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-MLA-2
	)	ASLBP No. 13-926-1-MLA-BD01
(Marsland Expansion Project)	)	
	)	August 17, 2018

OGLALA SIOUX TRIBE'S INITIAL POSITION STATEMENT

Oglala Sioux Tribe (the "Tribe" or "OST") hereby submits this Initial Position Statement on the sole admitted contention, OST Contention 2, as set forth by the Board and reproduced below. The Oglala Sioux Tribe (the "Tribe") challenges the License Application Amendment for the Marsland Expansion Area ("MEA") and the NRC Staff's Final Environmental Assessment (2018) ("Final EA") for Crow Butte Resources, Inc. ("Crow Butte")'s license amendment for the MEA. The Board should uphold the contention, revoke NRC's approval of Crow Butte's license amendment for the MEA, and affirm that the NRC Staff has failed to comply with applicable law including the Atomic Energy Act, NRC & EPA Regulations, and NEPA.

The admitted contention at issue in this proceeding is as follows:

OST Contention 2: Failure to Include Adequate Hydrogeological Information to Demonstrate Ability to Contain Fluid Migration

The application and final environmental assessment fail to provide sufficient information regarding the geological setting of the area to meet the requirements of 10 C.F.R. Part 40, Appendix A, Criteria 4(e) and 5G(2); the National Environmental Policy Act; and NUREG-1569 section 2.6. The application and draft environmental assessment[1] similarly fail to provide sufficient information to establish potential effects of the project on the adjacent surface and

[1] Now referring to the Final EA.

ground-water resources, as required by NUREG-1569 section 2.7, and the National Environmental Policy Act.

More specifically, the scope of the safety and environmental concerns encompassed by this contention include the following:

(1) the adequacy of the descriptions of the affected environment for establishing the potential effects of the proposed MEA operation on the adjacent surface water and groundwater resources;

(2) exclusively as a safety concern, the absence in the applicant's technical report, in accord with NUREG-1569 section 2.7, of a description of the effective porosity, hydraulic porosity, hydraulic conductivity, and hydraulic gradient of site hydrogeology, along with other information relative to the control and prevention of excursions;

(3) the failure to develop, in accord with NUREG-1569 section 2.7, an acceptable conceptual model of site hydrology that is adequately supported by site characterization data so as to demonstrate with scientific confidence that the area hydrogeology, including horizontal and vertical hydraulic conductivity, will result in the confinement of extraction fluids and expected operational and restoration performance; and

(4) whether the final EA contains unsubstantiated assumptions as to the isolation of the aquifers in the ore-bearing zones.

I. INTRODUCTION

The issuance of the NRC approval of the license amendment for the MEA 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 Crow Butte'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*., 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) establish potential effects of the project on the adjacent surface and ground-water resources, as required by NUREG-1569 section 2.7, and the National Environmental Policy Act (by establishment of containment).

Because the NRC license amendment was granted before the requisite 'hard look' under NEPA, the license amendment must be revoked. See, e.g., *Oglala Sioux Tribe v. Nuclear Regulatory Commission,* 896 F.3d 520 at 530-531 (D.C. Cir. 2018).

Substantial issues remain concerning undetermined impacts to the adjacent surface and ground-water 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.

The expert opinions detail the lack of scientifically-defensible analysis in the Final EA regarding potential impacts associated with the mine.

Procedural Background; Incorporation by Reference. The Tribe filed its Petition to Intervene (OST009), which is hereby incorporated herein by reference as if set forth at length. The Tribe hereby provides the expert opinions of Dr. David K. Kreamer (OST003) and Mike

Wireman (OST004), and Dr. Hannan LaGarry (OST010), each and every one of which is hereby incorporated herein by reference as if set forth at length.

The Tribe and its witnesses will demonstrate that the Final EA fails to (i) describe the affected area and environment; or (ii) establish potential effects of the project on the adjacent surface and ground-water resources, as required by NUREG-1569 section 2.7, and the National Environmental Policy Act (by establishment of containment).

II. TRIBE'S EXPERT WITNESSES

A. Dr. David K. Kreamer. Dr. Kreamer has been involved in hydrogeological studies and reviewed contaminated waste and pollution challenges for over 35 years, has served as an expert witness, and has testified before the U.S. Congress on issues of uranium mining. He serves as a professor in the Department of Geoscience at the University of Nevada, Las Vegas, is past President of the Universities Council on Water Resources, and Vice President for Science and program for the International Association of Hydrogeologists. He has been asked by the U.S. EPA and other internationally and nationally recognized professional groups to give short courses and lecture series on issues of groundwater quantity and quality. He has published over 65 professional publications and he is co-author of the 3rd Edition of the text, "Contaminant Hydrogeology" Fetter, Boving and Kreamer, 2018, Waveland Press. Dr. Kreamer's CV is OST001.

B. 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. He is currently President of Granite Ridge Groundwater, a small consulting firm. He provides consulting services related to hydrology and geology. Mr. Wireman's CV is OST002.

