is too high, it will exert a repressive effect upon its counterpart metal or mineral, causing a deficiency or imbalance. Since minerals are known to fuel enzyme systems in the body, and the living body is dependent upon enzymes for life itself, compromise of any enzyme system can cause severe health consequences and even death. The toxic heavy metals generated in ISL mining are shown in an overlay to accurately depict the interference of those toxins on the natural system and their impact to all living things, even plants. See slides 1-6 of powerpoint presentation submitted as INT-049.

(6) Inorganic salts of metals most prominent in aquifers, also have different toxicities, and any monitoring of aquifers should include speciations of these different forms so that proper toxicity evaluation can be done. Simply giving the absolute levels of a metal does not tell the whole story. All metallic "salts" are not equal. They can have different solubilities, different melting points, different Ph, different conductivity affecting the central nervous system that relies on electrical signals, and totally different chemistry within the living body. Further, any discussion to the general lay public needs to distinguish between a chemical metallic salt and ordinary table salt, that the public is led to believe will be created as "salt" in a mined aquifer. Slide 7 shows the many species/chemical forms that a metal can take upon exposure to oxidation/reduction reactions typical within an ISL mining aquifer. Typically, speciation testing, even if monitored by the mining company, is not made available to the public.

(7) Metals in an inorganic form have significantly different chemistry in the living body from organically bound minerals. Organic forms of uranium as well as other toxic metals have also been shown to exist in mining areas and they are not known to be recoverable by the ion exchange method of ISL recovery, since it is already bound organically and will not bind to the organic synthetic resins. Organic forms of any heavy metal are known to be much more toxic and much more bioavailable, so that they are able to penetrate the lining of the digestive tract much easier than ionic and inorganic salts that are blocked by their electrical charges. Organic metals have their electrical charges spread over the organic ligand they are bound to, so that they act as a "chelate", something that the health industry does to minerals to significantly improve absorption of essential minerals, and also make them much more able to enter into direct biochemical reactions in the living body. Organically bound metals under this circumstance, and there is plenty of organic carbon naturally existing with ISL mining sites to make this a complication, will continue to increase in the waste water of the ISL mine as they are

not recoverable, adding to the metal burden of the wastewater and also the toxicity of such beyond what would be if the metals remained in an inorganic and ionic form.

(8) Binding natural essential minerals to organic molecules will make them more bioavailable as well, and so much better able to enter the living body. We use that chelation process to enhance nutrition for essential minerals.

(9) Even the minerals that we consider necessary for the living body will have different biochemical actions and tissue and organ destinations in the living system. Common case in point: selenium. Selenium is known to have wonderful health effects, preventing cancer, converting the storage form of the thyroid hormone T4, to the active form T3 by virtue of fueling an enzyme glutathione peroxidase. This biochemical reaction is absolutely essential to life. Glutathione also doubles as the most powerful antioxidant in the body. Inorganic selenium, as is the form generated in ISL mining, is known to cause birth defects of the highest severity. However, in the inorganic state, selenium as a consequence of mining, is severely toxic, producing severe deformities. The higher evolved animals above micro organisms are not able to convert quantities of the inorganic forms of minerals, even essential ones like selenium, into the bio compatible organic forms. See slides 9-17 of INT-049.

(10) Bioaccumulation of organified heavy metals rises quickly in the living systems and the environment, rising up the food chain. Elemental inorganic forms of metals and minerals are "organified", bonded with carbon compounds to become organic forms by micro organisms, which are then eaten by simple life forms, which are then eaten by higher animals, and so on, all the way up to man and other top predators at the top of the food chain. As these metals and minerals pass from one body to the next, they are known to concentrate as they move up, with humans and other top predators then suffering the worst consequences from the highest concentration in their tissues and organs. There can be formed many different kinds of organic metal compounds, however, all are not equally bio essential, some are even more toxic as the living body cannot convert them. This will depend on which micro organisms are organifying the metals into which compounds. See slides 18-21 of INT-049.

(11) Selenium is a poorly regulated heavy metal, and difficult to regulate as far as toxicity and allowable levels are concerned, because of the myriad chemical forms that it can exist in, each with different toxicity.... Slide 22 (INT-049) shows the incongruencies between actual toxicities of some chemical forms of selenium and the regulatory levels. Most toxicity level charts fail to take into consideration the chemical forms of metals and minerals, which is absolutely critical in assessing any toxicity status. Care for patients suffering from selenium poisoning is usually aimed at treating symptoms. There is no specific antidote or treatments for selenium poisoning.

(12) Arsenic is another major pollutant. Unlike selenium, which has a value in certain chemical forms as a health and life biochemistry promoter, arsenic has not been

found to have any health value outside of its use as a parasiticide, and even that use can have toxic consequences. Slide 23 (INT-049) shows the major health effects of arsenic exposure. Arsenic opposes iodine on the mineral wheel of life, and will cause a physiological iodine deficiency by its opposing actions even if there is enough iodine in the diet to counteract general deficiency. Such is the case with all opposing metals and minerals of nutritional minerals....Metals like arsenic have their own set of compromising chemistries, but the opposition and interference chemistries of opposing metals and minerals presents a whole new set of pathways for health compromise, independent of the individual roles of the individual metals in actual biochemical reactions. So, but its opposing action on iodine, arsenic can precipitate a whole hypothyroid overlay on the living body, complete with all the health compromises that a hypothyroid body will manifest. Slide 24 shows the different LD 50 doses for different chemical forms of arsenic. LD 50 represents the level at which 50% of the animals are killed from the toxin presented. So this again shows the importance of different toxicities of different chemical forms. Slide 25 shows the comparison of the toxicity of arsenic relative to other common toxins. Slides 26-30 show arsenic effects in humans. There is no specific treatment for chronic arsenic poisoning. Once it has been identified further exposure should be avoided. Recovery from the signs and symptoms may take weeks to months from when exposure is stopped. In particular, effects on the nervous system may take months to resolve and in some cases a complete recovery is never achieved.

(13) **Epigenetics, a newly recognized toxic compromise of DNA by heavy metals.** Epigenetics is a new study looking at how heavy metals and other environmental toxins can and do affect the gene expression of DNA to cause potentially serious ill health compromises, even death. DNA is actually a set of switches which are found to be controlled by chemical signals from the cell membrane of each cell, which are generated in response to the cell membrane's sensing of the environmental characteristics in the fluid surrounding it. Every living cell is actually floating in a body fluid called lymph. If the cell membrane senses that something is wrong, it sends a chemical signal to the cell nucleus and DNA there to adjust by turning on or off certain genetic switches. This is the living body's way of adapting to its surroundings for survival. This is evolution in progress.

(14) Heavy metals have been found to both up regulate and down regulate DNA switches, and these switches tripped by epigenetic toxins can remain tripped into up to 5 generations hence, even if the original cause or toxin has been removed in the first generation. The implications for health and humanity for future generations considering epigenetics is mind blowing. Slides 31 -35 (INT-049) tell the story of epigenetics and the impact on DNA expression, all the way to cancer.

(15) Heavy metals also act as xenohormones and hormone disruptors in the living body. Our hormones are all stereoisomers, meaning atoms are arranged differently in 3 dimensional space, and are subject to the toxic effects of xenohormone environmental toxins. Heavy metals have been shown to act as xenohormones, entering into the cellular receptor sites and skewing the hormone biochemical pathways for Estrogen, Testosterone, Progesterone,

Cortisol, Pregnenolone, Thyroid, DHEA, Insulin and more. Since hormones are key initiators, regulators and intermediary metabolites of virtually every biochemical reaction in the living body, the protection of their integrity is crucial for their actions. Heavy metals, environmental chemicals and industrial chemical wastes can act as “xenohormones”, and interfere with natural hormones, enzymes, etc., and cause cancer and other severe ill health compromises.

(16) Heavy metals are known to be “xenoestrogens”, a hormone mimic of estrogen, the female and growth hormone. Estrogenic toxicity causes cancer, skin lesions, obesity, fertility problems, accelerated aging, liver problems, learning problems, mood disorders, metabolic syndrome, blood sugar irregularities, blood fat irregularities, increase in breast tissue and size in both males and females, smaller or even undeveloped male genitalia and higher anger and anxiety responses to daily life situations. Mineral imbalances caused by high levels of toxic heavy metals themselves, also are known to cause hormone imbalances of insulin, thyroid, testosterone, progesterone, estrogen and cortisol.

(17) All of the heavy metals studied so far, that are common exposures to man, have shown to be “xenoestrogens”, including those that are generated from the rock strata at Crowe Butte. The increase in obesity of animals and humans over the last several decades is directly correlated to the increase of environmental toxins that are known to be fat soluble and deposited in body fat, including heavy metals.

(18) Heavy metals are also known to denature protein and negate the biochemical activities of protein based enzymes and hormones, as well as cause effects in skeletal muscles. Protein makes up a full 90% of the dry weight of the living body. Any living body, any species. Protein is an organic compound composed of long chains of amino acids. Each protein has its own distinct combination of amino acids and also its unique three dimensional shape, and it is the shape that gives it its unique biochemical activity, not simply the chemical formula of its amino acid composition. This is the most important concept in protein, hormone and enzyme biochemistry.

(19) Heavy metal inorganic salts act to denature proteins in much the same manner as acids and bases. Heavy metal salts usually contain Hg+2, Pb+2, Ag+1, Tl+1, Cd+2 and other metals with high atomic weights. Since salts are ionic they disrupt salt bridges in proteins. The reaction of a heavy metal salt with a protein usually leads to an insoluble metal protein salt, meaning that it forms a solid and becomes inactive biochemically.

(20) Non-Insulin Dependent Diabetes, or Diabetes Type 2, is the result of such a compromise in the body, with the insulin not able to perform its designated function. It is also called Insulin Resistant Diabetes, because simply giving the affected patient more insulin does not cure the problem. Typical blood testing of insulin reveals the

presence of adequate insulin or even higher than normal levels, but conventional blood testing is not capable of viewing the actual three dimensional shape of the molecules to properly assess their actions or lack of. So we typically see the Type 2 diabetic having both high blood glucose along with high insulin levels that are not working effectively. The insulin has been denatured in the blood, and any new insulin that would be still functional when administered to the type 2 diabetic with toxic blood sporting effective levels of some denaturing toxin, will just further deform any new and functional insulin given. Such is the naming of "Insulin Resistance".

(21) This is a serious problem in assessing the real toxicity of any environmental toxin that has been shown to denature protein, such as heavy metals. Conventional blood testing does not accurately reflect the true health compromise of the sick individual. Slides 36 - 37 (INT-049) show how proteins are formed and then folded into their three dimensional shapes and then subsequently unravelled and deformed by denaturing agents. Slide 38 shows the hormone insulin with its characteristic folded nature, that is unfolded in Type 2 diabetes by denaturing agent exposure.

(22) The impacts of selenium on humans and wildlife if Crow Butte uses land application of mining wastes are material, adverse and potentially fatal to humans and wildlife exposed to selenium. Heavy metals, most notably: Selenium, Molybdenum and Arsenic will be generated in soluble forms that are highly toxic to all living things, and are able to be concentrated even further by bioaccumulation up the food chain.

(23) The land application for wastewater is destined for environmental contamination that will never be able to be remediated. Heavy metals never degrade into harmless substances. Those lixiviant solubilized toxic heavy metals, will eventually migrate into groundwater aquifers or surface water via streams, floods, melting snow runoff and storms.

(24) The more dangerous the mined materials, the more toxic the residual mess left. In this case, mining of uranium, a toxic heavy metal in itself, also brings an additional risk of radiation from radon gas and lixiviant solubilized radioactive heavy metals of vanadium, thorium, strontium and radionuclides.

(25) When high levels of heavy metals offset and upset the biochemistry of the living body, severe compromises to health are set in motion, including hormone imbalances. Heavy metals will not only create deficiencies of essential minerals but also exhibit toxicity by their very presence in the living body. Thus they are doubly toxic.

(26) In this study (<http://link.springer.com/article/10.1007/s00244-001-0037-y#page-2> - INT-049), mean selenium concentrations in grasses, grasshoppers, red-winged blackbirds eggs and livers were 5.8 to 30 times higher at the study area than at the reference site. Elevated selenium collected from soil, water, and wildlife demonstrate that selenium is being mobilized and is bioaccumulating in the food

chain. This can eventually affect livestock grazing in the area and can then enter the human food chain.

(27) Fish and aquatic organisms are especially sensitive to selenium levels and grasshoppers and other insects, salamanders and crayfish are key parts of the food chain at risk.

(28) Slides 9 and 10 (INT-049) show fish affected by selenium toxicity. A low concentration of selenium in water has the potential to increase by several orders of magnitude by the time it reaches fish and wildlife. For example, a water concentration of 10 ug/L (micrograms per liter or parts-per-billion) can increase to over 5,000 times that amount in fish tissues. Bioaccumulation causes otherwise harmless concentrations of selenium to reach toxic levels. This same principle applies to other heavy metals as well.

(29) Slides 13 (INT-049) show a graphic of how bioaccumulation works. The substance that exists in a low level amount in the environment, that was formerly thought to be so low as to be safe, is taken up by small and simple organisms such as algae, then eaten by animals, which in turn are eaten by other animals up the food chain, and the substance is further concentrated as it travels up the food chain, increasing its toxicity. Man, as the top predator, will suffer the most from bioaccumulation as we eat the animals in the food chain below us.

(30) Although fish do take up some selenium directly from water, most of it comes from their diet. Therefore, in order to protect fish from selenium poisoning it is essential to keep waterborne selenium below levels that cause bioaccumulation in the food chain (Lemly and Smith 1987).

(31) Selenium can exist in many chemical forms, and some forms are more toxic for the amount of selenium exposure than others. Symptoms of selenosis, selenium toxicity, include a garlic odor on the breath, gastrointestinal disorders, hair loss, sloughing of nails, (hooves and claws in animals), fatigue, irritability, thyroid compromise, thyroid chemistry compromise, and neurological damage. Selenium in certain chemical forms, is not only non-toxic but absolutely essential to life. It fuels the enzyme that converts T4, the storage form of thyroid hormone to T3, to the active form, that regulates the speed of all biochemical reactions in the body at the cell level. Extreme cases of selenosis can also result in cirrhosis of the liver, pulmonary edema, and death. Slide 10 is a graphic that shows how inorganic selenium from mining wastes is biotransformed into organic forms that are far more bioavailable and can be more toxic depending on what it is bound with. Locoweeds are plants that bioaccumulate high levels of selenium that are toxic as organic forms not compatible with living animal bodies.

(32) The same result of toxic bioaccumulation occurs for other known pollutants and products of ISL mining, such as arsenic. So that everything stated above for selenium can also be said for arsenic, manganese, chromium, copper, vanadium, and other heavy metals. Slides 26 - 29 (INT-049) shows cancer and lesions from chronic arsenic poisoning in humans.

(33) Metals cannot be broken down to other elements in Nature or the living body, and in fact, toxin exposure in continuous low levels, formerly thought to be safe, have now been shown to have additive or synergistic effects, where the end effects of a combination of toxin exposure produces more severe health compromises than those that would be expected from each toxin.

(34) Since different chemical forms of minerals and metals can and do exist, and some are more toxic than others, and travel up the food chain at different rates. Different chemical forms of minerals and metals target different organs and tissues of the body.

(35) Each individual toxin is shown to enter the body at levels under the body's detoxification radar of liver detoxification, thus allowing toxic levels of the pollutant to build up over time, until the body becomes so sickened that it cannot help itself anymore in a detox and elimination protective method.

(36) Arsenic, in particular, is extremely dangerous in the world today, and especially North America, because arsenic opposes iodine on the mineral wheel, meaning that high arsenic causes iodine deficiency. Current research has shown that we need far more iodine than we thought we did for health, and we are not getting it in food or water, even as we used to decades past, when iodine was used in food processing and water purification.... Arsenic compromises thyroid.

(37) Cadmium, another toxic metal, has no known biological function in higher organisms, and is extremely toxic to life. Cadmium is said to be 10 times more toxic than lead. Cadmium will bind with many organic compounds, and the structures of many cadmium complexes with nucleobases, amino acids and vitamins have been determined. Thus, cadmium will and can affect genetic expression negatively.

(38) Cadmium, with no known beneficial activity in the living body, is found to be able to enter into, and to interfere and corrupt normal biochemical pathways critical to the living body, and the highest concentration of cadmium has been found to be absorbed in the kidneys of humans, causing kidney disease. Cadmium can substitute for zinc and so will be uptake by the living body at a greater level in the presence of a zinc deficiency and also will create a physiological deficiency of zinc even when adequate levels of zinc are present, if the levels of cadmium are sufficiently elevated. Such is the

case with all metals in opposition or relation to each other on the mineral wheel in Nature. cadmium has been designated as a carcinogen.

(39) The ingestion of highly soluble cadmium compounds can cause significant toxicity to humans and animals. Cadmium has also shown activity as a xenoestrogen/estrogen mimic and causing breast cancer.

(40) Cadmium works as an endocrine disruptor and experimental studies have shown that it can interact with different hormonal signaling pathways. Cadmium can bind to the estrogen receptor alpha, and affect signal transduction along the estrogen and MAPK signaling pathways at low doses. Since estrogen is actually the major hormone activity in the living body for both males and females, any interference, down or up regulation of this hormone can cause skewing of the other major hormone cycles and feedback loop cycles that regulate both the production of hormones as well as their biochemical activity and influence in the living body. These affected hormones are: progesterone, pregnenolone, thyroid hormone, testosterone, cortisol and insulin, DHEA and estrogens estradiol, estril and estrone. The types of cancers most driven by xenoestrogens such as cadmium are endometrial, breast, ovarian and prostate cancers. Osteoporosis in humans is also documented as cadmium directly opposes calcium on the mineral wheel and in the living body.

(41) Cadmium exposure is a risk factor associated with early atherosclerosis and hypertension, which can both lead to cardiovascular disease.

(42) In Nature, we have observed Cadmium toxicology in fish and other aquatic animals.

(43) Cadmium toxicity was first described and observed in 1950 in Japan as Itai-Itai disease. This study is important as it describes the effects of cadmium as the principal metal involved in this disease. being highly toxic even at low levels, causing a flu like syndrome initially, known as "The Cadmium Blues", and quickly poisoning both liver and kidneys. Its initial toxic activity is that of a metal substitution for zinc, poisoning all of the enzyme and other biochemical reactions in the body in which zinc is involved, because of its similarity to zinc, acting as a metal mimic. again I refer back to the Mineral Wheel: slides 5 and 6.

(44) Cadmium has been shown to exist in both inorganic and organic forms and to quickly bioaccumulate up the food chain. Slide 40 shows the common known biochemical pathways that are compromised by cadmium in the living body. "TCA" is the tricarboxylic acid pathway, often called the "citric acid cycle" or the "Krebs Cycle", and often thought to be the most important energy producing pathway in the body. Slides 41 - 42 show the most commonly affected areas of the body and the associated diseases caused by cadmium. Slide 42 is actually a video presentation of the toxicity explained.



(45) Slide 43 shows the toxic effects of a purely inorganic form of cadmium salt, documented in the lab, important because ISL mining is known to produce quantities of metals salts such as this in an inorganic state.

(46) Lead is another heavy metal that has no known function in the living body. Therefore, it has only toxic effects and those can be measured even at low levels. Lead levels are known to increase over time as radioactive elements degrade into lead at the end of their metallic lives. Lead is known to be present in wastewater and ISL mined aquifers in toxic levels. Lead toxicity has been known for a long time, and so is now recognized as a toxin in conventional wisdom. Slide 44 shows the most common physiological effects of lead on both children and adults. Slide 45 shows the correlation between blood levels and clinical symptoms of lead poisoning. Keep in mind, that blood levels are normally much lower than the total toxic body burden for many metals, including lead, because the body is actively storing toxins away in different tissues and organs, to get it out of active metabolism for survival. So blood levels will only reflect the actual levels left circulating and not the storage levels. For this reason, hair analysis is commonly implemented, as it more accurately records tissue levels because hair is a continually growing tissue, and has been correlated in both humans and animals by tissue biopsy to be accurate for total body tissue levels. Slide 46 shows the pathway in the body for lead and the health manifestations it causes with exposure and time with resulting toxicity symptoms. Slide 47 shows the effects of inorganic lead on different levels of exposure. Slide 48 shows the classification of different naturally occurring metals by toxicity and hydrologic availability. Note that the metals we are referring to here are found in the highest toxicity category. ISL mining exacerbates this list greatly in that even higher quantities of these metals in all categories are generated, increasing the toxicity of all of them.

(47) Containment of toxic wastewater load is not feasible in a leach pond designed to be large enough to be a lake bed, contrary to a plan to fence out Nature. No fence will last the lifetime of the toxins being contained here: ie; the lifetime of radiation left behind and accumulation of heavy metals that never die or degrade, in sediments of a pond. It is not possible to adequately fence off Nature.

(48) Fencing plans are to fence off mammals, however, there is no fence for the rest of Nature, insects and other small crawly things, small mice, salamanders, snails, etc., at the bottom of the food chain, that would leave the pond and be eaten by their predators, to have their toxins then bioaccumulate up the food chain.

(49) Seasonal weather changes bringing heavy rains, winds, blizzards and floods will cause the borders of the pond to be overrun, taking toxins away from the pond, toward streams and rivers, and giving access to Nature, the environment and wildlife.

(50) Seasonal drying in summer and drought conditions will allow exposure to the winds of dried sediments on the pond's edge, adding to air pollution which can be carried for miles.

(51) Migrating birds and other animals will carry toxins to far away places, while it damages their bodies for survival, and contaminates game birds that are hunted and eaten by man.

(52) Re: Evaporation Ponds: Ponds are shallow design, not more than a few feet deep. This allows for more contact between the highly chemically active waste water and the plastics in the liners, facilitating faster degradation. And all plastics do degrade over time, even without this chemical exposure. The high levels of oxidizing chemicals will speed degradation dramatically. This is what these chemicals do and why they are used in the ISL process to degrade rocks.

(53) Re: Evaporation Ponds: The plastics used in the liners are polypropylene and polyethylene, common plastics we use every day. These plastics are so easily degraded that they are the principle plastics used in the food and bottled water industry and easily recycled by adding chemicals to degrade and disintegrate, and hence the ones we recycle. The warranty by the manufacturer is only 1 yr for the polypropylene and 2 yr for the polyethylene, and the project is supposed to last 20 yrs. And the strips of plastics will be bonded together by seams of heat and or glue, and these have been shown in other EPA tests to leak.

(54) Re: Evaporation Ponds: The plasticizers that are integral in all plastics to give them their softness and pliability, are well known endocrine disruptors and hormone mimics, and also are well known to leach into foods. Hence the warnings of plastic bottled juices, foods and waters. When these plasticizers are leached from the plastics, the plastics become brittle and will break and then leak. I would expect leaks fairly quickly in the these ponds because of the contact with these highly active oxidative chemical waste waters facilitating that leaching of plasticizers and degradation.

(55) Re: Evaporation Ponds: The clay liner underneath will not be impervious to the leakage, as we have found with clay pits of old that are now deemed superfund sites.

(56) The numerous foregoing opinions demonstrate that conditions for land reclamation and prevention of contamination cannot be met with Crow Butte's mining activities. None of this data or analyses have been considered by NRC in its environmental assessment.

E. Dr. Louis Redmond. Dr. Redmond's CV is submitted (INT-061).

Dr. Redmond has opined that:

(1) The materials utilized for the Crow Butte Expansion cultural resource licenses appear to be faulted in several places. First, there does not appear to be any

identification or accreditation of whomever it is that allegedly conducted the Class III survey or the TCP survey(s). There are, as I stated earlier, very specific qualifications must be met for field surveyors, supervisors and principal investigators of Class III archeological surveys and Traditional Cultural Property investigation.

(2) The standards for principal investigators are laid out in the Secretary of Interior's Standards and Guidelines, which are the defining standards nationally. The minimum qualification for the principal investigator is clearly spelled out in the "Professional Qualifications" pages of the Standards. This is defined for Archeology as a minimum of a graduate degree in archeology, anthropology or closely related field plus:

- 1. At least 1 year of full-time professional experience or equivalent specialized training in archeological research, administration or management:***
- 2. At least 4 months of supervised field analytic experience in general North American archeology, and***
- 3. Demonstrated ability to carry research to completion.***

***In addition to this minimum qualification, a professional in prehistoric archeology shall have at least one year of full-time professional experience at a supervisory level in the study of archeological resources of the prehistoric period. A professional in historic archeology shall have at least one year of full-time professional experience at a supervisory level in the study of archeological resources of the historic period. (Emphasis added.)***

(3) In addition to archeologists, a principal investigator may also have an advanced degree in History, Architectural History, Architecture, or Historic Architecture, however these last are generally meant primarily for principal investigators involved with Historical Archeology and Historical Traditional Cultural Properties. These also have additional field and supervisory qualification as appropriate to their own specific fields.

In other words, a principal investigator must have a minimum of a graduate degree in a specific field, with a minimum of one year of qualifying generalized work in that field, and addition specific areal work of usually 4 to 6 months within the general region of work.

(4) In addition, Traditional Cultural Property are also held to this same high standard for principal investigators. Also, Traditional Cultural Property investigations need to be done in concert between anthropologists or historians qualified at this same high level, and qualified tribal elders of all concerned tribal groups. This last is in accordance with the stated goals of the Protection of Historic Properties 36 CFR part 800 subpart B (the 106 process).

(5) In this case, we know that this has not been done, in that at a minimum the Oglalla Sioux Tribe has not been adequately consulted in any Traditional Cultural Property survey. How many other tribal groups that should have been consulted for both historic

properties and Traditional Cultural Properties and were not is at this point, anyone's guess according to the available materials I have been able to read.

(6) These surveys are not a simple viewing of the ground surfaces, but also a realization of the impact that any projects might have upon past or in fact, current traditional ceremonial or cultural properties, such as hanblechia (vision quest) or Sun Dance sites which can have their sacred view-shed and/or landscape impacted.

(7) To the best of my knowledge, and any literature available to me at this time, none of this has been considered at this time, which would be a direct violation of the current cultural heritage laws. In the last several years the Advisory Council on Historic Preservation has been, to say the very least, been frantically attempting to solve the problems of cultural groups and the myriad problems of Traditional Cultural Landscapes (see [http://www.nps.gov/history/nr/publications/guidance/TCP\\_comments.htm](http://www.nps.gov/history/nr/publications/guidance/TCP_comments.htm)) for example.

(8) To say that this has become an open wound for the Federal Government would be a gross understatement. This problem essentially began in the 1990's with two diverse landscapes or properties, San Francisco Peaks in Arizona and Poletown in Detroit, Michigan; a Native American site and a site traditionally important to Polish-Americans in Michigan. Both ended up being destroyed by "economic necessity" to the detriment of their cultural group.

(9) Traditional Cultural Properties or Landscapes are not investigations that can be written off by a simple piece of paper paid for with corporate monies. These are specifically defined just as definitively as Historical/Archeological Surveys are defined within the Secretary of the Interior's Standards and Guidelines.

(10) The qualifications for the principal investigators and other participants are just as high and therefore should be treated just as highly and seriously.

(11) Also in reviewing the Nebraska State Historic State Historic Preservation Plan, especially the goals and standards for the state, it would seem that this project especially is in direct opposition to its stated plans of the State of Nebraska. Its specific goals, problems and solutions for cultural resources, archeology, and interaction with tribal groups and local populations seems to be directly opposed to what is happening at sites like Crow Butte and others in this region of the country. Not only are archeological materials being displaced, but traditional properties and landscapes are being impacted, as well as contemporary lifeways.

F. Debra White Plume. Debra White Plume is a member of the Oglala Sioux Tribe and is a founding member and director of Owe Aku/Bring Back the Way. Debra White Plume and Owe Aku/Bring Back the Way are admitted as intervenors in this proceeding. Owe Aku/

Bring Back the Way's mission is to preserve Lakota culture and ways of life and to seek social justice and human rights for the Lakota people, including treaty rights. In her capacity with Owe Aku/Bring Back the Way and as a lifelong resident of the Pine Ridge Indian Reservation, Debra White Plume has direct personal knowledge about the living conditions throughout the Reservation.

Ms. White Plume has opined in INT-021 that:

(1) Our Pine Ridge Homelands (the Reservation) has 85% unemployment, the highest suicide rate in America, lacks basic housing needs for 4,000 families, 90% of the children on the Reservation live at or under the poverty level. President Obama has recently declared our Homelands a "Promise Zone".

(2) All over the Reservation, residents have to hook up to the Rural Water Supply System, funded by the United States to pipe in drinking water from the Missouri River at Pierre, SD because the ground water tests reveal high amounts of radioactivity and arsenic and other contaminants.

(3) Oglala Sioux Tribe tribal members used to be able to make use of the White River, fishing in it, watering horses and cattle, and for crop irrigation. Now, most people are leery of it due to contamination and low flow.

(4) Oglala Sioux Tribe tribal members who learn that their water source is contaminated are often unable to afford bottled water so are they likely to drink it anyway. It is difficult for tribal members to drive to grocery stores or other sources of bottled water. For example, Debra White Plume lives a ten mile round trip from the nearest store, 180 miles from the nearest shopping center. Debra White Plume drinks well water from the Ogllala Aquifer, as the Rural Water Supply System is no longer funded by Congress and there are currently 400 homes on the waiting list.

(5) Debra White Plume is concerned that the people on the Reservation, as the last remaining Oglala Lakota people on Mother Earth are suffering from the lack of environmental justice by being surrounded by uranium mines by Cameco to the south and the west and abandoned uranium mines to the north, and that we face extermination as a people from this condition. This area is dependent on the Ogllala Aquifer for drinking water. Debra White Plume notes that the Reservation is under drought conditions already and to risk the groundwater contamination for an endangered people can be genocidal.

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### **III. Applicable Legal Standards.**

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

Significantly, the national interest and common defense aspects include protecting the health and safety of the public, including the environment and water resources. “The Atomic Energy Act was passed years before broader environmental concerns prompted enactment of the National Environmental Protection Act (“NEPA”). Yet many of those same concerns permeated provisions of the first-mentioned legislation and the regulations promulgated in accordance with its mandate. To say that these must be regarded independently of the constantly increasing consciousness of environmental risks reflected in proceedings with reference to NEPA, would make for neither practicality nor sense. Nor can AEA requirements be viewed separate and apart from NEPA considerations. Especially in view of NEPA, it also is unreasonable to suppose that

risks are automatically acceptable, and may be imposed upon the public by virtue of AEA, merely because operation of a facility will conform to the Commission's basic health and safety standards. The weighing of risks against benefits in view of the circumstances of particular projects is required by NEPA in view of AEA. The two statutes and the regulations promulgated under each must be viewed in *para material*. *Citizens for Safe Power, Inc. v. NRC*, 524 F.2d 1291, 1299 (DC Cir. 1975).

When, as here, 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). On behalf of its Oglala members, Consolidated Intervenor's also have asserted and continue to assert a concrete interest in the protection of lands, natural resources, economic prosperity, and the health, safety, and welfare of the Oglala, which are all threatened by the continued operation of the Crow Butte ISL/ISR mine.

AEA Section 61 provides that the Commission must "find that the determination that such material is source material is in the interest of the common defense and security. 42 USC 2091. AEA Section 62 provides that "no person may transfer or receive in interstate commerce, transfer, deliver, receive possession of or title to, or import into or export from the United States any source material after removal from its place of deposit in nature. 42 USC 2092. AEA Section

69 provides that “[t]he Commission shall not license any person to transfer or deliver, receive possession of or title to, or import into or export from the United States any source material if, in the opinion of the Commission, the issuance of a license to such person for such purpose would be inimical to the common defense and security or the health and safety of the public. 42 USC 2099 (emphasis added).

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

The AEA and NEPA requirements for the Crow Butte renewal are set forth in NRC Regulations at 10 CFR Part 40, including Appendix A thereof, and 10 CFR Part 51. See 10 CFR 40.1; 10 CFR 51.1. As described in NRC Regulation Section 40.1(b), the Part 40 Regulations also contain implementations of title II of the Energy Reorganization Act of 1974, as amended (88 Stat. 1242), and titles I and II of the Uranium Mill Tailings Radiation Control Act of 1978, as amended (42 U.S.C. 7901).

### **Part 40 Regulations**

NRC Regulation Section 40.9 provides that all information provided to the Commission by Applicant shall be **complete and accurate in “all material respects.”** Further, Section



40.9(b) requires Applicant to notify the Commission if Applicant has identified information having a significant implication for public health and safety or common defense and security.

NRC Regulation Section 40.31 provides for the application of a license such as the license at issue in this case. The Commission retains the authority under NRC Regulations Section 40.31(b) to “require further statements in order to enable the Commission to determine whether the application should be granted or denied or whether a license should be modified or revoked.” NRC Regulation Section 40.31(h) provides that “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.”

Once the Commission has received full disclosure in an application, and in responses to any and all follow up requests for information, it may approve the sought after source materials license in accordance with Section 40.32 if: (a) The application is for a purpose authorized by the Act; (b) The applicant is qualified by reason of training and experience to use the source material for the purpose requested in such manner as to protect health and minimize danger to life or property; **(c) The applicant's proposed equipment, facilities and procedures are adequate to protect health and minimize danger to life or property;** and **(d) The issuance of the license will not be inimical to the common defense and security or to the health and safety of the public.** 10 CFR 40.32 (emphasis added); 10 CFR 40.45.

NRC Regulations Section 40.41(c) provides, in pertinent part, that:  
§ 40.41 Terms and conditions of licenses.

(a) Each license issued pursuant to the regulations in this part shall be subject to all the provisions of the act, now or hereafter in effect, and to all rules, regulations and orders of the Commission.

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(c) Each person licensed by the Commission pursuant to the regulations in this part shall confine his possession and use of source or byproduct material to the locations and purposes authorized in the license. Except as otherwise provided in the license, a license issued pursuant to the regulations in this part shall carry with it the right to receive, possess, and use source or byproduct material.

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(e) The Commission may incorporate in any license at the time of issuance, or thereafter, by appropriate rule, regulation or order, such additional requirements and conditions with respect to the licensee's receipt, possession, use, and transfer of source or byproduct material as it deems appropriate or necessary in order to:

(1) Promote the common defense and security;

(2) Protect health or to minimize danger of life or property;

(3) Protect restricted data;

(4) Require such reports and the keeping of such records, and to provide for such inspections of activities under the license as may be necessary or appropriate to effectuate the purposes of the act and regulations thereunder.

#### **Appendix A to Part 40**

NRC Regulations at Appendix A to Part 40 provide, among other things:

Appendix A to Part 40—Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Material Content

...

The specifications must be developed considering the expected full capacity of tailings or waste systems and the lifetime of mill operations. Where later expansions of systems or operations may be likely (for example, where large quantities of ore now marginally uneconomical may be stockpiled), the amenability of the disposal system to accommodate increased capacities without degradation in long-term stability and other performance factors must be evaluated.

Licensees or applicants may propose alternatives to the specific requirements in this appendix. The alternative proposals may take into account local or regional conditions, including geology, topography, hydrology, and meteorology. **The Commission may find that the proposed**

**alternatives meet the Commission's requirements if the alternatives will achieve a level of stabilization and containment of the sites concerned, and a level of protection for public health, safety, and the environment from radiological and nonradiological hazards associated with the sites, which is equivalent to, to the extent practicable, or more stringent than the level which would be achieved by the requirements of this Appendix and the standards promulgated by the Environmental Protection Agency in 40 CFR Part 192, Subparts D and E. (Emphasis added.)**

All site specific licensing decisions based on the criteria in this Appendix or alternatives proposed by licensees or applicants will take into account the risk to the public health and safety and the environment with due consideration to the economic costs involved and any other factors the Commission determines to be appropriate. In implementing this Appendix, the Commission will consider "practicable" and "reasonably achievable" as equivalent terms. Decisions involved these terms will take into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of atomic energy in the public interest.

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Appendix A of Part 40 further provides, among other things:

**Criterion 5—Criteria 5A-5D and new Criterion 13 incorporate the basic ground-water protection standards imposed by the Environmental Protection Agency in 40 CFR Part 192, Subparts D and E (48 FR 45926; October 7, 1983) which apply during operations and prior to the end of closure. Ground-water monitoring to comply with these standards is required by Criterion 7A. (Emphasis added.)**

Clearly Criterion 5 implicates groundwater monitoring during operations and prior to closure with reference to Criterion 7A, and the Proposed Rules in new Subpart F will also apply by their terms to impose groundwater monitoring standards and reports during restoration and decommissioning, and may apply to the exclusion or to the modification of what is set forth in Criterion 7A. See Proposed Rules at 80 Fed. Reg. 4172-4174, 4185.

Appendix A to Part 40 provides further, among other things, that:

5B(1)—Uranium and thorium byproduct materials must be managed to conform to the following secondary ground-water protection standard: Hazardous constituents entering the ground water from a licensed site must not exceed the specified concentration limits in the uppermost aquifer beyond the point of compliance during the compliance period. Hazardous constituents are those constituents identified by the Commission pursuant to paragraph 5B(2) of this criterion.

Specified concentration limits are those limits established by the Commission as indicated in paragraph 5B(5) of this criterion. The Commission will also establish the point of compliance and compliance period on a site specific basis through license conditions and orders. The objective in selecting the point of compliance is to provide the earliest practicable warning that the impoundment is releasing hazardous constituents to the ground water. The point of compliance must be selected to provide prompt indication of ground-water contamination on the hydraulically downgradient edge of the disposal area. The Commission shall identify hazardous constituents, establish concentration limits, set the compliance period, and may adjust the point of compliance if needed to accord with developed data and site information as to the flow of ground water or contaminants, when the detection monitoring established under Criterion 7A indicates leakage of hazardous constituents from the disposal area.

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5B(2)—A constituent becomes a hazardous constituent subject to paragraph 5B(5) only when the constituent meets all three of the following tests:

- (a) The constituent is reasonably expected to be in or derived from the byproduct material in the disposal area;
- (b) The constituent has been detected in the ground water in the uppermost aquifer; and
- (c) The constituent is listed in Criterion 13 of this appendix.

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5B(3)—Even when constituents meet all three tests in paragraph 5B(2) of this criterion, the Commission may exclude a detected constituent from the set of hazardous constituents on a site specific basis if it finds that the constituent is not capable of posing a substantial present or potential hazard to human health or the environment.

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5B(4)—In making any determinations under paragraphs 5B(3) and 5B(6) of this criterion about the use of ground water in the area around the facility, the Commission will consider any identification of underground sources of drinking water and exempted aquifers made by the Environmental Protection Agency.

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5B(5)—At the point of compliance, the concentration of a hazardous constituent must not exceed

- (a) The Commission approved background concentration of that constituent in the ground water;
- (b) The respective value given in the table in paragraph 5C if the constituent is listed in the table and if the background level of the constituent is below the value listed; or
- (c) An alternate concentration limit established by the Commission.

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5B(6)—Conceptually, background concentrations pose no incremental hazards and the drinking water limits in paragraph 5C state acceptable hazards but these two options may not be practically achievable at a specific site. Alternate concentration limits that present no significant hazard may be proposed by licensees for Commission consideration. Licensees must provide the basis for any proposed limits including consideration of practicable corrective actions, that limits are as low as reasonably achievable, and information on the factors the Commission must consider. The Commission will establish a site specific alternate concentration limit for a hazardous constituent as provided in paragraph 5B(5) of this criterion if it finds that the proposed limit is as low as reasonably achievable, after considering practicable corrective actions, and that the constituent will not pose a substantial present or potential hazard to human health or the environment as long as the alternate concentration limit is not exceeded.

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<b>5C-Maximum Values for Ground-Water Protection</b>	
<b>Constituent or property</b>	<b>Maximum concentration</b>
Milligrams per liter:	
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Selenium	0.01
Silver	0.05
Endrin (1,2,3,4,10,10-hexachloro-1,7 -epoxy-1,4,4a,5,6,7,8,9a-octahydro-1, 4-endo, endo-5, 8- dimethano naphthalene)	0.0002
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer)	0.004
Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenylethane)	0.1
Toxaphene (C <sub>10</sub> H <sub>10</sub> Cl <sub>16</sub> , Technical chlorinated camphene, 67-69 percent chlorine)	0.005
2, 4-D(2,4-Dichlorophenoxyacetic acid)	0.1
2, 4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid)	
Picocuries per liter:	
Combined radium-226 and radium-228	5
Gross alpha-particle activity (excluding radon and uranium when producing uranium byproduct material or radon and thorium when producing thorium byproduct material)	15

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5D-If the ground-water protection standards established under paragraph 5B(1) of this criterion are exceeded at a licensed site, a corrective action program must be put into operation as soon as is practicable, and in no event later than eighteen (18) months after the Commission finds that the standards have been exceeded. The licensee shall submit the proposed corrective action program and supporting rationale for Commission approval prior to putting the program into operation, unless otherwise agreed to by the Commission. The objective of the program is to return hazardous constituent concentration levels in ground water to the concentration levels set

as standards. The licensee's proposed program must address removing hazardous constituents that have entered the ground water at the point of compliance or treating them in place. The program must also address removing or treating any hazardous constituents that exceed concentration limits in ground water between the point of compliance and the downgradient facility property boundary. The licensee shall continue corrective action measures to the extent necessary to achieve and maintain compliance with the groundwater standard. The Commission will determine when the licensee may terminate corrective action measures based on data from the ground-water monitoring program and other information that provide reasonable assurance that the ground-water protection standard will not be exceeded.