C. Dr. Hannan LaGarry. Hannan E. LaGarry, Ph.D. has over 25 years of experience studying the rocks and fossils of northwestern Nebraska. He led a team of geologists from the Nebraska Geological Survey that mapped in detail the surficial geology of most of northwestern Nebraska (a total of 80 1:24,000 quadrangles). This mapping included the entire Pine Ridge area and the area between Crawford, Nebraska and Pine Ridge, South Dakota. These maps, including digital versions (ArcInfo) and supporting field notes, are available from the University of Nebraska-Lincoln School of Natural Resources. As a direct consequence of this mapping, he 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). He has taught in and chaired the Department of Math and Science at Oglala Lakota College (OLC) on the Pine Ridge Reservation. He has managed an international network of 11 academic collaborators in all areas of science (including uranium), and have received funding from the National Science Foundation (TCUP, PEEC, EPSCoR) and the United States Department of Agriculture (NIFA TCEP) to pursue research. Dr. LaGarry has testified at state and federal hearings involving uranium mining. Dr. LaGarry's CV is OST013.

III. EXPERT OPINIONS

A. Kreamer Opinions: Dr. Kreamer's Opinion tackles this long-standing and valid criticism of the ISL process and, were we able to set aside the adversarial nature of these proceedings, might actually advance the understanding of the problem enough to ultimately change the outcome.

Dr. Kreamer states that, "observable but unreported heterogeneity is consistent with unequal distribution of spot contamination during [the] site stabilization process at CBR and the need to utilize more complex numerical modeling to understand preferential flow in the remedial process." [OST003 at 5].

Dr. Kreamer's point being that the failed remediation of the Marsland mine units begins here at licensing. CBR's presentation of, and NRC Staff's uncritical acceptance of, inadequate hydrogeological characterization of the target aquifer will allow ISL mining to commence without a thorough understanding of the actual subsurface conditions. Allowing a heterogeneous

and anisotropic aquifer to be characterized as homogeneous and isotropic, not only lacks scientific rigor, but ensures the failure of restoration.

After mining is complete, CBR will, no doubt, diligently apply the best practicable technology available at that late stage in what will likely be a good faith effort to reach the unattainable restoration goals. However by then it will be too late. The time for the diligent application of the best practicable technology is now in the pre-mining state.

Dr. Kreamer has opined in OST003 that:

Kreamer Opinion 1: The site characterization by Aqui-Ver, Inc., Marsland Hydrologic Test Report #8, written in 2011, revised in 2015, for the Marsland Expansion Area (MEA) [OST009] is deficient and mischaracterizes the hydrogeologic environment at the MEA site.

Basis: There are several deficiencies with the Marsland Expansion Area hydrogeologic characterization. Essentially much of the collected pumping test data was selectively ignored, the solitary pumping test covered very little of the of the MEA site leaving the majority of the site hydrogeolologically undefined, and the single pumping test that was analyzed was influenced by conditions outside the site boundary.

A. The Aqui-Ver Inc., Marsland Hydrologic Test Report #8, written in 2011, revised in 2015 only reported one of two pumping tests done on the MEA – a second 19 hour test was not presented and was characterized as "failed". [OST009 at 10] The "failed" Marsland pumping test that went on for 19 hours had a long enough duration to be possibly analyzed and perhaps could have be included as a second analysis in the reporting of hydrological conditions. This second test could supply additional insight as to the hydrogeological conditions beneath the site. The justification for test failure was a poorly explained pump failure. If this occurred at the end of the test, the information recorded is still valid.

B. The report only analyzed selective portions of the data from the single pumping test. The report did not present analysis of the complete data set. The data the report selectively excluded can demonstrate, if analyzed, the lack of confinement of the Basal Chadron Sandstone Aquifer and production zone.

C. The report stated that Cooper-Jacob semi-logarithmic evaluations were performed on the data. [OST009 at 15] These analyses did not appear in the report and can identify a recharge boundary which would be consistent with lack of confinement of the aquifer.

D. The report did not include analysis of pumping test data from water level changes at Monitoring Wells 2 or 8 in the analysis, although these wells were reported to be in the radius of influence of the pumping test and those water level changes were used to define an extended radius of pumping well influence.

E. The single pumping test covered only a relatively small portion of the site which is over five miles long. Only one pumping test on so large a site is poor professional practice. The subsurface hydrogeological response of the large majority of the site to pumping remains unknown. The hydrologic response of more of the MEA's subsurface can only be guessed.

F. The single, solitary pumping test performed at the MEA was impacted by hydrogeologic influences off-site that were not part of the area to be evaluated. Because of the elongated nature of the MEA, the cone of depression's radius of influence for the solitary pumping test extended significantly off-site, well past the boundaries of the narrow portion of the property. The pumping test drew water from these off-site locations. This is significantly impactful as much of the analyses selectively addressed only late time data, which is more influenced by off-site factors.