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5E-In developing and conducting ground-water protection programs, applicants and licensees shall also consider the following:

(1) Installation of bottom liners(Where synthetic liners are used, a leakage detection system must be installed immediately below the liner to ensure major failures are detected if they occur. This is in addition to the ground-water monitoring program conducted as provided in Criterion 7.

Where clay liners are proposed or relatively thin, in-situ clay soils are to be relied upon for seepage control, tests must be conducted with representative tailings solutions and clay materials to confirm that no significant deterioration of permeability or stability properties will occur with continuous exposure of clay to tailings solutions. Tests must be run for a sufficient period of time to reveal any effects if they are going to occur (in some cases deterioration has been observed to occur rather rapidly after about nine months of exposure)).

(2) Mill process designs which provide the maximum practicable recycle of solutions and conservation of water to reduce the net input of liquid to the tailings impoundment.

(3) Dewatering of tailings by process devices and/or in-situ drainage systems (At new sites, tailings must be dewatered by a drainage system installed at the bottom of the impoundment to lower the phreatic surface and reduce the driving head of seepage, unless tests show tailings are not amenable to such a system. Where in-situ dewatering is to be conducted, the impoundment bottom must be graded to assure that the drains are at a low point. The drains must be protected by suitable filter materials to assure that drains remain free running. The drainage system must also be adequately sized to assure good drainage).

(4) Neutralization to promote immobilization of hazardous constituents.

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5F—Where ground-water impacts are occurring at an existing site due to seepage, action must be taken to alleviate conditions that lead to excessive seepage impacts and restore ground-water quality. The specific seepage control and ground-water protection method, or combination of methods, to be used must be worked out on a site-specific basis. Technical specifications must be prepared to control installation of seepage control systems. A quality assurance, testing, and

inspection program, which includes supervision by a qualified engineer or scientist, must be established to assure the specifications are met.

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5G—In support of a tailings disposal system proposal, the applicant/operator shall supply information concerning the following:

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5H—Steps must be taken during stockpiling of ore to minimize penetration of radionuclides into underlying soils; suitable methods include lining and/or compaction of ore storage areas.

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Criterion 6—(1) In disposing of waste byproduct material, licensees shall place an earthen cover (or approved alternative) over tailings or wastes at the

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Criterion 6A—(1) For impoundments containing uranium byproduct materials, the final radon barrier must be completed as expeditiously as practicable considering technological feasibility after the pile or impoundment ceases operation in accordance with a written, Commission-approved reclamation plan.

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Criterion 7—At least one full year prior to any major site construction, a preoperational monitoring program must be conducted to provide complete baseline data on a milling site and its environs. Throughout the construction and operating phases of the mill, an operational monitoring program must be conducted to measure or evaluate compliance with applicable standards and regulations; to evaluate performance of control systems and procedures; to evaluate environmental impacts of operation; and to detect potential long-term effects.

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7A—The licensee shall establish a detection monitoring program needed for the Commission to set the site-specific ground-water protection standards in paragraph 5B(1) of this appendix. For all monitoring under this paragraph the licensee or applicant will propose for Commission approval as license conditions which constituents are to be monitored on a site specific basis. A detection monitoring program has two purposes. The initial purpose of the program is to detect leakage of hazardous constituents from the disposal area so that the need to set ground-water protection standards is monitored. If leakage is detected, the second purpose of the program is to generate data and information needed for the Commission to establish the standards under Criterion 5B. The data and information must provide a sufficient basis to identify those

hazardous constituents which require concentration limit standards and to enable the Commission to set the limits for those constituents and the compliance period. They may also need to provide the basis for adjustments to the point of compliance. For licenses in effect September 30, 1983, the detection monitoring programs must have been in place by October 1, 1984. For licenses issued after September 30, 1983, the detection monitoring programs must be in place when specified by the Commission in orders or license conditions. Once ground-water protection standards have been established pursuant to paragraph 5B(1), the licensee shall establish and implement a compliance monitoring program. The purpose of the compliance monitoring program is to determine that the hazardous constituent concentrations in ground water continue to comply with the standards set by the Commission. In conjunction with a corrective action program, the licensee shall establish and implement a corrective action monitoring program. The purpose of the corrective action monitoring program is to demonstrate the effectiveness of the corrective actions. Any monitoring program required by this paragraph may be based on existing monitoring programs to the extent the existing programs can meet the stated objective for the program.

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Criterion 8—Milling operations must be conducted so that all airborne effluent releases are reduced to levels as low as is reasonably achievable.

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Criterion 8A—Daily inspections of tailings or waste retention systems must be conducted by a qualified engineer or scientist and documented.

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#### V. Hazardous Constituents

Criterion 13—Secondary ground-water protection standards required by Criterion 5 of this appendix are concentration limits for individual hazardous constituents. The following list of constituents identifies the constituents for which standards must be set and complied with if the specific constituent is reasonably expected to be in or derived from the byproduct material and has been detected in ground water. For purposes of this appendix, the property of gross alpha activity will be treated as if it is a hazardous constituent. Thus, when setting standards under paragraph 5B(5) of Criterion 5, the Commission will also set a limit for gross alpha activity. The Commission does not consider the following list imposed by 40 CFR Part 192 to be exhaustive and may determine other constituents to be hazardous on a case-by-case basis, independent of those specified by the U.S. Environmental Protection Agency in Part 192.

### **Part 51 Regulations**

The NRC Regulations at Part 51, particularly Subpart A thereof, are intended to implement NEPA. 10 CFR 51.1; 10 CFR 51.2. Subpart A of Part 51 provides in pertinent part:



Subpart A--National Environmental Policy Act--Regulations Implementing Section 102(2)  
§ 51.10 Purpose and scope of subpart; application of regulations of Council on Environmental Quality.

(a) The National Environmental Policy Act of 1969, as amended (NEPA) directs that, to the fullest extent possible: (1) The policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in NEPA, and (2) all agencies of the Federal Government shall comply with the procedures in section 102(2) of NEPA except where compliance would be inconsistent with other statutory requirements. **The regulations in this subpart implement section 102(2) of NEPA in a manner which is consistent with the NRC's domestic licensing and related regulatory authority under the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and the Uranium Mill Tailings Radiation Control Act of 1978, and which reflects the Commission's announced policy to take account of the regulations of the Council on Environmental Quality published November 29, 1978 (43 FR 55978- 56007) voluntarily, subject to certain conditions.** (Emphasis added.)

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(b) The Commission recognizes a continuing obligation to conduct its domestic licensing and related regulatory functions in a manner which is both receptive to environmental concerns and consistent with the Commission's responsibility as an independent regulatory agency for protecting the radiological health and safety of the public. Accordingly, the Commission will:

- (1) Examine any future interpretation or change to the Council's NEPA regulations;
- (2) Follow the provisions of 40 CFR 1501.5 and 1501.6 relating to lead agencies and cooperating agencies, except that the Commission reserves the right to prepare an independent environmental impact statement whenever the NRC has regulatory jurisdiction over an activity [sic] even though the NRC has not been designated as lead agency for preparation of the statement; and

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(c) The regulations in this subpart also address the limitations imposed on NRC's authority and responsibility under the National Environmental Policy Act of 1969, as amended, by the Federal Water Pollution Control Act Amendments of 1972, Pub. L. 92-500, 86 Stat. 816 et seq. (33 U.S.C. 1251 et seq.) In accordance with section 511(c)(2) of the Federal Water Pollution Control Act (86 Stat. 893, 33 U.S.C 1371(c)(2)) the NRC recognizes that responsibility for Federal regulation of nonradiological pollutant discharges into receiving waters rests by statute with the Environmental Protection Agency.

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

§ 51.45 Environmental report

(a) General. As required by §§ 51.50, 51.53, 51.54, 51.55, 51.60, 51.61, 51.62, or 51.68, as appropriate, each applicant or petitioner for rulemaking shall submit with its application or petition for rulemaking one signed original of a separate document entitled "Applicant's" or "Petitioner's Environmental Report," as appropriate. An applicant or petitioner for rulemaking may submit a supplement to an environmental report at any time.

(b) Environmental considerations. **The environmental report shall contain a description of the proposed action, a statement of its purposes, a description of the environment affected, and discuss the following considerations:**

(1) The impact of the proposed action on the environment. Impacts shall be discussed in proportion to their significance;

(2) Any adverse environmental effects which cannot be avoided should the proposal be implemented;

(3) Alternatives to the proposed action. The discussion of alternatives shall be sufficiently complete to aid the Commission in developing and exploring, pursuant to section 102(2)(E) of NEPA, "appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." To the extent practicable, the environmental impacts of the proposal and the alternatives should be presented in comparative form;

(4) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and

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

(c) Analysis. **The environmental report must include an analysis that considers and balances the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse environmental effects.** An environmental report required for materials licenses under §

51.60 must also include a description of those site preparation activities excluded from the definition of construction under § 51.4 which have been or will be undertaken at the proposed site (i.e., those activities listed in paragraphs (2)(i) and (2)(ii) in the definition of construction contained in § 51.4); a description of the impacts of such excluded site preparation activities; and an analysis of the cumulative impacts of the proposed action when added to the impacts of such excluded site preparation activities on the human environment. An environmental report prepared at the early site permit stage under § 51.50(b), limited work authorization stage under § 51.49, construction permit stage under § 51.50(a), or combined license stage under § 51.50(c) must include a description of impacts of the preconstruction activities performed by the applicant at the proposed site (i.e., those activities listed in paragraph (1)(ii) in the definition of "construction" contained in § 51.4), necessary to support the construction and operation of the facility which is the subject of the early site permit, limited work authorization, construction permit, or combined license application. The environmental report must also contain an analysis of the cumulative impacts of the activities to be authorized by the limited work authorization, construction permit, or combined license in light of the preconstruction impacts described in the environmental report. Except for an environmental report prepared at the early site permit stage, or an environmental report prepared at the license renewal stage under § 51.53(c), the analysis in the environmental report should also include consideration of the economic, technical, and other benefits and costs of the proposed action and its alternatives. Environmental reports prepared at the license renewal stage under § 51.53(c) need not discuss the economic or technical benefits and costs of either the proposed action or alternatives except if these benefits and costs are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation. In addition, environmental reports prepared under § 51.53(c) need not discuss issues not related to the environmental effects of the proposed action and its alternatives. The analyses for environmental reports shall, to the fullest extent practicable, quantify the various factors considered. To the extent that there are important qualitative considerations or factors that cannot be quantified, those considerations or factors shall be discussed in qualitative terms. The environmental report should contain sufficient data to aid the Commission in its development of an independent analysis.

(d) Status of compliance. The environmental report shall list all Federal permits, licenses, approvals and other entitlements which must be obtained in connection with the proposed action and shall describe the status of compliance with these requirements. The environmental report shall also include a discussion of the status of compliance with applicable environmental quality standards and requirements including, but not limited to, applicable zoning and land-use regulations, and thermal and other water pollution limitations or requirements which have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection. The discussion of alternatives in the report shall include a discussion of whether the alternatives will comply with such applicable environmental quality standards and requirements.

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

## EPA'S PROPOSED RULES

On January 26, 2015, the U.S. Environmental Protection Agency ("EPA") published in the Federal Register a battery of proposed rules and amendments to its current "Human and Environmental Protection Standards for Uranium and Thorium Mill Tailings." 80 Fed. Reg. 4156 et. seq. (January 26, 2015) (amending 40 C.F.R. part 192). The Proposed Rules are the result of years of study by the EPA into the environmental impacts of in situ leach mining of uranium. In pertinent part, the Proposed Rules provide that:

In the absence of explicit regulatory language addressing ISR facilities, NRC and its Agreement States have used guidance and license conditions to implement many aspects of groundwater protection programs, including the selection of restoration goals and post-restoration monitoring.

Based upon the information that we have reviewed, **we believe an even more rigorous approach is warranted for (a) determining background groundwater concentrations, which are necessary to establish appropriate restoration goals, (b) establishing restoration goals, and (c) demonstrating the continued stability of groundwater after restoration.** In addition, prolonged stability monitoring is needed to provide the necessary level of confidence that groundwater quality will not degrade over time or promote contaminant migration in the future. 80 Fed. Reg. at 4165 (internal citations omitted) (emphasis added).

## BACKGROUND ON NEPA REQUIREMENTS

NEPA is an action-forcing statute applicable to all federal agencies. Its sweeping commitment is to "prevent or eliminate damage to the environment and biosphere by focusing government and public attention on the environmental effects of proposed agency action." *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 371 (1989). The statute requires "that the agency will inform the public that it has indeed considered environmental concerns in its

decision making process.” *Baltimore Gas and Electric Company v. NRDC*, 462 U.S. 87, 97 (1983).

As the United States Supreme Court has explained when examining the statute, in a NEPA document, the government must disclose and take a “hard look” at the foreseeable environmental consequences of its decision. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21, 96 S. Ct. 2718, 2730 n.21 (1976); *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971).

Closely related to NEPA’s mandate that agencies take a “hard look” at environmental impacts, NEPA prohibits reliance upon conclusions or assumptions that are not supported by scientific or objective data. *Citizens Against Toxic Sprays, Inc. v. Bergeland*, 428 F.Supp. 908 (1977). “Unsubstantiated determinations or claims lacking in specificity can be fatal for an [environmental study] .... Such documents must not only reflect the agency’s thoughtful and probing reflection of the possible impacts associated with the proposed project, but also provide the reviewing court with the necessary factual specificity to conduct its review.” *Committee to Preserve Boomer Lake Park v. Dept. of Transportation*, 4 F.3d 1543, 1553 (10th Cir. 1993).

NEPA’s implementing regulations require agencies to:

[I]nsure the professional integrity, including scientific integrity of the discussions and analysis in environmental impact statements. [Agencies] shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement.

40 C.F.R. § 1502.24 (Methodology and Scientific Accuracy). Further, where data is not presented in the NEPA document, the agency must justify not requiring that data to be obtained. 40 C.F.R. § 1502.22.

The CEQ regulations require that: “NEPA procedures must ensure that environmental information is available to public officials and citizens **before** decisions are made and **before** actions are taken.” 40 C.F.R. § 1500.1(b)(emphasis added). As the federal circuit courts have held:

NEPA ensures that a federal agency makes informed, carefully calculated decisions when acting in such a way as to affect the environment and also enables dissemination of relevant information to external audiences potentially affected by the agency's decision. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). ... NEPA documentation notifies the public and relevant government officials of the proposed action and its environmental consequences and informs the public that the acting agency has considered those consequences ....

*Catron County Board of Commissioners v. U.S. Fish and Wildlife Service*, 75 F.3d 1429, 1437 (10th Cir. 1996). The statutory prohibition against taking agency action before NEPA compliance applies to NRC decisionmaking. 42 U.S.C. § 4332(2)(C) *cited by New York v. NRC*, 681 F.3d 471, 476 (D.C. Cir. 2012). Otherwise, NEPA's mandate that agencies “shall [...] utilize a systematic, interdisciplinary approach” is reduced to an after-the-fact formality. 42 U.S.C. § 4332(2)(A).

In order to meet these requirements “an agency must set forth a reasoned explanation for its decision and cannot simply assert that its decision will have an insignificant effect on the environment.” *Marble Mountain Audubon Society v. Rice*, 914 F.2d 179, 182 (9th Cir. 1990), *citing Jones v. Gordon*, 792 F.2d 821 (9th Cir. 1986). “An agency cannot avoid its statutory

responsibilities under NEPA merely by asserting that an activity it wishes to pursue will have an insignificant effect on the environment. The agency must supply a convincing statement of reasons why potential effects are insignificant.” *Public Service Co. of Colorado v. Andrus*, 825 F.Supp. 1483, 1496 (D. Idaho 1993) *citing The Steamboaters v. FERC*, 759 F.2d 1383, 1393 (9<sup>th</sup> Cir. 1985) (internal quotes and citations omitted).

NEPA also requires that all connected, similar and cumulative actions be considered in the same environmental review. NEPA defines connected actions as those which are “closely related,” including those that “[c]annot or will not proceed unless other actions are taken,” or those that are “interdependent parts of a larger action and depend on the larger action for their justification.” *Id.* at § 1508.25(a)(1). Cumulative actions are those that “have cumulatively significant impacts and should therefore be discussed in the same impact statement.” *Id.* at § 1508.25(a)(2). Similar actions include those that have “common timing or geography.” *Id.* at § 1508.25(a)(3).

A federal agency may not simply claim that it lacks sufficient information to assess the impacts of its actions. The courts are very clear with respect to an agency's statements in a NEPA document that “[a] conclusory statement unsupported by empirical or experimental data, scientific authorities, or explanatory information of any kind not only fails to crystallize the issues, but affords no basis for a comparison of the problems involved with the proposed project and the difficulties involved in the alternatives.” *Seattle Audubon Society v. Moseley*, 798 F. Supp. 1473, 1479 (W.D. Wash. 1992), *aff'd* 998 F.2d (9th Cir. 1993).

NEPA requires that mitigation measures be reviewed in the NEPA process. “[O]mission of a reasonably complete discussion of possible mitigation measures would undermine the ‘action forcing’ function of NEPA. Without such a discussion, neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects.” *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 353 (1989), accord *New York v. NRC*, 681 F.3d 471, 476 (D.C. Cir. 2012).

NEPA regulations require that an EIS: (1) “include appropriate mitigation measures not already included in the proposed action or alternatives,” 40 C.F.R. § 1502.14(f); and (2) “include discussions of: . . . Means to mitigate adverse environmental impacts (if not already covered under 1502.14(f)).” 40 C.F.R. § 1502.16(h). In a similar case involving the Forest Service, the federal courts ruled:

The Forest Service’s perfunctory description of mitigation measures is inconsistent with the “hard look” it is required to render under NEPA. “Mitigation must be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated.” *Carmel-By-The-Sea v. Dept. of Transportation*, 123 F.3d 1142, 1154 (9th Cir. 1997) (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 353 (1989)). “A mere listing of mitigation measures is insufficient to qualify as the reasoned discussion required by NEPA.” *Northwest Indian Cemetery Protective Association v. Peterson*, 795 F.2d 688, 697 (9th Cir. 1986), *rev’d on other grounds*, 485 U.S. 439 (1988).

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It is also not clear whether any mitigating measures would in fact be adopted. Nor has the Forest Service provided an estimate of how effective the mitigation measures would be if adopted, or given a reasoned explanation as to why such an estimate is not possible. ... The Forest Service’s broad generalizations and vague references to mitigation measures ... do not constitute the detail as to mitigation measures that would be undertaken, and their effectiveness, that the Forest Service is required to provide.

*Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1380-81 (9th Cir. 1998).



Federal regulations define “mitigation” as a way to avoid, minimize, rectify, or compensate for the impact of a potentially harmful action. 40 CFR §§ 1508.20(a)-(e). ... In order to be effective, a mitigation measure must be supported by analytical data demonstrating why it will “constitute an adequate buffer against the negative impacts that may result from the authorized activity.” **The proposed monitoring program fails this test, as it could detect impacts only after they have occurred.** [The agency's] statement that it would reserve the authority to modify approved operations does not provide enough protection under this standard. A court must be able to review, in advance, how specific measures will bring projects into compliance with environmental standards. *See Nat'l Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 733 (“The Parks Service proposes to increase the risk of harm to the environment and then perform its studies.... This approach has the process exactly backwards.”). Monitoring may serve to confirm the appropriateness of a mitigation measure, but that does not make it an adequate mitigation measure in itself. *Alaska Wilderness League v. Kempthorne*, 548 F.3d 815, 827-828 (9<sup>th</sup> Cir. 2008)(emphasis added).

Last, “for contentions based on NEPA, such as the one at issue here, the burden shifts to the Staff, because the NRC, not the applicant, bears the ultimate burden of establishing compliance with NEPA.” *In re Calvert Cliffs 3 Nuclear Project, LLC* (Calvert Cliffs Nuclear Power Plant, Unit 3), LBP-12-17, 76 N.R.C. 71, 80 (2012); *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.”).

## BACKGROUND ON NHPA STANDARDS

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 C.F.R. § 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 (4th 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 (10th 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 C.F.R. § 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 C.F.R. § 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 C.F.R. § 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 (9th Cir. 1981) (“any Federal Government action is subject to the United States' fiduciary responsibilities toward the Indian tribes”). See also, Petitioners Brief re Indian Law and Rights Filed in North Trend Proceeding February 22, 2008, INT-030.

### **Burden of Proof on CBR and NRC**

As noted by the Powertech board in LBP-15-16:

As the proponent of the agency action, an applicant generally has the burden of proof in a licensing proceeding. The statutory obligation of complying with NEPA, however, rests with the NRC. Consequently, when NEPA contentions are involved, the burden shifts to the NRC

Staff. Nonetheless, because “the Staff, as a practical matter, relies heavily upon the Applicant’s Environmental Report in preparing the EIS, should the Applicant become a proponent of a particular challenged position set forth in the EIS, the Applicant, as such a proponent, also has the burden on that matter.” And relative to factual matters, to carry that burden, the NRC Staff and/or Powertech must establish that its position is supported by a preponderance of the evidence. [Footnotes omitted.]

The same principles as to burden of proof apply in this case. CBR carries the burden of proof except where NRC Staff carries the burden of proof due to its NEPA and NHPA obligations.

### **III. Position on Individual Contentions**

The Consolidated Intervenor's and the Oglala Sioux Tribe have maintained their contentions for the past several years that Crow Butte has failed, with the NRC's cooperation and assistance, to comply with clear legal obligations. These clear legal obligations are: (1) concerning consultation, protection of tribal cultural properties (TCPs), and (2) concerning the safety, monitoring and operations of the ISL mine which we have maintained is in an area fractured and faulted in ways that expose the Consolidated Intervenor's and members of the OST to exposures to contaminants generated by Crow Butte. We believe that this exposure has caused adverse health impacts to the people, animals, plants, water supply and environment in and around the area of the mine, around Chadron, NE and at Pine Ridge Indian Reservation.

These concerns have prompted the Consolidated Intervenor's and the OST and many of its tribal members to oppose the expansion and renewal licensing of the Crow Butte ISL mine at Crawford, NE. and to testify at, and where possible intervene in, public hearings related to the same. One such hearing was held on January 16, 2008 in the Crow Butte North Trend Expansion

Area (NTEA) proceeding in which the OST and several of the Consolidated Intervenor's are also intervenor's.

At the January 2008 public hearing, we had the honor and privilege of hearing testimony from three respected Oglala Lakota elders, Chief Joe American Horse (INT-023), Chief Oliver Red Cloud (now deceased) (INT-024), and Floyd Looks for Buffalo Hand (INT-025). The testimony of these three Oglala Lakota elders supports and is supported by the testimony of OST Witness Catches-Enemy (INT-031), and OST Witness Yellow Thunder (INT-032), as well as former THPO Wilmer Mesteth (now deceased) (INT-026; INT-029); accordingly, the 2008 testimony of such Oglala Lakota elders is relevant to this proceeding.

At the 2008 public hearing, Chief American Horse stated:

I was in the Basketball Hall of Fame in Nebraska. I was an athlete when I was young. But today I am a diabetic. I have to watch myself what I eat. I don't use alcohol, I don't use tobacco, and I've got to watch what I eat and I've got to watch where I'm going. Because even the other day I fell down and I scraped myself and it got infected, so. I've also had two surgeries. So in my life I like to have a clean environment. I like to not only myself but some of my other people they have the same thing that we have and that's diabetes. We have diabetics. I don't know where it came from. They say it's our diet and everything like that. But still we still have it on the Indian reservation....Now David was mentioning about 1851 and 1868 Treaty. We used to be a large nation. Lakota used to be a large nation with 10,000 campfires. That tells you how large we are. The State of Nebraska, Dakotas, Minnesota and Missouri area all Lakota names, are all Sioux names. So we were that big one time....And our concern is really important because the water which we're drinking, the water downwind, we're talking about a sweat lodge we have every two weeks. What that sweat lodge does is that we pray for those people having a hard-time, whether the alcoholism, whatever it is.

At the 2008 public hearing, Chief Red Cloud stated:

Okay, first of all I want to tell you who I am. I am Chief Red Cloud, Oglala Sioux Tribe. And my great, great grandpa made that treaty....Treaty. Fifty-one, it still stands. Fifty-one it's all

mineral rights. And I've been fighting for the treaty rights for Lakota people at reservation. And today I look around, I see young people here talking about treaty. I'm 89 years old. And you kids, you people are just born the other day. And I know what I'm talking about. I've been in Washington, I've been to United Nations, and treaty rights. And today you're talking about some that concern about people....And again in the water rights, you're talking, mentioned water rights. That belongs to the Lakota people. We still stand because that '51 made on the United Nations, not on the United States Constitution. And your people have to understand your treaty and your rights because United States just organized here in 1776 or '78 and they make that United States Constitution law. But we are not in that, we are in the United Nations. We are the 43 nations in this world....

And today I listen and people about what's going to happen over here on the Crawford, Nebraska, I guess that's section that we own there....We still, we still own that Indian Reservation, Indian Territory. We still have that. It's in the Constitution of the United States and under United Nations.....And...I respect the people here talking about, but talking about rights because what you're talking about concerns the people. I used to work for BIA for 35 years and I studied water, the water bay that's under here and Colorado. And I know how the water works. So this water it still belongs to Lakota people under 51. United States can't say they changed that because state just organized after 51. So you have to remember.

At the 2008 public hearing, Floyd Looks for Buffalo Hand stated:

My grandfather Big Hand is also a treaty signer. And my other grandfather Red Cloud is a treaty signer. And on my other side from my mother's side Big Foot is my grandfather. And Big Foot is known as Ten Elk and "Ahaka Gliska Sparga." So one of the things that I want elaborate on what he has said, I'm a delegate on the city [sic - 'treaty'] council. I'm the youngest member at '68. And we have been reorganizing our treaty laws. And under the '68 - and '51 treaty the mineral rights belong within the treaty boundaries, that's Section 16 of Crawford. And also that it falls under Article 1 of the '68 treaty. Therefore, this next meeting we have January 28, 29, 30, eight reservations I believe there will be a resolution to charge all mining companies with trespassing and desecration and grave robbing which is the mineral rights that falls under. And I believe this is coming up in the statute of '68 and Article 1. So the '51 and '71 supersedes the United States Constitution. But under Article 6 of the United States Constitution the European Americans hold no title to the mineral rights of North America. And that's where the law is. So it's a nation to nation agreement. So that's what he asked me to elaborate on.

After the 2008 public hearing, the board in that proceeding invited the parties to submit briefing on the nature and extent of federal Indian law and treaty law and, as a result, the intervenors in that proceeding submitted the Petitioners Brief re Indian Law and Rights Filed in North Trend Proceeding February 22, 2008 (INT-030), which is hereby incorporated herein by reference as if fully set forth at length.

The OST and other interested parties are also concerned about proposed ISL mining by the proposed Azarga/Powertech Dewey-Burdock mine in Fall River and Custer Counties, South Dakota. Fall River County, SD abuts Dawes County, NE. As a result of their concerns, they have intervened in the ASLB licensing proceeding with respect to Powertech/Dewey-Burdock, which recently resulted in a partial decision as set forth in LBP 15-16. Since many of the consultation and TCP survey issues raised in that proceeding generated testimony that is relevant to this proceeding, the Hearing Transcript from the first day of that proceeding, August 19, 2014, is included and filed herewith as INT-028. At that August 2014 public hearing, testimony was offered concerning the nature and extent and likely costs involved in conducting proper TCP surveys with estimates ranging from lows of \$100,000+ to as much as \$1,000,000. See Testimony Concerning Costs of TCP Surveys from 2014 Powertech hearing (INT-027).

Since the 2008 Petition filings by Consolidated Intervenor's and OST in this matter until February 2015, there have been 40 new events added to the List of CBR Violations, Spills and Leaks. See INT-042 List of CBR Violations, Spills and Leaks as of February 2015.

Dr. Hannan LaGarry has updated his 2008 Opinion (INT-003) and his 2015 Opinion (INT-013) with INT-043 and has provided a relevant Wyoming Fuels Company Map - 1982



(INT-044, INT-045) from the 1980s which appears to support the 1989 Petersen Whistleblower Letter (INT-009) and 1984 HWS Elliot Report (INT-066), as well as the 2008 LaGarry Opinion (INT-003), the 2015 LaGarry Opinion (INT-013), the Kraemer Opinion (INT-046) and the Wireman Opinion (INT-047) to the effect that there is inadequate containment. The foregoing also tend to undermine the adequacy of the NRC Staff modeling of the White River Fault vs. White River Fold analysis. It also undermines the adequacy of the LRA and also the specific responses to the accusations of faulting that go all the way back to 1984 with the HWS Elliot Report (INT-066) and Petersen Letter (INT-009) and refutations such as those issued by Ferret Exploration (INT-067) and the NRC based on Ferret's representations (INT-068).

**Contention EA 1:**

In LBP 15-11 at 16-17, the Board ruled that:

Second, insofar as Contentions 1 and 2 challenge whether there has been meaningful consultation with the Tribe and whether a class III archaeological study represents a hard look under NEPA, they are admissible. Based on the pleadings, as well as on the parties' responses to the Board's questions during oral argument, the Board has concluded, however, that these are issues of law without factual dispute. The Board may request further legal briefing on this point, and if it does, a schedule for such briefing will be issued in a subsequent Order....

Finally, insofar as Contentions 1 and 2 challenge whether the cultural surveys performed and incorporated into the EA are not adequate support for the EA's conclusions in this regard, they are admissible. Factual issues remain regarding what the NRC Staff did and whether it was sufficient to comply with NEPA, both of which will be explored in pre-filed witness testimony and at the upcoming evidentiary hearing.

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**EA Contention 1 (Joint): 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 Final EA fails to meet the requirements of the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4231, *et seq.*, the National Historic Preservation Act (NHPA), 16 U.S.C. § 470, *et seq.*, and implementing regulations, including NRC regulations in 40 C.F.R. Part 51, specifically including 10 CFR §51.45, §51.10, §51.70, and §51.71, because the Final EA does not provide analyses that are adequate, accurate, and complete in all material respects to either (i) describe the affected area and environment; or (ii) demonstrate that cultural and historic resources within the project area are identified and protected pursuant to Section 106 of the NHPA.

As a result, the Final EA fails to comply with Section 51.60 because its analyses are not adequate, accurate and complete in all material respects concerning archaeological sites and materials within the project area. No specific survey was performed for this license renewal in order to demonstrate that archaeological sites within the project area are properly identified, evaluated and protected and to show that it has submitted a proper analytic discussion under Sections 51.45 and 51.60 as the NRC Staff relied on old surveys that were done in 1982 and 1987. Not all interested tribes were 'meaningfully' consulted, particularly including the Tribe, and the prior, informed consent of the Tribe to proceed with Crow Butte's activities was not obtained. Proper baseline information is lacking in the Final EA and it fails to demonstrate adequate confinement and protection of cultural resources.

As discussed herein, substantial issues remain concerning undetermined impacts to the Tribe's cultural and historic resources, and the desperate impacts of the activities of the Applicant, Crow Butte Resources, Inc. ("CBR") upon the interests, resources, and health of the Tribe and its members, including some of the Consolidated Intervenor's.

Regarding cultural and historic resources, the Final EA carries forward serious problems from the application stage. Despite having years to do so, neither Crow Butte nor NRC Staff have provided the Tribe, or those of Consolidated Intervenor's who are members of the Tribe, a meaningful opportunity to be involved in the assessment or determination of the significance of the identified sites, nor a meaningful opportunity to identify additional sites that may warrant evaluation or listing.

**Basis and Discussion:**

10 C.F.R. § 51.71(d) and NEPA require that the Final EA include an analysis of all environmental impacts of a proposed action, including cultural impacts. 10 C.F.R. § 51.70(a) places an affirmative duty on NRC Staff to conduct all NEPA analysis in conjunction with other surveys or studies required under federal law. This includes necessary surveys required under NEPA and the NHPA.

The Final EA relies on cultural resources surveys that are from 1982 and 1987, which are 33 years and 28 years old, respectively. These surveys are too old to use to ensure that there are no currently ascertainable cultural resources. As decades of weather, land use and subsidence have occurred, it is likely that additional cultural resources would have been revealed. The Final EA failed to obtain updated information except in the areas where Crow Butte was already

required to provide additional information (Marsland Expansion Area - MEA, Two Crows Expansion Area - TCEA).

The Final EA states at Section 3.9.6:

### **3.9.6 Previous Cultural Resources Survey**

Intensive (100-percent coverage) field surveys for historical and archaeological sites within the CBR facility (see Figure 1-1) were conducted in two phases. The University of Nebraska conducted identification and assessment of cultural resources in the CBR research and development area in March and April 1982. The Nebraska State Historical Society surveyed the remainder of the CBR license area (the Commercial Study Area) during April and May 1987. The results of the two surveys were presented in a single report (Bozell and Pepperl 1987).

The efforts in 1982 and 1987 recorded a total of 21 prehistoric and historic period archaeological sites. Cultural affiliation of the recorded sites included eight with Native American components, 12 historic period locations, and a buried bone deposit of undetermined cultural association.

Therefore, the potential impacts to these resources have not been addressed. Despite this confirmed lack of adequate survey, the Final EA prematurely determines that the impacts from operations fit within the "small" category. Such pre-ordained and categorical conclusions, without the benefit of necessary information and a competent analysis raise serious legal and procedural questions regarding the integrity of the entire Final EA analysis, and form the basis for a contention as to whether or not the Final EA conforms with NRC regulations, the NHPA, and NEPA, and the implementing regulations for these laws.

Among the applicable requirements are those under the National Historic Preservation Act ("NHPA") and related Executive Orders. Under these authorities, the NRC is required to fully involve the Tribe in all aspects of decision-making affecting Tribal interests such as those

directly impacted by the project, including the license renewal. These mandates require NRC to consult with Tribe as early as possible in the decision-making process. Here, the NRC has not meaningfully engaged in the required consultation process.

The Final EA describes the 'consultation' process as one involving a single large group "informal information-gathering" meeting involving the NRC, several tribes and representatives of more than one uranium company (Crow Butte and Powertech-Dewey Burdock) in June 2011 regarding three separate projects, Dewey-Burdock, Crow Butte renewal, and North Trend. EA, 54-56; Exs. INT-052 (May 12, 2011 letter), INT-053 (June 8, 2011 Meeting Transcript), INT-031 (Declaration of CatchesEnemy). There was never a meeting with the Oglala Sioux Tribe solely devoted to the Crow Butte renewal or the cultural resources that are within the existing Crow Butte licensed area. Further, although the Tribe was invited to do its own traditional cultural properties survey at its own cost (*see*, Exs. INT-53 (June 8, 2011 Meeting Transcript, p. 102), INT-027) it was never involved in the surveys that were being conducted with regard to Crow Butte Marsland Expansion Area and Two Crows Expansion Area, nor the 1982 or 1987 surveys on which the Final EA relies.

The Final EA states:

### **3.9.7 Tribal Consultation**

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As stated earlier, the NRC staff met with the Tribal Historic Preservation Offices (THPOs) to gather information on June 8, 2011. The purpose of the meeting was to help the NRC staff identify tribal historic sites and cultural resources that may be affected by actions associated with renewal of the CBR facility, the proposed CBR expansion areas in Nebraska, and the proposed Dewey-Burdock ISR

project. Representatives of six tribes (Oglala, Sioux, Standing Rock Sioux, Flandreau-Santee Sioux, Siston-Whapeton Oyate, Cheyenne River Sioux, and Rosebud Sioux) attended.

During the June 8 meeting to discuss several different projects, including the relicensing of the CBR facility, tribal officials expressed concerns about the identification and preservation of historic properties of traditional religious and cultural importance to tribes at the CBR facility. **Tribal officials stated that historic and cultural resources studies of sites should be conducted with tribal involvement.** A transcript of this meeting (NRC, 2011) is available through the NRC ADAMS database on the NRC website ([www.nrc.gov/reading-rm/adams.html](http://www.nrc.gov/reading-rm/adams.html)) (ML111721938). (Emphasis added.)

On January 19, 2012, the NRC staff sent letters to 24 Tribes inviting them to attend a meeting on February 14th and 15th 2012 to continue ongoing consultation and discuss hear the views of the Tribes about potential Traditional Cultural Properties. Representatives of 19 Tribes attended the meetings.

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### 3.9.8 Potential Places of Cultural Significance

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On October 31, 2012, NRC invited all the consulting Tribes to complete a TCP field Survey of the CBR facility and proposed expansion areas in the vicinity of the Crow Butte APE. In November and December of 2012, a TCP field survey was completed by the Santee Sioux Nation and the Crow Nation. A TCP report (ML13064A481) was submitted to the NRC by the Santee Sioux Nation on behalf of both Tribes (SSN 2013).

The report concluded that there were no eligible sites of cultural or religious significance to the Tribes at the CBR facility and the proposed Marsland and Three Crow expansion areas. Several other consulting Tribes responded to this report disagreeing with the findings (From Cheyenne River Sioux – ML13123A089 (Our response- ML13157A297); From Yankton Sioux – ML13126A309 (Our response ML13157A221); From Standing Rock Sioux – ML13126A327 (Our response- ML13157A263)).

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A detailed assessment of the report and the comments are found in the environmental impacts section of this EA.

In October, 2013 all Tribes were sent a copy of the NRC staff's preliminary documentation of its NHPA review for the CBR license renewal. The only comments that the NRC staff received were general in nature, pertaining to NRC staff's overall NHPA consultation.

The Standing Rock Sioux Tribe stated in the response at ML13126A327 that it disagreed with the interpretations in the Santee Sioux TCP Report as to the stone circles. All NRC response letters listed above are non-substantive responses that merely thank the tribe for sending correspondence and noting that it will be included in the record. There is no reply or responsive content to the letter from Standing Rock Sioux Tribe.

Dr. Louis A. Redmond in his 2013 opinion (Ex. INT-054) described problems with the neighboring Marsland Expansion TCP survey especially the red flags raised by the lack of any Native American properties located during the survey:

I do find several problems with the lack of any Native American properties located during the survey.

First, I worked in this general area from 1992 through the Fall of 1995 as the Forest Archeologist for the Nebraska National Forest. It was my experience that whenever we surveyed areas near or bordering on water resources, ponds, creeks, et cetera, we would almost invariably find prehistoric camp sites and related process sites. Throughout this proposed project area, there are a number of both permanent and intermittent water resources of all kinds, including creeks, springs and natural ponds.

At the hearing on the companion Dewey-Burdock project, in regards to the TCP surveys, Dr. Redmond opined in regards to traditional cultural property surveys:

**DR. REDMOND:** When I was doing TCPs for the Forest Service, I was working with some elders and one of them I had taken up to a site and his comment was very simple. He said, "Okay, fine. You've got a site. Where is the rest of it?" And his meaning was you've got where the people lived. Now where did they do their living? Where did they get -- where did the women collect their food? Where did the men collect their materials that they lived with? Where did they process their food? Where did they do their ceremonies? Where did they do these things? Those are the TCPs.

**JUDGE COLE:** Where did they bury them?

**DR. REDMOND:** Where did they bury them?

**CHAIRMAN FROEHLICH:** Dr. Redmond, you have conducted these TCP studies for other agencies?

**DR. REDMOND:** Yes.

**CHAIRMAN FROEHLICH:** You have.

**DR. REDMOND:** And that is a vast area around a simple site.

Ex. INT-028 (p. 809); see also, Dr. Redmond's 2015 Opinion (INT-022) at page 2. These same concerns are directly applicable to the Crow Butte renewal area.

While the OST was invited to conduct a TCP survey at its own expense, no offer was made to involve OST tribal representatives and elders in the TCP surveys being conducted at Crow Butte's expense.

The only tribal TCP field surveys mentioned in the EA were conducted in November and December of 2012 by the Santee Sioux Nation, just one band of the Great Sioux Nation, and the Crow Nation, both of whom are located some distance from the Crow Butte site. EA, 57; ML13064A481. The tribes located closest to the Crow Butte site, most importantly the Oglala Lakota, did not participate and have not conducted any TCP field surveys. Furthermore, the timing of these surveys by the Santee Sioux and Crow, which was set by the Applicant and its contractor, the SRI Foundation, is problematic. As Dr. Redmond opines:



[T]he survey that was performed in this area was over approximately 4,500 acres, which was surveyed between November 2010 and February 2011. It was also my experience in working in this area that during that time of the year, snow and ice covered most of the ground surface, at least greater than 85%. **My problem with this scenario is that it would be relatively impossible to locate 99% of prehistoric/Native American sites without a much higher level of ground surface observation, i.e., greater than 60-75%, preferably greater than 90%.** As stated in the synopsis of the cultural report, this area of the Nebraska Panhandle has not been subjected to even minor investigation. **Due to this lack of research, it would appear intuitively evident that an investigation with little or no ground surface visibility would be insufficient to state that no Native American/prehistoric materials were present.**

As Dr. Redmond states, there is scant if any research or literature related to Native American sites in the subject area of the Nebraska Panhandle and due to this lack of research and the investigation during a time when there is little or no ground surface visibility, the lack of a finding of TCPs should not be interpreted as grounds for a conclusion that no such TCPs exist in the area. INT-054. If the survey were done by Crow Butte in the summer and complied with standard protocols for such surveys, then Tribe's concerns would be less. However, it appears that Crow Butte intentionally scheduled the surveys for a time when it would be highly unlikely to find TCPs due to the weather and ground conditions.