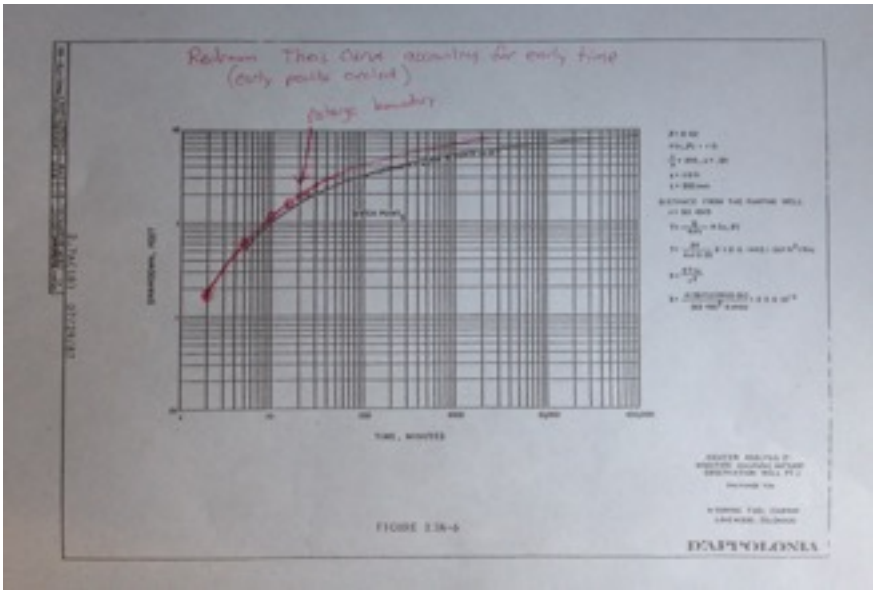
G. The report does not make it clear if the actual aquifer thicknesses were used to calculate transmissivity or only the average aquifer thickness.

H. From Figure 2.6-9 [CBR008 at 76], the thickness of the Basal Chadron Sandstone varies from 21ft to 91ft across the site; the screened intervals of the monitoring wells varied from 22 to 50 feet giving the possibility that these wells did not measure results solely from the entire thickness of that aquifer, or conversely, in part measured water derived from formations other than the Basal Chadron Sandstone.

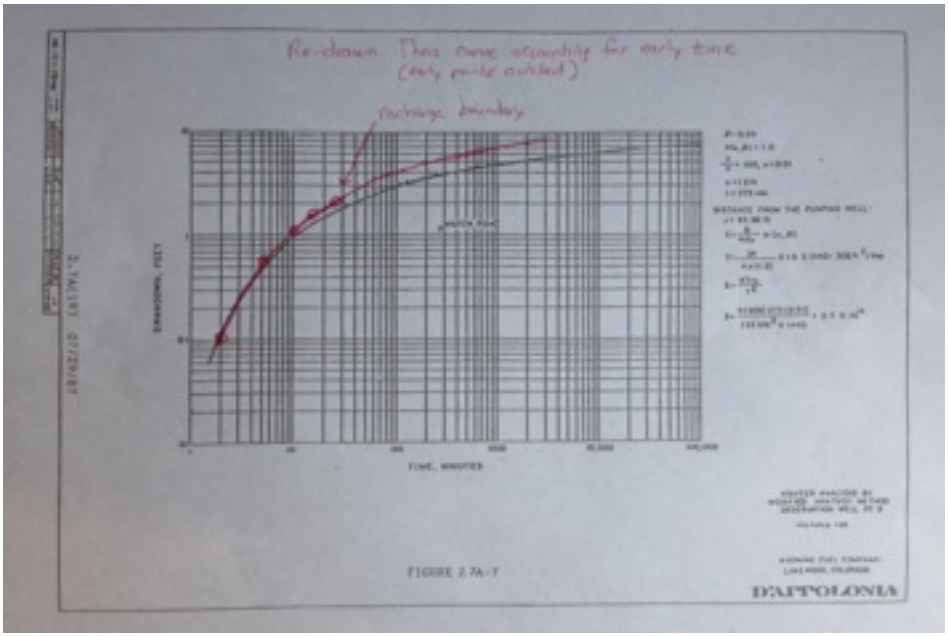
Kreamer Opinion 2: The summary of historical testing results, mischaracterizes results of previous testing of the Basal Chadron Sandstone. Particularly the assertion on page 6 of the Aqui-Ver, Inc., Marsland Hydrologic Test Report #8 that ***"Results of previous testing indicate that the Basal Chadron is relatively homogeneous and isotropic within the current Class III UIC area***…" is contradicted by previous data. [OST009 at 10].

Basis: Previous hydrogeologic testing identified non-homogeneous anisotropic conditions in properties adjacent to the MEA. Ten aquifer tests were performed at the or around the Crow Butte Resources (CBR) site and five of those tests were invalidated by CBR because of possible vertical leakage (Tests 5 through 9 in 2004 and 2005). Information on those pumping tests was not provided. For CBR Aquifer Test One the CBR report explicitly states on page 2.7A (15) [OST006 at 16], *"Figures 2.7A-4 through 2.7A-7 give the apparent indication of leakage especially noticeable at late times."* On page 2.7A (8) [OST006 at 9] in the CBR report the authors state that, *"Based on significant deviation of the pump test data from the Theis type curve in the original analysis the USNRC questioned the use of a non-leaky analysis method in the data."* On page 2.7A (22) [OST006 at 23] they state, *"Examination of the drawdown/time curves plotted for observation well indicated that some leakage from confining bed occurred*

during the pumping test." Additionally, Dr. David Kreamer in testimony regarding pumping test one showed departure from the classic Theis curve consistent with leakage (See Exhibits 1 and 2 below). [OST005 at 4] This same departure is evident in the MEA pumping test. [OST009 at 80-96]