In addition, Dr. Redmond further opines that the lack of subsurface testing when large scale ground disturbances are being contemplated is a violation of TCP survey standards and protocols:

[T]his project will eventually cause significant ground disturbance, and yet there is no evidence that any type of subsurface testing process for any level of cultural materials took place. It would seem that some form of subsurface testing to at least below the alluvium level be performed over at least the area where most of the surface impacts will occur. I would suggest that this type of processing be

instituted on at least the higher elevations near water resources where the alluvium layer would be shallower due to natural erosional processes.

Ex. INT-054; see also, Ex. INT-028 (p. 786).

Further, Dr. Redmond states that the number and identity of the tribes having an interest in the area are greater in number than is reflected in the TCP survey:

[A]lthough it is true that the primary tribal use of this area was by the Sioux (sic) and Cheyenne, a number of tribes utilized the Nebraska Panhandle area. According to just the treaties from this area, a number of tribes are not noted for this cultural review. One of the most encompassing of these treaties is the 1851 Fort Laramie Treaty involving the Sioux or Dahcotah (sic), Cheyennes, Arrapahoes, Crows, Assinaboines, Gros-Ventre Mandans, and Arrickaras. The People listed as "Sioux or Dahcotah" are not easily defined, but include the Lakota Nations of the Sicangu, Brule, Oglala, Minnecoujou, Hunkpapa, Izipaco, Sihasapa, and Ooinunpa nations. Added to these are the Sans Arcs, Santee and Yanktons who are Dakota speakers. The Mandans and Arrickara noted in the said treaty would also include the Hidatsa peoples of the Three Affiliated Nations. As to the Cheyenne defined in the 1851 Treaty, this would indicate both the current Northern and Southern Cheyenne Nations since the division is an artificial artifact of the Government reservation system. In addition, although not listed in this treaty, the Pawnee would also have utilized this area, at least the northern Pawnee or Skidi.

INT-054. Thus, Dr. Redmond lists 21 Indian tribes that should have been consulted which is far more than is described in the Final EA; which means that there are tribes that have not been properly consulted as part of the Section 106 process in violation of NEPA and NHPA.

Further, it was improper for the NRC Staff to rely upon the Santee Sioux TCP Survey to the detriment of the OST. The OST has never been involved in a TCP Survey conducted by Crow Butte despite there being several survey conducted without tribal involvement.

#### **4.8 Historical and Cultural Resources Impacts**

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Section 3.9 of this EA discusses how NRC fulfilled its responsibilities under Section 106 of the NHPA for the CBR license renewal project. By letter dated July 15, 2013, the Nebraska SHPO concurred with NRC's Finding of No Historic Properties Present for the CBR In Situ Uranium Recovery License Renewal Project (ADAMS ML13266A266).

Following SHPO concurrence with this finding, on September 30, 2013, the NRC posted a draft of its Section 106 documentation for the project on the NRC's public website and requested public comment. E-mails were also sent notifying the consulting parties of the website. No comments were received at the NRC.

Since the CBR Crow Butte project area has been subjected to intensive cultural resources field surveys for archaeological and historical sites (including a TCP field survey), and the six properties evaluated as "potentially eligible" for the NRHP are being actively avoided during all phases of the overall project, the NRC staff concludes that there will be no effects to the known and recorded cultural resource sites if the operating license is renewed.

At present, a class III archeological survey, a TCP survey completed by Santee Sioux Nation, a completed literature review and overall Tribal consultations have not yielded new information on TCPs that might be located within the CBR facility.

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Based on information obtained through Section 106 consultation, the TCP cultural Report submitted by Santee Sioux Nation (SSN, 2013), the class III archeological survey, and independent Staff reviews, overall impacts to historic and cultural resources from the relicensing of the CBR facility would be SMALL. Additionally, the NRC staff concludes that no new identified properties are eligible for listing in the National Register as TCPs.

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#### **4.13.8 Cumulative Impacts for Historic and Cultural Resources**

With respect to historic and cultural resources, the NRC staff included an assessment of cumulative impacts to these resources during consultation for

Section 106 of NHPA (ML13260A566). **Though the density of sites found is very low within this geographic setting, and therefore is unlikely to result in significant cumulative impacts to historic and cultural resources, the detailed cumulative impacts assessment developed during consultation with the public and Native American Tribes is discussed within this section.**

Additional supporting information has also been documented on the following website: <http://www.nrc.gov/info-finder/materials/uranium/licensed-facilities/crow-butte/section-106-license-renewal-docs.html>.

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Additional data are available from other proposed CBR projects that are currently under NRC review. CBR applications for license amendments for the proposed NTEA and the proposed MEA are currently under environmental review. The proposed NTEA is located 4 miles northwest of the town of Crawford. The proposed MEA site is located south of the Pine Ridge elevation about 11 miles south-southeast of the CBR ISR project area. CBR has indicated that it intends to provide the NRC a license amendment application for the TCEA in November of 2014 (ML14125A181). For the purpose of the present comparative analysis, archaeological and historic inventories of resources as well as a TCP survey by the Santee Sioux Nation have been completed at the CBR facility, the MEA, and the TCEA (SSN 2013).

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At previous tribal consultations including the June 7–9, 2011 information-gathering meeting, NRC staff was informed of several potential TCPs located in proximity to both the existing CBR facility and the other close by proposed CBR expansion areas (NRC, 2011). Contacts with the nearby Fort Robinson State Park, State of Nebraska Ponderosa Wildlife Management Unit, and the Pine Ridge District of the Nebraska National Forest did not yield specific information for any additional nearby potential places of religious and cultural significance (SC&A, 2012).

On October 31, 2012, the NRC invited all the consulting Tribes to complete a TCP field Survey of the CBR facility, the MEA, and the TCEA. In November and December of 2012, a TCP field survey was completed by the Santee Sioux Nation and the Crow Nation. A TCP report (ML13064A481) was submitted to the NRC by the Santee Sioux Nation on behalf of both Tribes (SSN 2013). The

report concluded that none of the 13 places identified was potentially eligible for listing on the National Register of Historic Places, but offered recommendations for a buffer zone around places to avoid impacts during future project activities. Several other consulting Tribes responded to this report disagreeing with the findings (From Cheyenne River Sioux – ML13123A089 (NRC response- ML13157A297); From Yankton Sioux – ML13126A309 (NRC response, ML13157A221); From Standing Rock Sioux – ML13126A327 (NRC response, ML13157A263).

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Based on available information, the NRC staff concludes that the cumulative impacts of renewing the CBR facility on cultural resources including TCPs would be SMALL during all phases of the proposed action, given the low density of sites found within this geographic setting and their lack of eligibility for nomination and potential listing on the NRHP. Additionally, NRC is responsible for satisfying the requirements of Section 106 of the NHPA for this proposed undertaking as well as the proposed NTEA, MEA and the TCEA projects. If, in review of NTEA, MEA, and the TCEA, the NRC staff find TCPs eligible for listing on the National Registry, NRC will comply with Section 106 of the NHPA, 16 U.S.C. §§ 470, and its implementing regulations (36 CFR § 800 (2004)) through consultation with Tribes.

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Based on available historic and cultural resources information from the CBR application for the project area under the original license and the data related to the proposed license amendments for the NTEA, MEA, and TCEA, overall cumulative impacts to historic and cultural archaeological resources are not expected to be significant.

The Tribe notes that although the NRC Staff refers to the existence of a “a class III archeological survey” in Section 4.8 of the Final EA and elsewhere in the Final EA several times and NRC Staff puts great reliance on the existence of such ‘class III archeological survey,’ no information is provided as to the date of such survey, the name and credentials of the person supervising the survey that would indicate that it is a valid ‘class III’ survey. Without such

information, as noted by Dr. Redmond, it is not possible for Tribe, Consolidated Intervenor's, or the public to evaluate the nature and extent of the TCP surveys that have been performed. Exs. INT-022, INT-028 (pp. 785-786), INT-054. Accordingly, the Final EA's description of cultural resources and the impacts thereon is defective in violation of NEPA and NHPA.

Further, the OST's silence in 2012 and 2013 was related to its lack of representation by an attorney in this matter and inability to properly understand and respond to the legal issues raised by the NRC's cultural resources process. It is a violation of NEPA and the assumed federal trust responsibility to conduct TCP surveys in this way when the OST is completely unrepresented. Under no circumstances should the Tribe's silence be interpreted as assent.

The tribes both individual and collaboratively, including the Oglala Sioux Tribe, have from the beginning have been objecting to the delegation of the federal government's responsibilities to CBR's private contractor, the SRI Foundation, in regards to the assessment of historic and cultural properties at the Crow Butte sites. They have been demanding instead that the process proceed according to a nation-to-nation, government-to-government relationship, and that the tribes collaboratively be in control of the design and execution of the TCP surveys. *See*, Exs. INT-031 (Declaration of CatchesEnemy), INT-032 (Declaration of Yellow Thunder), INT-053 (June 8, 2011 Meeting Transcript, pp. 77-87, 102-103, 107, 113-114, 165-166, 190-191), INT-033 (pp. 24, 27, 28, 29-30), INT-034, INT-037, INT -039, INT-040, INT-041. The NRC Staff refused to accept, or fund, the TCP survey design protocol proposed by the tribes as to their own cultural resources and the consultation process collapsed. *Id.*; also, INT-038 (withdrawal from participation), INT-027 (excerpt of August 19, 2014 Dewey-Burdock Hearing

Transcript re funding costs of tribal TCPs). The NRC Staff failed to and is not carrying out its agency responsibilities in a manner that recognizes and respects the government-to-government relationship. The failure to engage the Tribe on NHPA issues in a meaningful way at the earliest possible time and within the NEPA process presents a violation of NEPA, NHPA and of Part 51 Regulations.

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 [NEPA document].")

Consolidated Intervenor's and the Tribe note that tribal governments change and consultations, to be meaningful, are not 'static.' Section 3.9.7 of the Final EA states that there was an 'Information Gathering Meeting' in June 2011 and that the Tribe attended that meeting (which was not exclusively devoted to Crow Butte's facilities). Section 3.9.7 of the Final EA

states that in February 2012 a meeting took place and that representatives of 19 tribes attended that meeting. However, the Final EA omits to state whether the Tribe was one of those 19 tribes and what were the offices held by the persons who attended. Were they Tribal Council members authorized to engage in formal consultations with the United States Government? Since none of their names, offices or tribal affiliations are stated in the Final EA, the Final EA is defective and fails to state enough information for there to be a legal conclusion that there have occurred meaningful consultations between the Tribe and the NRC Staff concerning the Crow Butte renewal.

As a result, there has been and continues to be insufficient compliance with the Section 106 consultation process in this case, in violation of NEPA and NHPA.

NRC Staff interpretations of these requirements are not entitled to deference. 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 C.F.R. § 800.2(c)(2)(ii). (emphasis added) As discussed above, under the UN DRIP, consultation further requires the free, informed consent of the Tribe to activities that may impact such historic, religious, and cultural properties.

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.

Here, the Final EA was released and the FONSI made even though no competent cultural survey of the site has yet been conducted with any participation of the Tribe, or any members of the Tribe who are Consolidated Intervenor's, and even though the last cultural resources surveys of 1982 and 1987 are decades old without being updated. And further, such surveys were conducted without the required consultations with the Tribe.

To exclude the Tribe from the NEPA/NHPA process in this way contravenes the requirements of the NHPA and NEPA, and NRC and NHPA regulations, and harms the Tribe's ability to participate in the initial identification of historic/cultural properties, squelches its voice

to articulate its views, 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, NEPA, and applicable regulations, the harms to the Tribe, and Consolidated Intervenor who are members of the Tribe, began accruing immediately upon NRC consideration of the License Renewal Application in a manner that segregated the Tribe’s interdisciplinary, culturally-based consultation on the project from what NRC Staff considers technical and environmental concerns. These harms are exacerbated by the NRC Staff’s decision to issue the Final EA despite the lack of any meaningful involvement in any survey of the affected areas.

This contention seeks to reintegrate the interdisciplinary study requirements of NEPA to ensure that the purposes of NEPA, the NHPA, and the government-to-government relationship are honored by NRC Staff, and included in a new, comprehensive EIS issued for review and comment for the Tribe, Tribal members, the public, and other interested persons.

**Dewey-Burdock Decision Finding the Process Employed by the NRC Failed to Satisfy It’s Burden to Adequately Consult With Affected Tribes**

As discussed above, the tribal consultation process developed by the NRC Staff and the Applicant through its private contractor, the SRI Foundation, was combined for three pending license application, the Crow Butte renewal, the North Trend expansion, and the Dewey-Burdock project. *See*, EA, 54-56; Exs. INT-052 (May 12, 2011 letter), INT-053 (June 8, 2011 Meeting Transcript), INT-031 (Declaration of CatchesEnemy). The exact same process was applied for each site, often simultaneously. *Id.*; see also, INT-035.

On April 30, 2015, in *Powertech USA, Inc. (Dewey-Burdock In Situ Uranium Facility)*, LBP-15-16, Dkt. No. 40-9075-MLA, ASLB No. 10-898-02-MLA-BD11 (ML15120A299), following an evidentiary hearing that included a challenge to the nearly identical if not more involved consultation process employed by the NRC Staff (see pp. 25-31), the NRC Board found and concluded that consultation process to be inadequate as follows:

**The FEIS has not adequately addressed the environmental effects of the Dewey-Burdock project on Native American culture, religious and historic resources, and the required meaningful government-to-government consultation between the Oglala Sioux Tribe and the NRC Staff has not taken place. Because of these facts, procedures must be put in place to assure that the required NEPA hard look is taken, the NRC's Part 51 environmental regulations are satisfied, and an opportunity for meaningful consultation is provided.**

**...Meaningful consultation between the NRC Staff and the Oglala Sioux Tribe may still be undertaken to identify and mitigate any potential harm to Sioux cultural, historical or religious sites .... We therefore conclude that additional consultation between the NRC Staff and the Oglala Sioux Tribe is necessary. This additional consultation is required in order to 1) to satisfy the hard look at impacts required by NEPA and to supplement the FSEIS, if necessary, and 2) to satisfy the consultation requirements of the NHPA.**

**The NRC Staff can remedy this deficiency in the Record of Decision in this proceeding by promptly initiating a government-to-government consultation with the Oglala Sioux Tribe to identify any adverse effects to cultural, historic or religious sites of significance to the Oglala Sioux Tribe that may be impacted by the Powertech Dewey-Burdock project. This would then allow the adoption of mitigation measures, as necessary. The FEIS and Record of Decision in this case must be supplemented, if necessary, to include any cultural, historic or religious sites identified and to discuss any mitigation measures to avoid any adverse effects.**

**Finally, given our conclusion that the inadequate discussion of potential impacts to Sioux cultural, historical or religious sites in the FEIS or Record of Decision is a significant deficiency in the NRC Staff's NEPA review, this Board could require immediate suspension of the issued materials license.**

*Id.* at 42-44.

As with the consultation over the Crow Butte renewal which was proceeding simultaneously with that over Dewey-Burdock, the Board noted that “the NRC Staff/tribal consultation process broke down, and the vast majority of the consulting tribal parties, including the Oglala Sioux Tribe, did not participate in the field survey opportunity provided by the NRC Staff and Powertech. The consulting parties could agree on neither the scope, techniques, or timing of the field surveys, nor alternatives to a field survey to address Native American cultural religious and historic concerns.” *Id.* at 40-41. The Board noted and found:

**The NRC Staff is at least partly at fault for the failed consultation process. For the past five years the Oglala Sioux Tribe has raised its concerns with the consultation process, and yet the NRC Staff has not held a single consultation session, on a government-to-government basis, solely with members of the Oglala Sioux Tribe. Instead, the NRC Staff has held three face-to-face sessions with multiple tribes concerning multiple ISL projects in both South Dakota and Nebraska. The three meetings cited by the NRC Staff as government-to-government consultations were large group meetings, with members of many diverse tribes, all with varying degrees of attachment to the Black Hills area of South Dakota. Though numerous letters were sent to the Oglala Sioux Tribe, as detailed above, quantity does not necessarily equate with meaningful or reasonable consultation and “doesn’t in itself show the NHPA-required consultation occurred.”**

Then, specifically in regards to the Oglala Sioux Tribe, the Board remarked: **“The Oglala Sioux Tribe has shown it has the most direct historical, cultural and religious ties to the area. The Oglala Sioux Tribe’s Pine Ridge reservation is located approximately 50 miles from the project site. The Oglala Sioux Tribe is both a consulting party and an Intervenor in this proceeding. It is entitled to a meaningful, face-to-face, government-to-government consultation session with the NRC Staff regarding this specific project.”**

These findings and this ruling is equally applicable here. The underlying facts, and NRC Staff failures, regarding the deficiencies in the consultation process employed by the NRC Staff are identical and the Board's findings, conclusions, and rulings thereon set forth above should be applied here as well.

Accordingly, as of now the Tribe has not be involved in a TCP field survey of the Crow Butte project area to the prejudice of the Tribe and the Consolidated Intervenor's who are members of the Tribe. As a result, there has been a violation of NEPA, NHPA and Part 51 Regulations.

**Contention A:**

**Contention A:** There is no evidence based science for [the NRC Staff's] conclusion that ISL mining has "no non radiological health impacts," or that non radiological impacts for possible excursions or spills are "small."

Intervenor's assert that CBR's ISL mining operation has the potential for a number of specific non-radiological health impacts from spills, excursions or other unintended release and that the current groundwater monitoring program operated by CBR and approved by NRC Staff is insufficient to detect significant potential contamination rendering it inadequate to protect public health and safety.

Dr. LaGarry has long maintained that there is evidence of faults and fractures in the area of the CBR mine that would enable hydraulic communication between individual aquifers and potentially to surface alluvium. INT-003 & INT-013, INT-043 passim.

Hydrogeologists Mike Wireman and Dr. Kraemer also point to the likely presence of hydraulic connectivity between aquifers and its potential to affect surface alluvium and/or travel

great distances underground through faults and fractures. INT-047 & INT-046.

In her affidavit and attached power-point presentation, biochemist Linsey McLean details specific ways that ISL mining products and by-products can directly and severely impact the human body, animals, plants and wildlife. INT-048 & INT-049.

In his opinion letter at INT-047, hydrogeologist Mike Wireman details the deficiencies in CBR's groundwater monitoring regimen:

Opinion: The groundwater monitoring program intended to detect offsite migration of ISL mining related contaminants is inadequate and poorly reported.

Basis: CBR currently includes 19 domestic water supply wells in the groundwater monitoring program. These wells are reportedly sampled quarterly for uranium and radium 226 only. Neither the LRA nor the SER include any information on the location, depth and screened interval for these wells. Trend data should be presented for these and other monitoring wells and there should be a more complete analyte list that includes metals, TDS and selected anions. (NRC plans to add to this sampling via a condition in renewed license). Most of the background and offsite groundwater sampling has been focused on the basal Chadron. The Brule Fm, especially the lower Brule is under represented as is the alluvial aquifer along the floodplains of White River. CBR should review the offsite (non-excursion) groundwater and surface water monitoring programs and make modifications necessary to accommodate new understandings and new mining units and satellite ore bodies. This information should be included in license renewal documentation.

INT-047 at 8. After concluding that, "Available scientific evidence shows heterogeneous conditions and a geologic history of faulting that would allow vertical migration of fugitive contaminants," Dr. Kraemer goes on to further draw into question the efficacy of CBR's groundwater monitoring schema's ability to detect such contamination:

Opinion: Site monitoring has the potential to provide information that does not accurately reflect levels and spatial orientation of any potential pollutant release, synergistic effects of multiple contaminants, and does not provide early warning

of contaminant migration.