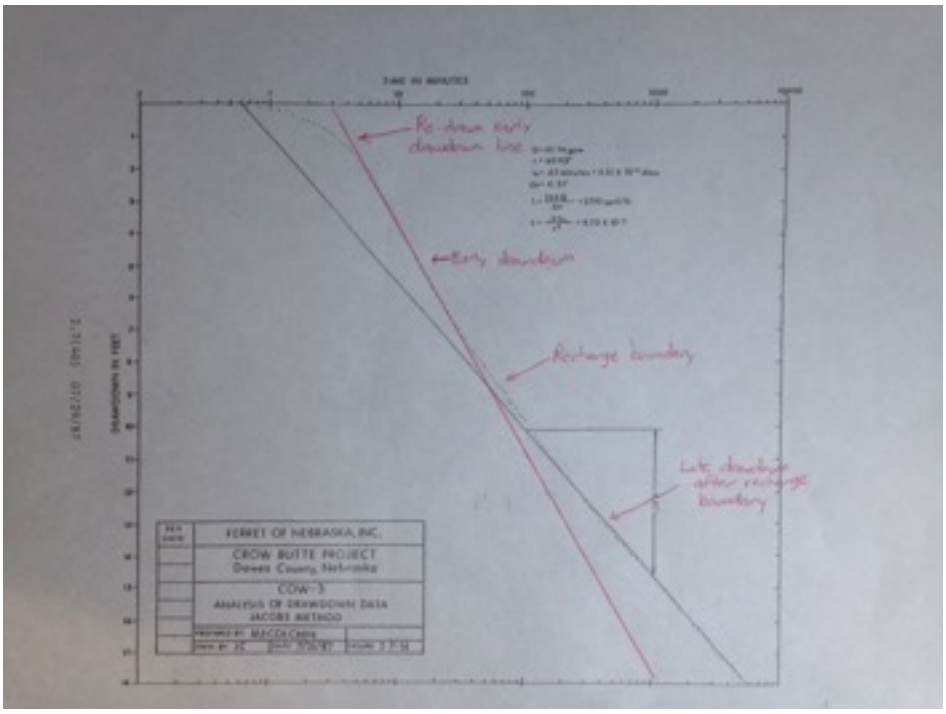


OST005 at 4: Dr. Kreamer re-drawn Figure 2.7A-6, with Theis type-curve matching early time in red. Early data points are circled – late time data below type curve indicates recharge.



OST005 at 4: Dr. Kreamer re-drawn Figure 2.7A-7, with Theis type-curve matching early time in red. Early data points are circled – late time data below type curve indicates recharge.

Historical Aquifer Test 2 from CBR also showed a recharge boundary. [OST007]. Kreamer Testimony September 2015 Exhibit 3 below [OST005 at 7] is Figure 2.7-14 with additional early time interpretation, showing a distinct break point at about 30 minutes, signifying a clear recharge boundary, which can be interpreted as additional vertical flow. Residual time-drawdown data for COW-3 also exhibits this recharge boundary (Figure 2.7-20 on page 2.7 (46)). [OST007 at 33].



OST005 at 7: Cooper Jacob semi-logarithmic plot (Figure 2.7 -14) modified (in red) by Dr. Kreamer to show early drawdown. A recharge boundary appears at approximately 30 minutes, and forms a line of late time data to the right of the red early data trend.

For CBR Pumping test three no vertical leakage analysis was performed, and the report authors document that Test 3 was *"not performed to quantitatively assess the nature of the confining layer above the Chadron Sandstone"*. [OST008 at 13] Similar problems were identified in other CBR pumping tests.

The historic analytical mathematical approaches used by CBR, which are the same used at MEA for interpretation, assume *a priori* homogeneity and isotropy. This presumption by CBR was debunked by the quantification of anisotropy in Pump Test 2 on page 2.7 (53). [OST007 at 40] Note that the major axes of anisotropy reported in CBR Aquifer Test 1 [OST006 at 23] had azimuth difference of 49 degrees from those reported in Test 2 [OST007 at 40] and there are large differences in magnitude of hydraulic conductivity, indicating the complete lack of homogeneity, and the likelihood of preferential flow. This observable but unreported heterogeneity is consistent with unequal distribution of spot contamination during site

stabilization process at CBR and the need to utilize more complex numerical modeling to understand preferential flow in the remedial process.

By making the unsupported statement, "***Results of previous testing indicate that the Basal Chadron is relatively homogeneous and isotropic within the current Class III UIC area"***, [OST009 at 10] the Aqui-Ver report for MEA misrepresents past aquifer testing results and wrongly implies the local geology is simple. It further mistakenly presumes an overly simplified and inappropriate mathematical analytical approach which assumes homogeneous, isotropic subsurface conditions is appropriate.

Kreamer Opinion 3: Aqui-Ver, Inc. in its Marseland Hydrologic Test Report #8 only presented one form of analysis for the MEA site, that is, the Theis methodology, although in their report they refer to **also using the semilogrithmic Cooper- Jacob technique** which was not presented. [OST009 at 15] Both mathematical forms of analysis are considered the simplest forms of aquifer pumping test analysis. They require the same fundamental assumptions to be fulfilled for accurate results. The first major assumption inherent in these analytical, mathematical approaches employed in the MEA hydrology report [OST009 at 15], is that the Basal Chadron Sandstone aquifer is *"confined and has apparent infinite extent"*. The presumption by the authors is not consistent with the data and evidence. This main foundation for the analytical approach was presumed, but is inconsistent with the test data.

Basis: This explanation that the analytical work with semi-logarithmic Cooper Jacob was done is in the Aqui-Ver Report, but no analysis appears, or is omitted. The measured water levels in the MEA aquifer test monitoring wells break significantly from the expected Theis curve. [OST009 at 80-96] This change in the level of water from the Theis curve is consistent with a lack of confinement of the aquifer. The authors of the report acknowledge this flattening of the data, but present only one possible explanation and do not discuss or analyze the possibility of lack of confinement. The variation in the horizontality and thickness of the Basal Chadron is documented in the Report [OST009 at 9] and the qualifying assumptions for the stated mathematical approach are not consistent with the field site.

Kreamer Opinion 4: The second major assumption inherent in this analytical, mathematical Theis approach employed in the MEA hydrology report, is that the Basal Chadron Sandstone aquifer is, ***"homogeneous and isotropic, and of uniform effective thickness over the area influenced by pumping".*** [OST009 at 15] This foundational requirement is violated and is not consistent with the data and evidence. Again, this fundamental condition for accurate use of the Theis methodologies is presumed, but is inconsistent with the evidence.

Basis: Transmissivities that range from 230 ft^2/day to 1780 ft^2/day and values of Storage Coefficient from $1.7x10^{-3}$ to $8.32x10^{-5}$ are not consistent with homogeneous conditions. Homogeneity also means that the thickness of the formation is uniform – it is not. Conjecture in

the EA [NRC006 at 67] that the lack of continual thickness of the Basal Chadron Formation is due to the formation of paleo channels as the sediment was being deposited seems not to be an explanation for the upper surface of the Pierre Shale and lower boundary of the Basal Chadron because that boundary is rather flat, whereas the upper boundary of the Basal Chadron changes elevation repeatedly and fairly abruptly. This is illustrated in the Figures presented in CBR008 at 68-70 and also in Pump Test #8. [OST009 at 35-40]

Kreamer Opinion 5 – Rigorous analyses for anisotrophy were not demonstrated or undertaken for the EA or hydrologic report, and the nature of directional hydraulic conductivity differences remains undefined and not quantified, particularly in the vertical direction.

Basis – The argument put forth in the Aqui-Ver Report [OST009 at 18], and accepted in the EA [NRC006 at 70 & 255], that no anisotrophy exists in the small area of the MEA which underwent a pumping test was based on a 2-dimensional, hand-drawn visual rendering with very few data points [OST009 at 48] rather than a standard, serious, data based evaluation. This is not consistent with professional practice.

Kreamer Opinion 6: Significant discontinuities in the thickness of the Basal Chadron Sandstone aquifer invalidate the simplified mathematical approach used to characterize the hydrological properties of the formation.

Basis: The Basal Chadron Formation is not entirely horizontal nor of equal thickness as required by the Theis assumptions (see above).

Kreamer Opinion 7: There is no justifiable basis for arbitrary analyzing only a selected portion of the pumping data and not the entire test information.

Basis: Selecting just portions of the measured data is not consistent with getting a complete picture of the pumped region, which in turn is just a small area of the site. It can greatly basis the results. In some well response analysis by Aqui-Ver late time data was chosen for analysis, for other wells late time was disregarded and the middle time period was analyzed.

B. Wireman Opinions: Mickel Wireman has opined in OST004 that:

Wireman Opinion 1:
Characterization of the local / regional hydrogeology and groundwater flow at the Marsland Expansion Area is inadequate for demonstrating the ability to contain unwanted fluid migration from excursions and to adequately conduct groundwater restoration.

Basis:
There is still too much uncertainty regarding groundwater flow in the Basal Chadron aquifer. While hydraulic characteristics have been quantified via an aquifer test to provide

data necessary for ISR operation, there are no data and an inadequate discussion regarding:

(1) recharge and discharge to the Basal Chadron – The Technical Report ("TR") contains no information on sources of recharge or the primary pathways which deliver recharge to the deep, confined aquifer. The TR should discuss the relationship between annual recharge to the Basal Chadron aquifer and the annual consumptive used estimated by CBR for MEA operations (maximum of about 500 acre-feet per year). On page 2-88 of the TR [CBR006 at 137] CBR reports that the potentiometric surface fluctuates about 7 ft annually. How does this relate to recharge? The only reference in the TR to discharge from the Basal Chadron aquifer on page 2-86 [CBR006 at 135] is that it occurs at a point east of Crawford where the unit is exposed. CBR should conduct hydrogeologic mapping to locate and characterize the suggested discharge areas.

(2) groundwater flow downgradient of the MEA pumping center – There is significant uncertainty about groundwater flow in the Basal Chadron downgradient of the MEA. The Environmental Assessment ("EA") states in Section 3.3.2.1 [NRC006 at 66] that groundwater flow in the Basal Chadron aquifer is not affected by the Pine Ridge escarpment -even though this escarpment functions as a groundwater divide in the Arikaree and Brule aquifers. There is no discussion to support this statement. The TR indicates that ISR operations at the main CPF mine units resulted in a 60 ft decline in the Basal Chadron aquifer potentiometric surface. The TR further estimates a maximum of about 500 acre-feet per year of consumptive use and a 30 ft decline at the Marsland site. Continuous pumping associated with mining and groundwater restoration will cause some drawdown of the Basal Chadron aquifer miles from the pumping center(s).