Basis: EPA monitoring well guidelines emphasize short screened intervals and several adjacent, nested monitoring wells with screens at different and restricted vertical depths to reduce the common problem of concentration dilution, and those guidelines never suggest averaging of concentration around a site to serve as a restoration goal. At Crawford in particular, groundwater sampling during restoration has a likelihood of “false negatives” through dilution in monitoring well bores. This is manifest with mixtures of low concentrations of aqueous parameters of concern, in regions or sections of a borehole that should not be sampled, with zones of deleterious high concentrations in other sections of a borehole. False negatives can occur through misplacement of monitoring wells, inappropriate screened intervals, vertical migration of fluids in the annular space due to failed packers or shale traps, poor well construction, migration in the aquifer material outside the borehole due to fracturing of the surrounding medium during the drilling process. Alternatively, placement of a monitoring well outside the path of a projected contaminant plume would also produce a false negative, and when averaged with correctly functioning monitoring, producing higher concentrations would mislead restoration efforts.

The monitoring program investigates a very limited number of potential pollutants and water quality parameters, atypical of most rigorous monitoring programs. This leaves no solid basis for assessing the potential migration and impacts of potential groundwater contaminants, both radiological and non radiological, nor for assessing their potential synergistic health impacts. Increased monitoring contingencies and plans for any future, identified spills are not well addressed by CBR. In addition, mining activities release potential “tracers” that can be used to determine the potential influence of ISL on groundwater, often sequentially in advance of the arrival of any contaminants. Use of these indicators of mining's influence on groundwater are potentially very beneficial and can act as an early warning system, but are largely ignored in stated future efforts at the site.

INT-046 at 3-5.

Together these experts call into question NRC Staff's acceptance of CBR's conclusory statements that ISL mining has no non-radiological health impacts and that any impact from spills or excursions would be small. NRC Staff's cursory review of the potentially deleterious health effects capable of persisting in the environment for many thousands of human lifetimes is



inadequate to protect human health and safety. Since the NRC Staff's description in the Final EA is inaccurate, it will not meet its burden of proof and the Board should find that there has been a violation of NEPA and should find in favor of Intervenor on this contention.

### **Contentions C & D:**

In ruling on the EA Contentions Filings, the Board ruled in LBP 15-11 at 25 that:

These contentions broadly cover hydrogeological connectivity between the Crow Butte mining areas and nearby features, in particular the White River. Therefore, while Intervenor's supporting material for this contention is potentially relevant to migrated Contentions C and D, the Board will not admit EA Contention 5 to the extent it is repetitive of these other contentions.

As to the Board's first point concerning how Intervenor's supporting material for this contention is potentially relevant to migrated Contentions C and D, Intervenor submit that the following supporting material initial submitted in support of EA Contention 5, as noted by the Board, is relevant and should be considered in support of migrated Contention C and Contention D. As a reminder, such supporting material are the 2008 LaGarry Opinion (INT-003), the 2015 LaGarry Opinion (INT-013), the Abitz Opinion (INT-002), the JR Engineering Opinion (INT-004), as well as the arguments made in the Consolidated Intervenor EA Contention Filing (INT-012) at pages 48-59 thereof, all of which are incorporated herein by reference in support of Contention C and Contention D.

### **Contention C:**

[The NRC Staff's] characterization that the impact of surface waters from an accident is "minimal since there are no nearby surface water features," does not accurately address the potential for environmental harm to the White River.

Contention C is largely a factual dispute between Intervenor's and CBR & NRC Staff regarding the hydraulic characterization of the CBR site, particularly as relates to the White River and its alluvium. Intervenor's maintain that CBR and NRC Staff's relative lack of specificity regarding the gaining and losing reaches of the White River is evidence of their incomplete understanding of this hydraulic characterization.

In his 2008 opinion, regarding potential contaminant pathways to the White River, Dr. LaGarry opined that:

(\*) Contaminant Pathways/White River Alluvium: The White River alluvium can receive contaminants from three sources: a) from surface spills at the Crow Butte mine site; b) from waters transmitted through the Chamberlain Pass Formation where it is exposed at the land surface; and c) through faults. Contaminants within the White River can be transmitted into the areas where the alluvium intersects faults downstream from Crawford. Once into the White River alluvium, every rain event will push the contaminants a little bit downstream. In the case of the White River, downstream is to the N-NE and directly onto the Pine Ridge Reservation. Residential users, agricultural users, wildlife, and the City of Crawford all receive water supplies from the White River alluvium.

INT-003 at 3. In subsequent testimony, Dr. LaGarry clarified this explanation regarding the connectivity of groundwater to the White River alluvium through faults as evidenced by artesian flow:

Perforation of Upper Confining Unit: Artesian flow is most likely where the upper confining layer is perforated by secondary porosity (faults and joints), poorly constructed or improperly sealed exploration wells, or thinning or absence of upper confining layers. Artesian flow could transmit leachate, the most toxic mineral-laden of waters, onto the land surface (and into White River alluvium) and discharge large amounts of contaminants into connected aquifers or faults in a very short time.

\* \* \*

Re: secondary porosity: Preliminary studies of the interaction of these faults with surface waters in the region show that creeks that provide municipal water supplies can be entirely consumed and redirected by the region's secondary porosity. Chadron Creek, the stream that supplies water to the city of Chadron, Nebraska, went dry for the first time in the city's history. Subsequent study of the creek's water flow rates by Chadron State College students suggested that normal amounts of water are flowing from springs, but the water is disappearing into deeper alluvium or into fractures in the rock (Balmat & others 2008, Butterfield & others 2008).

INT-013 at 3, 6; see also INT-043. Hydrogeologist Mike Wireman shares Dr. LaGarry's concerns about connectivity between the CBR mine site, specifically English Creek and Squaw Creek, and the White River alluvium:

(\*) There is uncertainty regarding direction of groundwater flow – the LRA (page 2-140) reports a N-NW flow direction; the LRA (page 2-153) reports an E-NE flow direction; the SER (p22) reports a NW flow direction; Souder (2004) reports a N-NE flow direction.

(\*) Regarding the Brule aquifer: Groundwater in the aquifer is hydraulically connected to the White River and likely to Squaw Creek and English Creek. It is important to identify the location of gaining and losing reaches of the White River and the temporal nature base flow and stream loss to the shallow aquifer.

\* \* \*

(\*) Most of the background and offsite groundwater sampling has been focused on the basal Chadron. The Brule Fm, especially the lower Brule is under represented as is the alluvial aquifer along the floodplains of White River. CBR should review the offsite (non-excursion) groundwater and surface water monitoring programs and make modifications necessary to accommodate new understandings and new mining units and satellite ore bodies. This information should be included in license renewal documentation.

INT-047 at 3, 8. Dr. Kraemer also draws attention to the potential for contamination of the White River alluvium based on secondary porosity from faulting as well as from the significant precipitation events that are common in the region:

(\*) Information is not made available on projected future groundwater use from alluvial sources, nor is the potential for horizontal translation of groundwater along ephemeral stream courses explicitly quantitated. Any surface spill would have the potential to reach and infiltrate into the alluvium, and become a long-term source. Any transmission of contaminants through faulted regions, or from surface expressions of the Chamberlain Pass Formation to the alluvium could also serve as a long term source.

\* \* \*

(\*) There is indication of post Chadron faulting (LRA, Section 2). Additionally, any effects of future or past earthquakes, tectonic activity, or large pulses of infiltrating precipitation from intense storm activity, is not adequately addressed.

INT-046 at 2-3. These expert assessments point to a decidedly different characterization of the White River alluvium and its potential contamination from spills at the CBR mine site. This discrepancy must be addressed if the CBR mine site is to operate in a safe manner that is protective of public health and safety. Since the NRC Staff's description in the Final EA is inaccurate, it will not meet its burden of proof and the Board should find that there has been a violation of NEPA and should find in favor of Intervenor's on this contention.

**Contention D:**

**Contention D/Merged EA Contentions 3 & 10 - 'communication of aquifers part':**

In LBP 08-24 at 38-41, the Board ruled on Contention D, which the Board stated as follows:

In 7.4.3 [Crow Butte's] Application incorrectly states there is no communication among the aquifers, when in fact, the Basal Chadron aquifer, where mining occurs, and the aquifer, which provides drinking water to the Pine Ridge Indian Reservation, communicate with each other, resulting in the possibility of contamination of the potable water.

The Board ruled that:

We find that the Tribe proffers sufficient supporting documentation and expert opinion to demonstrate that a genuine dispute exists with Crow Butte on a material issue of fact.... Dr. LaGarry notes a fault along the White River that, based on the regional geology, could act as a pathway to transport contaminants to the White River from the current ISL mining location. The importance of this claim is substantiated by NDEQ in its November 8, 2007 letter wherein its scientists dispute Crow Butte's assertion that there is no hydraulic connection among regional aquifers and the White River. These NDEQ scientists assert that Crow Butte's claim is "lacking scientific support," and that Crow Butte "fails to account for the White River Fault" that may affect the control of any migration outside the mining area. We do not find persuasive Crow Butte's characterization of the NDEQ letter as a document analogous to an RAI. To the contrary, the NDEQ letter is an expert source that directly supports the Tribe's proffered contention. [Footnotes omitted.]

Intervenor's submit that the 2015 Dr. LaGarry Opinions (INT-013, INT-043), as well as the opinions of Dr. Kraemer (INT-046) and Mr. Wireman (INT-047) support our contentions that the LRA incorrectly states that there is no communication among the aquifers when in fact, the Basal Chadron aquifer, where mining occurs, and the aquifer, which provides drinking water to the Pine Ridge Indian Reservation, communicate with each other, resulting in the possibility of contamination of the potable water. Therefore, CBR should not be able to meet its burden of proof as to the LRA and the NRC should not be able to meet its burden of proof as to the Final EA. The LRA fails to comply with Part 40 of NRC Regulations, the Final EA fails to comply with Part 51 of NRC Regulations and the license renewal violates the AEA and Section 40.32 of NRC Regulations because the issuance thereof is inimical to public health and safety.

It is inimical to public health and safety because of lack of adequate confinement and the existence of multiple contaminant pathways through which toxic heavy metals such as arsenic, cadmium, lead, and selenium, and toxic radioactive elements such as radium and uranium are mobilized through contaminant pathways to humans, animals, plants and wildlife. The McLean

Opinions (INT-048) provide details on the adverse health impacts to humans, animals, plants and wildlife from the foregoing heavy metals and for uranium.

In ruling on the EA Contentions Filings, the Board ruled in LBP 15-11 at 25 that:

These contentions broadly cover hydrogeological connectivity between the Crow Butte mining areas and nearby features, in particular the White River. Therefore, while Intervenor's supporting material for this contention is potentially relevant to migrated Contentions C and D, the Board will not admit EA Contention 5 to the extent it is repetitive of these other contentions. Insofar, however, as it challenges the modeling of the White River discussed in section 3.5.2.3.3 of the EA, EA Contention 5 does raise a new issue. That section acknowledges that Crow Butte expressed some uncertainty as to whether the White River feature is a "fault" or a "fold." The EA, after discussing modeling undertaken to answer this question, concludes that the White River feature is a "fold," not a "fault."

Although the NRC Staff asserts that the White River feature is only in the North Trend area, and thus cannot be modeled using data from the license renewal area, Intervenor's nonetheless raise a factual question both as to the model's accuracy, and as to the accuracy of the NRC Staff's analysis that the White River feature is a "fold" versus a "fault."

Intervenor's have already demonstrated the plausibility of their concerns about hydrogeological connectivity, as expressed in admitted Contentions C and D. The NRC Staff cannot simply nullify the plausibility of Intervenor's arguments by reaching a contrary conclusion in the EA. "NEPA requires a 'hard look' at the environmental effects of the planned action," not a circular restatement of the NRC Staff's own conclusions. [Footnotes omitted.]

As to the Board's second point that Intervenor's have raised a factual question both as to the model's accuracy, and as to the accuracy of the NRC Staff's analysis that the White River feature is a "fold" versus a "fault," Intervenor's submit that the Kraemer Opinion (INT-046) and the Wireman Opinion (INT-047) as well as the LaGarry Opinions (INT-003, INT-013, INT-043) further support Intervenor's position that the NRC's modeling at Section 3.5.2.3.3 of the EA and related analyses are not sound. Intervenor's further incorporate the EA filing (INT-012)

arguments at page 62 in further support thereof. The models accuracy as to whether there is a fold or fault is further called into question by the 1989 Petersen Whistleblower Letter (INT-009), and the 1984 HWS Elliot Report (INT-066).

Specifically, Dr. LaGarry's Opinions, especially including those described in Section II.A., paras (7)-(12), (16), (17), and (24)-(32), as well as Dr. Kraemer's opinions described in Section II.B., para (12), and Mr. Wireman's opinions described in Section II.C., para (4) above, all support Intervenor's arguments on this contention that it is in fact a fault that serves as a contaminant pathway and that the NRC Staff's analysis in the Final EA is inaccurate and violates NEPA. Based on the foregoing, the NRC Staff may not sustain its burden of proof and Intervenor's should prevail on this contention.

Intervenor's EA Contention 10 as stated in the EA Filing INT-012) at pp 90; 91-92, which are hereby incorporated herein by this reference, and particularly discussed as follows:

### **The Final EA Fails to Adequately Analyze Cumulative Impacts**

The Final EA fails to adequately analyze cumulative impacts associated with the proposal as required by 10 C.F.R. §§ 51.10, 51.70 and 51.71, and the National Environmental Policy Act, and implementing regulations.

A cumulative impact analysis must provide a "useful analysis" that includes a detailed and **quantified** evaluation of cumulative impacts to allow for informed decision-making and public disclosure. *Kern v. U.S. Bureau of Land Management*, 284 F.3d 1062, 1066 (9th Cir. 2002). The NEPA requirement to analyze cumulative impacts prevents agencies from

undertaking a piecemeal review of environmental impacts. *Earth Island Institute v. U.S. Forest Service*, 351 F.3d 1291, 1306-07 (9th Cir. 2003).

The NEPA obligation to consider cumulative impacts extends to all “past,” “present,” and “reasonably foreseeable” future projects. *Great Basin Mine Watch v. Hankins*, 456 F.3d 955, 971-974 (9th Cir. 2006) (requiring “mine-specific ... cumulative data,” a “quantified assessment of their [other projects] combined environmental impacts,” and “objective quantification of the impacts” from other existing and proposed mining operations in the region).

This cumulative impacts analysis thus must address not only past uranium mining in the region by CBR or others, but also present and foreseeable uranium development - including the North Trend Expansion Area, the Marsland Expansion Area and the Three Crows Expansion Area (the “CBR Expansion Areas”). Consolidated Intervenor's note that while these expansion areas are discussed in the cultural resources sections because the NRC Staff has TCP surveys related thereto that it would like to discuss in the Final EA, the scope of the Final EA is not elsewhere expanded to include the cumulative impacts of these CBR Expansion Areas to all areas of the Final EA. This problem is further exacerbated by the decision of CBR with the assent of the NRC Staff to treat each of the CBR Expansion Areas as an ‘Amendment’ for a satellite rather than for a new license for each of the Expansion Areas.

As a result, there has been a violation of NEPA and applicable NRC Part 51 Regulations. The cumulative analysis must include information from the North Trend Expansion Area, Three Crows Expansion, Marsland Expansion as well as the Powertech/Dewey- Burdock mine in South Dakota. This is further supported by the LaGarry Opinions, the Kraemer Opinion, and the



Wireman Opinions in this matter and the prior submitted Abitz Opinion. These opinions indicate that there are multiple adverse impacts from the mine that are not being monitored, not being found by monitoring and are the result of inadequate confinement.

**Contention D/Merged EA Contentions 3 - 'environmental justice part':**

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In its Ruling LBP 15-11 at 19, the Board stated that:

In EA Contention 3, the Tribe relies on Dr. LaGarry's hydrogeology opinion to support extending the geographic scope of the environmental justice analysis in the EA. Dr. LaGarry's opinion states that it is a "likely" possibility that any contamination resulting from discharges into ground and surface water from Crow Butte's ISL mine would spread throughout the White River drainage area. Because the possibility of contamination of the Tribe's potable water in Contention D was an admissible issue, the issue whether the EA's environmental justice analysis should be based on the extent of possible contamination impacts, and not limited to a four mile review, is also an admissible issue. This contention will be merged into previously admitted Contention D, which is reproduced in Appendix A attached to this Order.

The Board also stated in LBP 15-11 at 40 that:

Additional analysis on the cumulative impacts with respect to environmental justice may be necessary, which the Board admits under merged Contention D and Contention 3.

Therefore, this part of contention D contains the environmental justice impacts based on the possible contamination impacts as well as the cumulative impacts analysis issues under NEPA.

**EA Contention D (cultural): Failure to Take the Requisite "Hard Look" at Environmental Justice Impacts; Fails to Describe Cumulative Impacts**

The EA fails to take the requisite "hard look" at whether relicensing the Crow Butte facility would cause disproportionate and adverse impacts on minority and low-income

populations within the 50-mile environmental impact area around the facility when compared to the impacts on the non-Environmental Justice ("EJ") population. In addition to the impact on the cultural resources of the Oglala Sioux Tribe and the Lakota people, including members of Consolidated Intervenor, the Board must also take a hard look at disproportionate impacts on the Tribe and its people, who are downstream and downwind from the contamination of the underground and surface water and air by the activities at the Crow Butte facility.

Although not expressly bound by the Executive Order on Environmental Justice, EO 12,898 (1994), the NRC has committed to undertake environmental justice reviews. *Dominion Nuclear North Anna, LLC*, CLI-07-27, 66 NRC 215, 237-38 (2007).

As part of that commitment, the Commission issued a Policy Statement in 2004, setting out its position on the treatment of environmental justice issues in the agency's licensing and regulatory activities. The Policy Statement re-stated and expanded upon the "environmental justice" doctrines then emerging from a handful of the NRC's adjudicatory decisions and also from two Staff guidance documents. Although the Policy Statement charged the Staff with diligently investigating potential adverse environmental impacts on minorities and low-income populations, it directed the Staff to conduct an even more detailed examination in situations where the Staff finds that "the percentage in the impacted area exceeds that of the State or the County percentage for either the minority or low-income population." Under those circumstances, the Commission charged the Staff to consider environmental justice "in greater detail." As explained below, the Board has suggested that we clarify the meaning of the quoted phrase and determine whether the Staff's FEIS satisfied our "greater detail" standard in this proceeding.

*Id.*, at 238 (citations omitted).

"Environmental justice, as applied at the NRC, ...means that the agency will make an effort under NEPA to become aware of the demographic and economic circumstances of local communities where nuclear facilities are to be sited, and take care to mitigate or avoid special

impacts attributable to the special character of the community.” *Private Fuel Storage, LLC*, CLI-02-20, 56 NRC 147, 156 (2002). “‘Disparate impact’ analysis is our principal tool for advancing environmental justice under NEPA. The NRC's goal is to identify and adequately weigh, or mitigate, effects on low-income and minority communities that become apparent only by considering factors peculiar to those communities.” *La. Energy Servs., L.P.*, CLI-98-3, 47 NRC 77, 100 (1998).

This detailed environmental justice examination is mandated by NEPA to fulfill its purposes. “NEPA has twin aims. First, it places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action. Second, it ensures that the agency will inform the public that it has indeed considered environmental concerns in its decision-making process. ... Congress did not enact NEPA, of course, so that an agency would contemplate the environmental impact of an action as an abstract exercise. Rather, Congress intended that the ‘hard look’ be incorporated as part of the agency's process of deciding whether to pursue a particular federal action.” *Baltimore Gas and Elec. Co. v. N.R.D.C., Inc.*, 462 U.S. 87, 97,100 (1983) (citations omitted). “NEPA promotes its sweeping commitment to prevent or eliminate damage to the environment and biosphere by focusing Government and public attention on the environmental effects of proposed agency action. By so focusing agency attention, NEPA ensures that the agency will not act on incomplete information, only to regret its decision after it is too late to correct.” *Marsh v. Oregon Nat. Res. Council*, 490 U.S. 360, 371 (1989).

In the matter at bar, that mandated gathering of information and the discussion and analysis of the disparate impacts upon the Indian Point EJ population are sorely incomplete. The

hard look requires an examination of the circumstances and conditions and discussion and analysis of not just one or two but each of the movement restricted institutions or communities within the EJ population to determine the specific nature and scope of the risk, impact, and disparity so that a transparent and informed public discussion can be had and an informed decision can be made by the Commission.

NEPA also requires that the environmental impact statement include as a component of the “hard look,” among other information, a “detailed” statement of “any adverse environmental effects which cannot be avoided should the proposal be implemented.” 42 U.S.C. §4332(2)(C) (ii). The Supreme Court in *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351 (1989), construed this provision to require “**a detailed discussion of possible mitigation measures.**” “[O]ne important ingredient of an EIS is the discussion of steps that can be taken to mitigate adverse environmental consequences. ...[O]mission of a reasonably complete discussion of possible mitigation measures would undermine the ‘action-forcing’ function of NEPA.” *Robertson*, 490 U.S. at 351-52; *see also*, *South Fork Band Council of Western Shoshone of Nev. V. U.S. Dept. of Int.*, 588 F.3d 718, 727 (9<sup>th</sup> Cir. 2009); *Limerick Ecology Action, Inc. v. U.S. N.R.C.*, 869 F.2d 719 (3<sup>rd</sup> Cir. 1989); *Calvert Cliffs 3 Nuclear Project, LLC*, LBP-09-4, 69 NRC 170, 228-29 (2009).

The implementing NRC regulation listing the information that must be included in the ER, 10 C.F.R. § 51.45(b)(2), restates this NEPA mandate. NRC regulation 10 C.F.R. §51.103(a) (4) also requires the Commission to state in the record of decision whether it “has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm from the alternative selected, and if not, to explain why those measures were not adopted. Summarize any

license conditions and monitoring programs adopted in connection with mitigation measures.”

As the Supreme Court emphasized in *Robertson*, a detailed discussion of mitigation measures cannot be had without the gathering of the information necessary for that discussion. As the NRC itself has noted, “the population distribution in the vicinity of the site affects the magnitude and location of potential consequences from radiation releases.” 48 Fed.Reg. at 16,020. In regards to mitigating environmental justice issues here, that requires a full examination of all of the impacted EJ communities and institutions within the 50-mile radius of Crow Butte facility.

Because the EJ information, discussion, and analysis are all incomplete, the only remedy is the remand of the issue back to the NRC Staff for the required detailed examination, discussion, and analysis, including a detailed discussion and evaluation of specific mitigation measures and the recirculation of the EA. *La. Energy Servs., L.P.*, 47 NRC at 110.

Section 4.9 of the Final EA states that

The NRC addresses environmental justice matters for license reviews through (i) identifying minority and low-income populations that may be affected by the proposed relicensing of the CBR facility and (ii) examining any potential human health or environmental effects on these populations to determine whether these effects may be disproportionately high and adverse.

The CBR facility is located in Dawes County, Nebraska, approximately 4 miles southeast of the city of Crawford. Table 4-5 shows 2010 Census data on poverty (low-income) and minority populations for the entire United States, the state of Nebraska, Dawes County, and the city of Crawford. The minority population percentages for Nebraska and Dawes County are approximately one third of the percentage across the United States. The minority population percentage in the city of Crawford is approximately one ninth that of the entire United States. The percentages of low-income populations are about the same for all four areas (slightly larger for Dawes County).

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Because the CBR facility is located in a rural area outside city limits, the area of assessment (review area) used for the environmental justice analysis is a 4-mile radius (NRC, 2003a, Appendix C)

It is worth noting that in setting forth the factual analysis for its EJ “hard look” the NRC Staff acknowledges the Oglala Sioux Tribe and its people, virtually all Native American and impoverished, as within the 50 mile environmental impact radius from the Crow Butte facility and even discusses the significant historic and cultural ties of the Tribe and its people to the Crow Butte area, but then omits them entirely from the tables and the discussions analyzing the data pertaining to minority and poverty. EA, pp. 42, 89-92; Figure 3-3; Tables 4-5, 4-6, 4-7. Instead, the NRC staff writes off the Tribe and its people as an afterthought:

As noted in Section 3.6.2, Shannon County, South Dakota, the location of the Pine Ridge Indian Reservation is located approximately 50 miles (80 km) from the CBR facility. About 54 percent of the Shannon County population is below the poverty level, compared with about 14 percent for the State of South Dakota (USCB, 2011). Also, Shannon County's population is approximately 96 percent minority (Native American).

**However, because of the distance between the Pine Ridge Indian Reservation and the CBR facility, the NRC staff concludes that there would not be disproportionately high or adverse impacts on minority or low-income residents on the Pine Ridge reservation from the relicensing of the CBR facility. (Emphasis added.)**

The systemic omission of Tribal and indigenous interests from the body of the EA and the dismissive tone and manner of the references to the Tribe and its interests by the NRC Staff in much of the EA is highly insensitive, if not subliminally racist. Outside of the discussion of the history of the indigenous use of the Crow Butte area and the historic and cultural interests, the sovereign treaty-secured territory of the Tribe is persistently referred to as “Shannon County,”

South Dakota, as if the Tribe was not a sovereign indigenous nation. EA, 43, 92. The EA's "Site Description" while mentioning other claimants of title fails to mention the Tribe's interest in the lands including their claims of title. EA, 4; compare EA, 56-57. The EA's description of the "Affected Environment" mentions the non-Indian agricultural uses of the area but fails to mention the treaty, historic, cultural, and spiritual interests of the Tribe and its people in the area that are also part of the environment affected by Crow Butte's activities. The "Land Use" table, Table 3-1 includes virtually all uses of the lands including recreational, *but* the historic, cultural, and spiritual uses of the area by the Tribe and its people and other indigenous people. EA, 18. Likewise, the discussion of the uses of the area includes recreational, agricultural, residential, commercial, industrial and mining, and even "habitat" for fish and wildlife, but again wholly omits any mention of the use of the land by the Tribe and its people and other indigenous peoples. EA, 19-20.

The interests of a number of tribes, and specifically the special historic, cultural, and spiritual relationship of the Lakota people and the Oglala Sioux Tribe to the area where the Crow Butte activities are taking place has already been discussed above and that discussion is incorporated here by reference. These interests are unique to these tribes in general and in particular to the Oglala Lakota, distinct from the interests of the non-EJ population, and are therefore subject to the required full and proper Environmental Justice analysis. The TCP surveys discussed above in regards to required consultations are an important part of the information gathering required for the EJ analysis and the abject failure of the consultation process also constitutes a failure of the EJ analysis as it is devoid of crucial information

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necessary to make the analysis. The analysis of EJ interests cannot be made unless the NRC Staff determines what exactly those interests are.

The discussion in the EA of the use of surface and groundwater resources once again wholly omits the treaty interests of the Tribe and its people to the waters on and under the lands in question and wholly omits the uses of those waters by the Tribe and its people as downstream from the Crow Butte facility. EA, 32-41. It's as if the Tribe does not exist.

On this last issue, the opinions of Dr. LaGarry state that contaminants move along the course of the White River to Pine Ridge Indian Reservation. A key issue in this litigation is whether there is a 'mixing of the aquifers' such that the mined aquifer might not be contained and might impact groundwater (Arikaree) and surface waters (White River). The NRC Staff is aware of Dr. LaGarry's opinion and has decided to assume that only distance should be considered and that 50 miles is too far. And yet, if Dr. LaGarry is correct and there are impacts to the White River and/or the Arikaree Aquifer, then the land distance in miles is irrelevant to whether there are environmental and environmental justice impacts to the people living at Pine Ridge Indian Reservation which is low-income and 96% minority.

In the next section, "Socioeconomics," the EA at page 43 describes the Native American residents of "Shannon County, South Dakota" in one paragraph as within the radius of impact consideration but then wholly omits them from the remainder of the socioeconomic impact discussion and analysis, including omission from the discussions on income and economy, housing and public infrastructure, and education resources. EA, 41-46. In Part 4 of the EA on "Environmental Impacts" there impacts on the Tribe and its people in regards to the land, water,



soil, natural resources, are again never mentioned. EA, 64-85. Nor are their interests mentioned in the parts on Ecological or Cumulative or Scenic or Health Impacts, EA, 92-120, 125-128. The only places where the Tribe and its people are mentioned by the NRC Staff in the EA are those parts referring to historic and cultural interests, as if the interests of indigenous peoples are as historic holdovers and cultural oddities. EA, 52-57, 86-88, 120-124. Even there, the EA fails to discuss in any detail the spiritual ties of the Lakota and other indigenous peoples to the Crow Butte area, including their spiritual obligation as care-takers of those lands, nor their customs and traditions that are impacted by the activities of Crow Butte on their treaty lands. There is no discussion of the impact the forced deprivation of those lands has had on the Lakota people.

Even its cursory Environmental Justice discussion, at pages 89-92 and 124-125, the entire discussion of the interests of the Tribe and its people – “Shannon County’s population” - is in one, short, dismissive paragraph and one dismissive sentence. EA, 92, 125.

Section 4.13.9 of the Final EA states:

As discussed in Section 4.9, the NRC staff considers environmental justice (EJ) in greater detail when the percentage of minority or low-income population in the impacted area exceeds the corresponding populations in the county or state by more than 20 percentage points, or when the minority or low-income population in the impacted area exceeds 50 percent (NRC, 2003a, Appendix C). As discussed in section 4.9, the EJ analysis for the proposed action found that minority populations comprise 4.4 percent of the demographic in the area of assessment for EJ, and low-income populations are 14.8 percent within that area. These percentages fall below the 20 percent and 50 percent thresholds identified above that would prompt the NRC to more heavily scrutinize impacts disproportionately affecting minority and low-income populations. Therefore, the NRC staff concluded that there would be no disproportionately high or adverse impacts to minority or low-income populations from the renewal of the CBR facility license.

This means that the NRC Staff would have completed a more in-depth analysis of the environmental justice impacts if it had included the 96% minority population living at Pine Ridge Indian Reservation as being affected. But because it only looked at the 4-mile area near Crawford, NE, which is only 4.4% minority, it found no need to conduct the more detailed environmental justice analysis. Therefore there has been a violation of NEPA and Part 51 Regulations due to a failure to adequately describe the EJ impacts of the proposed action. Since the NRC Staff's description in the Final EA is inaccurate, it will not meet its burden of proof and the Board should find that there has been a violation of NEPA and NHPA and should find in favor of Intervenor on this contention.

**Contention F:**

In its ruling in LBP 08-24 - at 54-56, the Board ruled on Contention F as follows:

Consolidated Petitioners state in Technical Contention F:  
Failure to include recent research.

Consolidated Petitioners present Dr. LaGarry's opinion to support this contention, arguing that Crow Butte uses "old data and old research when there is more recent research" available.

Consolidated Petitioners likewise note that Crow Butte's research was criticized in the November 8, 2007 NDEQ letter....The issue before us is the reliability of scientific evidence in order for Crow Butte's License Renewal Application to be complete and accurate. What Crow Butte must consider is recent research that allegedly describes the geology more accurately than those sources Crow Butte references.

Specifically, Consolidated Petitioners offer the comments and recommendations of Paul Robinson, Research Director for Southwest Research and Information Center, who notes that two of Crow Butte's references in the License Renewal Application were Environmental Protection Agency guidance documents for groundwater monitoring (from 1974 and 1977) that he claims are out of date and that more recent and appropriate guidance documents (from 1992 and 2000) should have been used.

It seems beyond dispute that EPA's updates reflect more reliable science than was contained in its earlier publications. As such, this more recent research likely represents more reliable science and thus there is a question regarding whether Crow Butte has simply cherry-picked its supporting data. Likewise, Consolidated Petitioners' references to Dr. LaGarry's opinion and the November 8, 2007 NDEQ letter are precise enough to provide the necessary support for this contention....

Dr. LaGarry's opinion includes research that both encompasses the location of Crow Butte's licensed ISL uranium mining operations and extends to those areas beyond the Crow Butte mining site.....Consolidated Petitioners raise a material dispute with the fundamental scientific evidence relied on for the conclusions presented in the License Renewal Application.

Paul Robinson's critique of Crow Butte's use of outdated EPA sources raises a similar material dispute by drawing into question the reliability of scientific evidence used in support of the License Renewal Application.

This contention is supported by the submitted opinions of Paul Robinson (INT-005), Dr. Abitz (INT-002), JR Engineering (INT-004), Dr. LaGarry (INT-003, INT-013, INT-043), Dr. Kraemer (INT-046), and Mike Wireman (INT-047), who each call into question at various points of their opinions the reliability of CBR's scientific evidence, nomenclature, assumptions, and quality of analysis.

Specifically, Dr. LaGarry's opinions in Section II.A., paras (13), (14) and (22) above support Intervenor's arguments on this contention. Further, Dr. Kraemer's opinions in Section II.B., paras (2), (3), (4), (7), (23), and (24) support Intervenor's arguments on this contention.

As a result, it is not possible for NRC or CBR to meet their burdens of proof and there has been a violation of the AEA and applicable NRC Part 40 Regulations.

**Contention 6:**

**EA Contention 6:** The Final EA violates the National Environmental Policy Act in concluding that the short-term impacts from consumptive ground water use during aquifer restoration are MODERATE.

In Section 4.6.2.3. of the EA, the NRC Staff concludes that the short-term impacts from consumptive groundwater use during restoration are MODERATE. NRC-010 at 83. This is based on the agency's arbitrary conclusion that the aquifer "should remain saturated" and that "water levels would eventually recover." Id. Neither of these statements is sufficiently supported by evidence in the record.

NEPA prohibits reliance upon conclusions or assumptions that are not supported by scientific or objective data. *Citizens Against Toxic Sprays, Inc. v. Bergeland*, 428 F.Supp. 908 (1977). "Unsubstantiated determinations or claims lacking in specificity can be fatal for an [environmental study] .... Such documents must not only reflect the agency's thoughtful and probing reflection of the possible impacts associated with the proposed project, but also provide the reviewing court with the necessary factual specificity to conduct its review." *Committee to Preserve Boomer Lake Park v. Dept. of Transportation*, 4 F.3d 1543, 1553 (10<sup>th</sup> Cir. 1993).

In order to meet these specificity requirements "an agency must set forth a reasoned explanation for its decision and cannot simply assert that its decision will have an insignificant effect on the environment." *Marble Mountain Audubon Society v. Rice*, 914 F.2d 179, 182 (9<sup>th</sup> Cir. 1990), *citing Jones v. Gordon*, 792 F.2d 821 (9<sup>th</sup> Cir. 1986). "An agency cannot avoid its statutory responsibilities under NEPA merely by asserting that an activity it wishes to pursue will have an insignificant effect on the environment. The agency must supply a convincing statement of reasons why potential effects are insignificant." *Public Service Co. of Colorado v. Andrus*, 825

F.Supp. 1483, 1496 (D. Idaho 1993) *citing The Steamboaters v. FERC*, 759 F.2d 1383, 1393 (9th Cir. 1985) (internal quotes and citations omitted).

The uncertainty of CBR's continued operational impact on groundwater quantity is exacerbated by NRC Staff's uncritical acceptance of CBR's estimate of 11 pore volumes for restoration activities in the mine units. NRC-010 at 83. While the EA does admit that, "Given the historical flow rates, it is anticipated that CBR may need to extract more than eleven pore volumes for all mine units," there is no detailed analysis of these "historical flow rates" nor verifiable estimate of how many pore volumes may actually be required.

If CBR's only restored mine unit is used as an example, than "more than eleven pore volumes" means 36.47 pore volumes. INT-050 at 3. There is no volumetric discussion that explains at what point MODERATE consumption of groundwater becomes LARGE. Nor is there any verifiable basis for NRC Staff's conclusions about aquifer recharge and at what point the aquifer might be unable to recharge.

Hydrogeologist Mike Wireman highlights these concerns with the EA:

(\*) Regarding the Basal Chadron (Chamberlain Pass Fm.): Not enough attention has been given to monitoring the magnitude and extent of the lowered potentiometric surface that results from consumptive use of the production bleed water. The pre-mining potentiometric surface is at or above the land surface over most of the area. CBR estimates that the potentiometric surface has been lowered by about 60 feet beneath the mine units. CBR (Page 3-20 LRA) also concludes that the BC potentiometric surface near the City of Crawford could decline by 20 ft due to consumptive use of BC water. The NRC EA (page 75) indicates a 30-50 ft decline at Crawford.

(\*) Regarding the Basal Chadron (Chamberlain Pass Fm.): There should be a BC monitoring well located near Chadron to monitor the decline as a lowering of the potentiometric surface will affect well yields. This data should be reported in the EA.

(\*) Regarding the Basal Chadron (Chamberlain Pass Fm.): There is no discussion of recharge and discharge to the BC. The recharge area for this aquifer should be described and or/ mapped. Pre-mining discharge mechanisms and locations should also be identified.

(\*) As indicated in Table 6.1-12 (LRA) CBR failed to achieve the restoration standards for seven parameters at MU 1 – radium 226, uranium, cadmium, chloride, manganese, sulfate and TDS. It is assumed that CBR requested ACLs for these parameters. CBR is currently conducting groundwater restoration at mine units 2-5 which have been in restoration since 1996, 1999, 2003, 2005 respectively....As of May 2011 uranium concentration at mine units 2-5 were still well above the restoration standard –even though restoration has been underway for years. CBR reports (SER) that more than 11 pore volumes may need to be removed from a mine unit before restoration is successful. Apparently CBR has significantly increased water treatment at MUs 2-5 in an effort to complete restoration.

INT-047 at 5-6. Dr. Kraemer also has concerns about the sufficiency of the evidence in the EA and its ability to support NRC Staff's conclusions:

(\*) There is insufficient evidence to support the industry's estimates of the impact of current and future water use.

(\*) The basic equations used to describe the impacts and drawdown of water tables and piezometric surfaces in the mining area are inappropriate for the indicated heterogeneous, anisotropic conditions. Coupled with the lack of detailed description of future water use and consumption, including uses for restoration and decommissioning, these impacts are not reasonably projected.

INT-046 at 5.

Where, as here, there is a dearth of information in the record to support the NRC Staff's conclusion that short-term consumptive water use will have MODERATE impact, such a conclusion cannot stand up to NEPA scrutiny and certainly cannot form the basis for a FONSI.

Since the NRC Staff's description of the impact in the Final EA is inaccurate, it will not meet its burden of proof and the Board should find that there has been a violation of NEPA and should find in favor of Intervenor on this contention.

**Contention 9:**

**EA Contention 9:** The Final EA violates 10 C.F.R. §§ 51.10, 51.70 and 51.71, and the National Environmental Policy Act and implementing regulations by failing to include the required discussion of ground water restoration mitigation measures.

NRC regulations at 10 C.F.R. §§ 51.10, 51.70, and 51.71 require that compliance with NEPA “be supported by evidence that the necessary environmental analysis have been made.” With respect to mitigation, NEPA requires agencies to: (1) “include appropriate mitigation measures not already included in the proposed action or alternatives,” 40 C.F.R. § 1502.14(f); and (2) “include discussions of: . . . Means to mitigate adverse environmental impacts (if not already covered under 1502.14(f)).” 40 C.F.R. § 1502.16(h). NEPA regulations define “mitigation” as a way to avoid, minimize, rectify, or compensate for the impact of a potentially harmful action. 40 C.F.R. §§ 1508.20(a)-(e).

“[O]mission of a reasonably complete discussion of possible mitigation measures would undermine the ‘action-forcing’ function of NEPA. Without such a discussion, neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects.” *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 353 (1989). NEPA, and NRC implementing regulations, require full review of these impacts as part of the public review process.

To satisfy NRC's NEPA duty to disclose and analyze mitigation measures, the NEPA documents must: (1) "include appropriate mitigation measures not already included in the proposed action or alternatives," and (2) "include discussion of . . . Means to mitigate adverse environmental impacts (if not already covered under 1502.14(f))." 40 C.F.R. § 1502.14(f); 40 C.F.R. § 1502.16(h). "Mitigation" is defined as a way to avoid, minimize, rectify, or compensate for the impact of a potentially harmful action. 40 C.F.R. § 1508.20 (a)-(e), 50 C.F.R. 51.14(b) (adopting CEQ definition). The NEPA duty to include and analyze mitigation measures is applicable directly to NRC actions via the CEQ regulations and via NRC's NEPA regulations. 10 C.F.R. §§ 51.10, 51.70 and 51.71.

An essential component of a reasonably complete mitigation discussion is an assessment of whether the proposed mitigation measures can be effective. *Compare Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1381 (9th Cir. 1998) (disapproving an EIS that lacked such an assessment) *with Okanogan Highlands Alliance v. Williams*, 236 F.3d 468, 477 (9th Cir. 2000) (upholding an EIS where "[e]ach mitigation process was evaluated separately and given an effectiveness rating"). The Supreme Court has required a mitigation discussion precisely for evaluating whether anticipated environmental impacts can be avoided. *Robertson*, 490 U.S. at 351-52 (citing 42 U.S.C. § 4332(C)(ii)).