(3) CBR has not installed any Basal Chadron monitoring wells upgradient or downgradient of the license area. These wells are necessary to provide the data required to fully evaluate downgradient impacts to the Basal Chadron aquifer. These impacts include potential perturbation of the potentiometric surface downgradient of the mine units and potential contamination of downgradient groundwater that may result from groundwater restoration operations.

(4) No data / information on surface water hydrology at MEA is included in the TR or the EA. Two southward flowing ephemeral streams traverse the MEA. A spring (Dooly spring) is located within the MEA. The baseline sampling conducted by CBR should include sampling the two streams when ephemeral flow is occurring and investigating the spring (is it flowing?; what geologic unit is discharging at the spring?).

(5) CBR has obtained site specific meteorological data for one year: Aug 2010 -Aug 2011. However, 2011 was abnormal year. Ten of the 18 inches of annual precipitation total occurred in May. Another year of meteorological data should be collected.

(6) Baseline monitoring – The TR reports that baseline groundwater quality is determined using data from "baseline restoration wells." CBR proposes a minimum of 6 baseline restoration wells per mine unit. Each of these wells will be sampled four times prior to mining. This data will be used to establish baseline. These wells have not been selected and no data is provided regarding background concentrations for applicable constituents.

Wireman Opinion 2:

Characterization of the structural geology is insufficient to develop an acceptable conceptual model of site hydrology that is adequately supported by site characterization data.

Basis:

The structural geologic setting in NW Nebraska is more complex than previously reported by CBR. Numerous significant structural features associated with the Black hills and Chadron uplifts occur in northwest Nebraska. The MEA is located between the Pine Ridge escarpment (Cochran arch?) to the north and an east-west trending graben south of Marsland. There is disagreement between CBR and previous researchers (Degraw, 1969, Souders, 1981) as to the existence of two major E-W trending faults - the Pine Ridge fault to the north of the Pine Ridge escarpment and the Niobrara Fault which trends parallel to the Niobrara River. CBR concludes that the faults do not exist and therefore there is no discussion of if / how these structures affect groundwater flow in the Arikaree and White River groups. The Black Hills and Chadron uplifts occurred prior to the deposition of the Chadron Fm. The Pine Ridge Escarpment is thought to be associated with the Black Hills uplift and therefore was uplifted prior to the deposition of the Basal Chadron. As discussed above CBR has concluded that groundwater flow in the Basal Chadron aquifer is not affected by the Pine Ridge escarpment. This cannot be the case if the uplift predates the Basal Chadron sandstone.

Wireman Opinion 3:

Aquifer testing conducted at the MEA is inadequate for developing an acceptable site-wide conceptual hydrologic model and does not adequately characterize the subsurface heterogeneity.

Basis:

Only one aquifer test has been conducted at the MEA. The aquifer test was conducted in May 2011. The test was focused primarily on obtaining data to assess the hydraulic

properties of the Basal Chadron. These data are necessary to design and operate ISR operations. The test utilized one Basal Chadron pumping well, 8 Basal Chadron monitoring wells and 3 Brule Fm. Monitoring wells. The pumping well was pumped at 27.08 gpm for 103 hours CBR reports that the radius of influence estimated from the aquifer test data was about 8800 ft (1.6 miles). The MEA extends for more than 7.2 miles from the NW corner to the SE corner. Therefore, much of the Basal Chadron has not been tested to determine if there is hydraulic connection between the Basal Chadron aquifer and the overlying Brule aquifer.

The aquifer test data indicate that hydraulic conductivity and transmissivity of the Basal Chadron near the pumping well is an order of magnitude lower than at the outlying monitoring wells. Lithologic and hydraulic data included in the TR for the Arikaree and Brule aquifers indicate significant heterogeneity. Sediment comprising these formations was deposited in a variety of fluvial environments resulting in facies changes within formations and vertical stacking of facies. The heterogeneity is further increased by structural deformation of the sedimentary rocks that comprise the aquifers. Groundwater flow and well yields are affected by these heterogeneities. The CBR TR includes information on an irrigation wells that yields more than 800 gpm form the Arikaree immediately east of the southern part of the MEA. The yield from this well contrasts with the average yield of less than 100 gpm for all Arikaree / Brule wells. Aquifer testing, monitoring and flow modeling of these aquifers must consider the heterogeneity.

Water table elevation data from the CBR Arikaree and Brule monitoring wells indicate that these two aquifers comprise a single aquifer system. Therefore, any contaminated groundwater migrating into the Brule could be pumped from Arikaree water wells.

Wireman Opinion 4:

There is too much uncertainty regarding applicable groundwater restoration standards. This uncertainty is problematic given the inadequate site hydrogeologic characterization.