Specifically in the mining context, federal courts hold that NEPA also requires that the agency fully review whether the mitigation will be effective. *See, South Fork Band Council v. Dept. of Interior*, 588 F.3d 718, 728 (9th Cir. 2009) *also, Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1380-81 (9th Cir. 1998) ["The [agency's] broad generalizations and vague references to mitigation measures ... do not constitute the detail as to mitigation



measures that would be undertaken, and their effectiveness, that the [agency] is required to provide.”].

A NEPA-compliant mitigation discussion without at least some evaluation of effectiveness is useless in making that determination. *South Fork Band Council v. U.S. Dep’t of Interior*, 588 F.3d 718, 726 (9th Cir. 2009). Agencies cannot rely on untested mitigation measures:

[T]he Court holds that the Corps’ reliance on mitigation measures that were unsupported by any evidence in the record cannot be given deference under NEPA. The Court remands to the Corps for further findings on cumulative impacts, impacts to ranchlands, and the efficacy of mitigation measures.

*Wyoming Outdoor Council v. U.S. Army Corps of Eng’rs*, 351 F. Supp. 2d 1232, 1238 (D. Wyo. 2005). Simply listing the mitigation measures, and asserting that they may be successful in eliminating or substantially reducing the Project’s adverse impacts, with no scientific evidence or analysis to support those claims, is the definition of an arbitrary and capricious decision. “[T]he Court [cannot] defer to the [agency’s] bald assertions that mitigation will be successful.” *Id.* at 1252. Mitigation must be “supported by ...substantial evidence in the record.” *Id.* Without that support, the agency “was arbitrary and capricious in relying on mitigation to conclude that there would be no significant impact to [environmental resources].” *Id.*

Restored ISL mine units are mythical creatures, like Sasquatch, or dragons. Many people swear they exist, but there is no scientific evidence that supports it. In the case of ISL mine restorations, there is plentiful scientific evidence that supports exactly the opposite conclusion. INT-014, INT-015, INT-016. Yet that has not stopped NRC Staff from accepting, as

an adequate mitigation strategy, the very same restoration plan that has not ever worked at the CBR facility, nor anywhere else.

In 1987, when the CBR facility was first licensed, the NRC Staff had the luxury of ignorance to accept the aquifer restoration plan advanced by the Applicant. No such luxury exists today. The EA is deliberately deceptive in its discussion of aquifer restoration. There will be no restoration of uranium levels to "Commission approved background conditions." There will not be compliance with "the table in paragraph 5C." Uranium levels will only, ever, be restored to ACLs. Discussion in the EA of any other restoration outcome is misleading and can only be interpreted as being included to intentionally confuse the public.

NEPA is an action-forcing statute applicable to all federal agencies. Its sweeping commitment is to "prevent or eliminate damage to the environment and biosphere by focusing government and public attention on the environmental effects of proposed agency action." *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 371 (1989). The statute requires "that the agency will inform the public that it has indeed considered environmental concerns in its decision making process." *Baltimore Gas and Electric Company v. NRDC*, 462 U.S. 87, 97 (1983).

NEPA documents must discuss "any adverse environmental effects which cannot be avoided should the proposal be implemented [...]," and must provide "a reasonably complete discussion of possible mitigation measures." *In re Detroit Edison Co.* (Fermi Nuclear Power Plant, Unit 3), LBP-12-23, 76 N.R.C. 445, 486 (2012) quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351-52 (1989).

A NEPA compliant environmental review would address the issue of uranium ACLs directly and analyze how the inevitably elevated levels of uranium in the post-mining, post-restoration aquifer might impact the environment and contribute to loss of resources. None of which, or course, could serve as the basis for a FONSI.

The restoration activities at CBR to date have been ineffective. Hydrogeologist Mike Wireman states:

(\*) Restoration of groundwater in mine units where mining is complete is inadequate.... The geochemical reactions that are induced by the injection of a lixiviant into uranium bearing aquifers result in significant mobilization of metals, uranium and radium 226. Key reasons for the failure to meet restoration standards include: (a) the mining companies do not conduct restoration activities for a long enough time period and (b) restoration programs do not include sufficient water treatment. Groundwater restoration conducted by CBR pursuant to NRC, EPA and NDEQ regulations has been inadequate to date.

(\*) As indicated in Table 6.1-12 (LRA) CBR failed to achieve the restoration standards for seven parameters at MU 1 – radium 226, uranium, cadmium, chloride, manganese, sulfate and TDS. It is assumed that CBR requested ACLs for these parameters. CBR is currently conducting groundwater restoration at mine units 2-5 which have been in restoration since 1996, 1999, 2003, 2005 respectively.... As of May 2011 uranium concentration at mine units 2-5 were still well above the restoration standard –even though restoration has been underway for years. CBR reports (SER) that more than 11 pore volumes may need to be removed from a mine unit before restoration is successful. Apparently CBR has significantly increased water treatment at MUs 2-5 in an effort to complete restoration.

(\*) Very little information is presented in the LRA or SER as to the details of restoration efforts at mine units 2-5.

(\*) NRC has recently determined that the secondary restoration goals (State of Nebraska Class of Use) are not consistent with 10CFR Part 40, Part 40, Appendix A, Criterion 5B(5). CBR has apparently committed to meeting the requirements in Criterion 5B(5); however the potential conflict between State of Nebraska and NRC restoration standards will provide CBR with support for establishment of alternative concentration limits. The CBR permit allows for requesting ACLs if

they can demonstrate that they have used best practicable effort. However there is no definition or guidelines for defining and evaluating best practicable effort.

INT-047 at 6-8.

The CBR facility is almost certain to leave behind a long term, underground hazardous waste storage facility, namely the post-mining aquifer. Dr. Kraemer points out that even the minimal gains the restoration strategy is able to achieve may be reversed over time:

(\*) [A] proposed "restoration" strategy is the short-term sequestration (stabilization) of contaminants by the addition of reductants. This effort is temporary, and is likely to be reversed with time, allowing the future release of contaminants.

\* \* \*

(\*) Part of the proposed short-range restoration strategy is reductant addition to the subsurface, as well as the addition of other stabilizing materials. Complete reductant life-cycle and distribution-efficiency calculations, detailed descriptions of reductant and stabilization chemistry, and potential side effects such as biocidal impact on groundwater microbiology, are not adequately addressed. Importantly, addition of reductant to sequester pollutants can be reversed with time and the continual, natural flow of more oxidized groundwater through the site.

INT-046 at 3-4.

Even if there was existing technology that could reverse the ISL process and actually achieve concentration levels accepted by NRC Staff as "baseline," the restoration plan must still fail under NEPA because NRC Staff's "baseline" levels are not representative of actual pre-mining conditions. Therefore any restoration standards are not sufficiently stringent. The actual pre-mining condition at the CBR site can never again be determined. An appropriate NEPA analysis would disclose this condition and take measures to approximate the pre-mining condition of the groundwater in the mine units based on credible analysis of similarly situated and currently undisturbed aquifers in the area.

Without a reasonable picture of the pre-mining environment, aquifer restoration cannot be properly evaluated. Dr. Kraemer explains on pages 3-4 of INT-046 that:

- (\*) Restoration goals for the site are inappropriate.
- (\*) The sampling during stabilization/ cleanup efforts at Crawford, that is used to establish parameter-by-parameter comparison with restoration goals ("baseline" values), is very restricted and artificially constrained compared to monitoring that is more typical of industry elsewhere. In comparing monitored constituents with "restoration standards" during ongoing and post-restoration, averaged values for each parameter are used rather than comparison with a fuller and more appropriate groundwater quality data set....
- (\*) Efforts to achieve primary restoration goals for in situ leaching (ISL) are based on returning groundwater to "baseline" water quality concentrations, as calculated on a mine unit average. This cleanup objective, a mine-averaged "baseline", also referred to as a "restoration standard", has several inherent weaknesses. Demonstrable and verifiable regional background concentrations are a more accepted remediation goal than artificially contrived and averaged "baseline" restoration standards. The restrictive and potentially unrepresentative use of average of mine unit values to establish baseline goals, rather than using more complete background values from surrounding sources of groundwater, and more robust averages, has the potential to misdirect restoration efforts. Averaged values from the mine site can perhaps be used to spot trends, but are essentially meaningless as restoration standards.
- (\*) The calculation of "baseline" values, and therefore restoration goals, relies on early measured values and groundwater attributes. These values and attributes, that were used to establish "restoration standards", were not exclusively sampled and measured in a pre-mining, pre-drilling, and unperturbed environment. The potential mining influence on the creation of "baseline", coupled with the relative paucity of spatial and temporal monitoring in groundwater adjacent to the mining area, leads to the high probability that "baseline" values of individual parameters are non representative of typical background conditions. The potential for perturbation of the groundwater system by typical mining activities such as increasing oxidizing conditions, and addition of lixiviants, and/or mobilizing agents can have the added effect of artificially raising the "baseline", creating a less stringent and less appropriate cleanup objective.

INT-046 at 3-4.

Further, Dr. Kraemer is concerned that the monitoring program, both at present, and for the future is inadequate especially when considering the elevated contamination levels that will linger in the post-mining aquifer for the foreseeable future. He states:

(\*) Site monitoring has the potential to provide information that does not accurately reflect levels and spatial orientation of any potential pollutant release, synergistic effects of multiple contaminants, and does not provide early warning of contaminant migration.

(\*) EPA monitoring well guidelines emphasize short screened intervals and several adjacent, nested monitoring wells with screens at different and restricted vertical depths to reduce the common problem of concentration dilution, and those guidelines never suggest averaging of concentration around a site to serve as a restoration goal.

(\*) At Crawford in particular, groundwater sampling during restoration has a likelihood of "false negatives" through dilution in monitoring well bores. This is manifest with mixtures of low concentrations of aqueous parameters of concern, in regions or sections of a borehole that should not be sampled, with zones of deleterious high concentrations in other sections of a borehole. False negatives can occur through misplacement of monitoring wells, inappropriate screened intervals, vertical migration of fluids in the annular space due to failed packers or shale traps, poor well construction, migration in the aquifer material outside the borehole due to fracturing of the surrounding medium during the drilling process. Alternatively, placement of a monitoring well outside the path of a projected contaminant plume would also produce a false negative, and when averaged with correctly functioning monitoring, producing higher concentrations would mislead restoration efforts.

(\*) The monitoring program investigates a very limited number of potential pollutants and water quality parameters, atypical of most rigorous monitoring programs. This leaves no solid basis for assessing the potential migration and impacts of potential groundwater contaminants, both radiological and non radiological, nor for assessing their potential synergistic health impacts. Increased monitoring contingencies and plans for any future, identified spills are not well addressed by CBR. In addition, mining activities release potential "tracers" that can be used to determine the potential influence of ISL on groundwater, often sequentially in advance of the arrival of any contaminants. Use of these indicators of mining's influence on groundwater are potentially very beneficial and can act as an early warning system, but are largely ignored in stated future efforts at the site.

Id at 4-5. Mike Wireman agrees:

(\*) Because there has been no rigorous, appropriate investigation of the hydraulic properties and groundwater flow in the UCU and the Brule aquifer, there are significant uncertainties that constrain the ability to assess unwanted fluid migration. These uncertainties are evident in the 2007 LRA, the 2014 SER and the 2014 EA.

(\*) Regarding the Brule aquifer: There is uncertainty regarding direction of groundwater flow – the LR (page 2-140) reports a N-NW flow direction; the LRA (page 2-153) reports an E-NE flow direction; the SER (p22) reports a NW flow direction; Souder (2004) reports a N-NE flow direction.

\* \* \*

(\*) The groundwater monitoring program intended to detect offsite migration of ISL mining related contaminants is inadequate and poorly reported.

(\*) CBR currently includes 19 domestic water supply wells in the groundwater monitoring program. These wells are sampled quarterly for uranium and radium 226 only. Neither the LRA nor the SER include any information on the location, depth and screened interval for these wells. Trend data should be presented for these and other monitoring wells and there should be a more complete analyte list that includes metals, TDS and selected anions. (NRC plans to add to this sampling via a condition in renewed license).

INT-047 at 3, 8. Given the certainty that ACLs will be required for uranium and likely for radium, cadmium and other persistent toxic contaminants, the long term monitoring strategy contemplated in the restoration plan is inadequate to identify, let alone contain the hazardous conditions that will persist in the post-mining aquifer for the foreseeable future. The NRC Staff's cursory review in the EA cannot be the basis for a FONSI. A complete EIS is required in order to present a thorough and detailed picture of the actual impacts of CBR's activities and an equally detailed and realistic assessment of ways to mitigate the damage already done and that which will continue for the duration of their license.

Since the NRC Staff failed to include the required description in the Final EA, it will not meet its burden of proof and the Board should find that there has been a violation of NEPA and should find in favor of Intervenor on this contention.

**Contention 12:**

In its ruling in LBP 15-11 at 45, the Board stated the first portion of the admissible

Contention 12 as follows:

EA Contention 12 is admissible in part. The first portion of the contention, asserting that the EA omits discussion of wind storms, tornadoes, and certain air emissions, is admissible solely as it pertains to the discussion of tornadoes.

In its ruling LBP 15-11 at 49-52, the Board described the second part of the admissible

Contention 12 as follows:

To be sure, the ISL mining GEIS does discuss impacts of selenium on wildlife, stating that “[p]otential impacts to migratory birds and other wildlife from exposure to selenium concentrations and radioactive materials in the evaporation ponds may occur.” .... The GEIS also discusses the land application of ISL wastewater, stating that this “could potentially impact soils by allowing accumulation of residual radiological or chemical constituents in the irrigated soils that were not removed from the water during treatment.” ...

\*\*\*

Intervenor provide sufficient support for their contention through reference to the FWS letters and reports on the hazards of ISL mining waste disposal. In contrast to the GEIS's conclusion that “[p]ast experience at NRC-licensed ISL facilities has not identified impacts to wildlife from evaporation ponds,” the FWS letter to the NRC notes that “[i]n 1998, the Service conducted a study of a grassland irrigated with wastewater from an in-situ uranium mine and found that selenium was mobilized into the food chain and bioaccumulated by grasshoppers and songbirds.” While the GEIS finds that basic mitigation measures “including perimeter fencing and surface netting” will limit impacts to wildlife, the FWS letter instructs that more need be done. The FWS report on ISL mining in the nearby state of Wyoming also raises material concerns that do not appear



to be covered in the GEIS. ...Intervenors have provided a sufficient explanation for how these documents support their contention, at least at the contention admissibility stage.

The Board recognized that Intervenor's have identified a valid issue concerning the land application of wastewater containing heavy metals like Selenium which are dangerous to humans and wildlife. See, e.g., FWS Report (INT-019) at 2 ("During migration, birds are very stressed and become much more susceptible to the effects of environmental contaminants.").

Intervenors assert the arguments made in the EA filing (INT-012) at pages 94-97, which are hereby incorporated herein by reference as if set forth at length.

EA Contention 12: Failure to Take a Hard Look at Impacts Such As Those Related to Selenium and Those Associated with Air Emissions and Liquid Waste.

The Final EA violates 10 C.F.R. §§ 51.10, 51.70, 51.71, the National Environmental Policy Act and implementing regulations, by failing to conduct the required "hard look" analysis at impacts of the proposed mine associated with air emissions and liquid waste disposal.

Final EA fails to properly account for impacts to wildlife resulting from land application of ISL wastes. The U.S. Fish and Wildlife Service has expressly stated that the agency "do[es] not recommend land application using center pivot irrigation for the disposal of in-situ mining wastewater." U.S. Fish and Wildlife Service letter to NRC 9/5/07 (INT-018).

This expert wildlife agency has published detailed information on the risks of selenium contamination resulting from ISL. See U.S. Fish and Wildlife Service Contaminant Report Number R6/715C/00, attached as Exhibit O hereto and filed herewith. Selenium is a very toxic

substance to humans and wildlife. Failure to describe the Selenium conditions is evidence of a failure to take the required 'hard look' and as a result, the Final EA violates NEPA.

The Final EA fails to account for these impacts and present credible evidence and scientific evaluation addressing why these concerns do not apply in this instance.

The McLean Opinion (INT-048) describes the impacts of selenium on humans and wildlife. These impacts are missing from the Final EA and from the LRA. Anything short of a full review violates NEPA's requirement to take a "hard look" at all environmental impacts.

#### **Contention 14:**

In LBP 15-11 at 59, the Board ruled that:

Intervenor's alleged that every earthquake, regardless of size, can change the ground's porosity such that water flow is affected, a valid material dispute presented in this contention. The EA analysis might also be incomplete because it only reviewed earthquakes recorded in Nebraska, neglecting earthquakes felt in nearby states. In fact, the two earthquakes cited in the contention had epicenters in South Dakota, and so would have been missed in the NRC's analysis for the EA.

For example, the distance from the Crow Butte site to the South Dakota border is roughly 20–30 miles, to the Wyoming border roughly 30–40 miles, to the Colorado border roughly 115 miles, and to the Kansas border roughly 200 miles.

And yet the EA contains no discussion of seismic activity in these nearby areas. In contrast, the distance from the Crow Butte site to the southeastern corner of Nebraska—which would have been encompassed in an analysis of Nebraska seismic activity—is roughly a distance of 400 miles.

As a result, Contention 14 raises genuine material disputes with the information included in the NRC Staff's EA, and is admitted.

Intervenors submit the arguments made in the EA Filings (INT-012) at 102-104, which are hereby incorporated herein by this reference as if fully set forth at length. These arguments are further supported by the Dr. LaGarry Opinions (INT-003, INT-013, INT-043), the Dr. Kraemer Opinion (INT-046) and the Wireman Opinion (INT-047).

More specifically, Dr. LaGarry's opinions concerning secondary porosity and earthquakes in Section II.A., paras (2)-(12) above and Mr. Wireman's opinions in Section II.C., paragraph (3) clearly support Intervenor's and make it impossible for CBR or the NRC to meet their burdens of proof on this contention.

**EA Contention 14: The Final EA Fails to Adequately Describe or Analyze Impacts From Earthquakes; Fails to Take 'Hard Look' at Impacts on Secondary Porosity**

The Final EA violates the National Environmental Policy Act in its failure to provide an analysis of the impacts on the project from earthquakes; especially as it concerns secondary porosity and adequate confinement. These failings violate 10 C.F.R. §§ 51.10, 51.70 and 51.71, and the National Environmental Policy Act, and implementing regulations.

Section 3.4.3 of the Final EA concerning Seismology states that:

The most recent earthquake recorded in Nebraska occurred April 16, 2007. The epicenter was about 45 miles north-northwest of McCook, Nebraska, and was about 180 miles southeast of Crawford. This earthquake had a recorded magnitude of 3.0, but was not felt at Crawford or the CBR facility. EA 3.4.3.

The foregoing fails to disclose at least earthquake that occurred in 2011 and was felt by the people of Crawford, Nebraska and reported in the Rapid City Journal/Chadron News on

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November 15, 2011 and attached as Exhibit I hereto, "Two Earthquakes Strike Area."

Apparently, a 3.3 and a 3.7 magnitude earthquake were felt in the area, "As of Thursday morning, three people in Crawford, two each in Chadron and Hot Springs and one each in Bridgeport and Spearfish, S.D., reported feeling the earthquake to the USGS." Exhibit INT-020.

Further the Final EA fails to disclose that even small earthquakes can result in greater secondary porosity, as described by Dr. LaGarry in the 2015 Opinion (INT-013) at pages 2-3.

The failure to evaluate the impact of small earthquakes in the area on the potential for secondary porosity constitutes a failure to take a 'hard look' and is a separate violation of NEPA. Consolidated Intervenor's assert that even small earthquakes such as the ones felt in Crawford, NE in 2011 have substantial impacts on secondary porosity and further undermine the 'adequacy' of the confinement of the mined aquifer. As a result, there has been a violation of NEPA and Part 51 of NRC Regulations.

#### **IV. Conclusion**

The Board should grant each of the Intervenor's contentions, revoke the license renewal, and affirm that the NRC Staff failed to comply with the Atomic Energy Act and NEPA. In the alternative, should the Board decide to uphold the license renewal, the Board should impose

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conditions, monitoring and reporting at least as stringent as that imposed by the Board in LBP 15-16.

Dated this 8th day of May, 2015.

Respectfully submitted,

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In the Matter of )  
)  
CROW BUTTE RESOURCES, INC. , ) Docket No. 40-8943  
) ASLBP No. 08-867-02-OLA-BD01  
(License Renewal for the )  
In Situ Leach Facility, Crawford, Nebraska) May 8, 2015

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing '**CONSOLIDATED INTERVENORS' AND OGLALA SIOUX TRIBE'S JOINT POSITION STATEMENT**', in the captioned proceeding were served via email on the 8th day of May 2015, which to the best of my knowledge resulted in transmittal of same to those on the EIE Service List for the captioned proceeding.

Respectfully submitted,

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