Basis:

Both the CBR 2015 TR and NRC Staff's 2018 EA are confusing regarding applicable restoration monitoring requirements and compliance standards. The EA and the TR state (EA page 2-9 [NRC006 at 37], TR page 6-4 [CBR006 at 297]) that the *"primary goal of the groundwater restoration program is to return groundwater affected by uranium recovery operations to pre-injection baseline values on a mine-unit average, as determined by the baseline water quality sampling program."* Per NRC regs (Criterion 5B (5) of 10CFR Part 40) – at the designated point of compliance concentrations of regulated constituents must not exceed (a) NRC approved background concentrations, (b) the applicable UMTRC value or, (c) an alternative concentration limit set by NRC. However, based on the discussion included in Section 6.1.3 of the TR [CBR006 at 297],

it appears that CBR is assuming the restoration efforts will not achieve background concentrations for some constituents -so they are anticipating that restoration values set by NDEQ for Class III UIC permits will apply. In section 6.1.3.1 of the TR [CBR006 at 298] CBR states that they will provide Tables for each of the 11 MEA mine units that include the baseline average and range and the NDEQ restoration standards. There are two issues around this:

1. Will NDEQ standards be considered alternative concentration limits and require NRC approval with a public involvement?
2. In the TR at page 6-4 [CBR006 at 297] it states that if restoration efforts are unable to achieve baseline conditions after *"diligent application of best available technology"* CBR commits to meeting the NDEQ compliance standards. This is consistent with the rational for requesting an ACL. What criteria will be applied to determine if *"diligent application of best available technology"* has occurred?

The NRC and the NDEQ also have different regulations regarding stabilization phase monitoring. The NRC regulations require that regulated constituent concentrations be stable for four consecutive quarters before closure can occur. NDEQ regulations only require sampling for six months. There is no discussion of post closure, long term monitoring.

Wireman Opinion 5:
There is inadequate information regarding the proposed wastewater disposal.

Basis:
The TR states on page 7-22 [CBR006 at 347] that CBR plans to use one or two deep disposal wells to dispose of waste fluids comprised primarily of bleed water (up to 120 gpm / 69 million gal/yr) and groundwater restoration waste water. The disposal wells will presumably be permitted as Class I UIC wells. The TR does not include any information on the geologic formations /aquifers into which CBR proposes to inject wastefluids. These include the lower Dakota, Morrison and /or Sundance. Are any of these formations an underground source of drinking water (USDW) as defined in the Federal Safe Drinking Water Act? If so CBR will need to (1) demonstrate that there are no USDWs below the proposed injection zone and / or request an aquifer exemption. Appropriate hydrogeoloic / water quality data will be necessary to address either of these requirements and should be included in the TR and EA.

C. <u>LaGarry Opinions</u>: Dr. LaGarry has opined in OST010 that:

<u>LaGarry Opinion 1</u>:

In-situ leach mining in the Marsland area would likely contribute toxic heavy metal contaminants, including but not limited to uranium, through three pathways: (a) surface leaks and spills, (b) underground leaks and spills (excursions), and (c) lack of containment. Once in the aquifer, contaminants would (d) migrate laterally through porous and permeable sandstones into the White and Niobrara rivers (Figure 1).

<u>LaGarry Opinion 2</u>:

<u>Surface leaks and spills</u>. The soils in western Nebraska are thin, and directly overly permeable, porous bedrock. The rocks exposed at the surface near Marsland are either the Anderson Ranch Formation of the Arikaree Group or the Runningwater Formation of the Ogallala Group. Both are sandstone. Any leaks or spills onto the landscape would be transmitted directly into the High Plains Aquifer within a few years. There are no confining layers within this aquifer, and in some areas the water table is within 20 meters of the surface. Figure 1 shows the interval of the aquifer vulnerable to surface leaks and spills.

<u>LaGarry Opinion 3</u>:

<u>Underground leaks and spills (excursions)</u>. In order to reach the uranium in the Chamberlain Pass Formation, injection and extraction wells will need to be drilled through the Anderson Ranch, Harrison, Coffee Mill Butte, Monroe Creek, and Ash Creek formations of the Arikaree Group. All of these contain water, and an excursion into any of them would be catastrophic, with contaminants quickly spreading thoughout the entire section of the aquifer. Under these rocks are the less permeable siltstones of the Brule and Chadron formations, which may contain useable water if sufficiently fractured (otherwise not). Below these are the uranium bearing rocks of the Chamberlain Pass Formation. Figure 1 shows the interval of the aquifer vulnerable to underground excursions.

<u>LaGarry Opinion 4</u>:

<u>Lack of containment</u>. Diffendal (1994) showed that there are several potential faults in the Marsland area, and Swinehart and others (1985) show known faults both north and south of Marsland. These faults may allow the transmission of mining fluids to travel upward into the aquifer and laterally into adjacent areas to the west and east. The faults shown in Figure 1 are those that were large enough to be discovered by Swinehart and others (1985) who compiled data from ~12,500 drilling records in western Nebraska and conducted new drilling at 5 mile intervals along the transect shown. My work over the past 25 years has shown that there are likely hundreds more that are too small to be shown on such a diagram.

LaGarry Opinion 5:

Lateral migration. Water in underground aquifers does not stay in the same place. It moves around laterally following the contours of the ancient landscapes the aquifer sediments were deposited onto. This water is also draw to wells (such as center pivots and stock tanks), springs (such as those that spawn the White River), and groundwater-fed rivers (such as the close-by Niobrara River). If contaminants were to escape into the High Plains Aquifer, within a few hears it could be drawn out of the ground and sprayed onto crops by center pivots, or be drawn to the surface by stock tanks placed to water cattle and horses. It would likely migrate eastwards (down gradient) and contaminate the White River, which supplies the towns of Glenn, Crawford, Whitney, and Pine Ridge with water. It could quickly find its way into the Niobrara River, which is a National Scenic River used by thousands of people for recreation every year (Figure 1).

LaGarry Opinion 6:

Based on the arguments presented above, it is my expert opinion that ISL mining in the Marsland, Nebraska area should not be allowed. Of greatest concern is its proximity to the Niobrara River (a National Scenic River), which is used for recreation by thousands of people each year. Unfortunately, if the High Plains Aquifer were to become contaminated, the effects would be irreversible and catastrophic for the local agricultural economy. It would likely lead to the depopulation of the region.

IV. 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, the Tribe has also asserted and continues 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 MEA expansion application 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). These are particularly relevant in light of Crow Butte's recent 2018 decision to cease production and decommission the mine.

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.

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.
***

(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.
***

(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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

5C-Maximum Values for Ground-Water Protection

Constituent or property	Maximum concentration
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 -expoxy-1,4,4a,5,6,7,8,9a-octahydro-1, 4-endo, endo-5, 8- dimethano napthalene)	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_{10} H_{10} $C1_6$, 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

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.)

***

(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 acitivity [sic] even though the NRC has not been designated as lead agency for preparation of the statement; and

***

(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.

***

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.**

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).

NRC Staff's NEPA practices have been recently found to violate NEPA. "The statute's requirement that a detailed environmental impact statement be made for a "proposed" action makes clear that agencies must take the required hard look before taking that action. *OST v. NRC*, *infra*, at 532-533; "Nothing in NEPA's text suggests that the required environmental analysis of a "proposed" action is optional…." *Id*. (Citations omitted.)

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). See also, *OST v. NRC, infra*.

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 (9th 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 the Final EA: (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."

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.").

Burden of Proof on CBR and NRC

As noted by the Board in the Memorandum and Order dated July 27, 2018, at 2:

> [T]he Board has recognized that Contention 2 frames several purported deficiencies that raise both safety and environmental issues associated with, respectively the application of Crow Butte Resources, Inc., (CBR) to amend its existing in situ uranium recovery (ISR) license to obtain authorization for ISR mining activities at the Marsland Expansion Area (MEA) in Dawes County, Nebraska, and the Nuclear Regulatory Commission (NRC) staff's environmental assessment regarding the MEA. See LBP-18-3, 88 NRC __, __ (slip op. at 43) (July 20, 2018). Accordingly, depending on the matter at issue, the staff or applicant CBR may have the ultimate burden of proof under 10 C.F.R. § 2.325 relative to the issuance of the requested 10 C.F.R. Part 40 license.

CBR carries the burden of proof except where NRC Staff carries the burden of proof due to its NEPA and NHPA obligations. Therefore, CBR carries the burden of proof that the MEA application met the applicable legal requirements for that and NRC Staff carries the burden of proof that the Final EA met the applicable legal requirements for that.

V. OST POSITION ON CONTENTION 2

The Tribe has maintained the contention 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 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.

For over a decade, the Oglala Sioux Tribe, individual tribal members and value aligned allies in the local community have intervened in numerous ISL licensing proceedings before the NRC, challenging uranium mining throughout Lakota treaty territory. A frequent and resounding criticism is that no aquifer that has been subjected to ISL uranium mining has ever had the water quality restored to baseline levels.

The Final EA fails its NEPA requirement to "fully inform" the public of the actual impacts of ISL mining by understating this absolute fact and leading even a critical reader to believe that three possible outcomes exist for aquifer restoration. [NRC006 at 33] In actual fact, based on years of accumulated, consistent, incontrovertible scientific data, restoration will only, ever, be to ACLs.

To its credit, while still misleading, CBR's explanation of the restoration process and goals is more candid and at least takes a more realistic view of what restoration will actually

entail in its discussion in the TR. [CBR006 at 297-299] Placing its emphasis on the "diligent application of best practicable technology available." [CBR006 at 297].

With respect to the narrow Contention 2, the sole admitted contention, the Tribe's position is as follows[2]: The MEA application and final EA fail to provide sufficient information regarding the geological setting of the area to meet the requirements of 10 C.F.R. Part 40, Appendix A, Criteria 4(e) and 5G(2); the National Environmental Policy Act; and NUREG-1569 section 2.6.[3]

The MEA application and final EA similarly fail to provide sufficient information to establish potential effects of the project on the adjacent surface and ground-water resources, as required by NUREG-1569 section 2.7, and the National Environmental Policy Act.[4]

The Tribe's position on the Contention 2 subparts are as follows:

(1) the descriptions of the affected environment for establishing the potential effects of the proposed MEA operation on the adjacent surface water and groundwater

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[2] The Tribe submits that all of the expert opinions submitted by it in support of its position support Contention 2 and all subparts. Specific reference are for the convenience of the Board.

[3] See: Kreamer Opinion 1, OST003; Kreamer Opinion 4, OST003; Kreamer Opinion 5, OST003; Kreamer Opinion 7, OST003; Wireman Opinion 1, OST004; Wireman Opinion 2, OST004; Wireman Opinion 4, OST004; LaGarry Opinion 1, OST010; LaGarry Opinion 2, OST010; LaGarry Opinion 3, OST010; and LaGarry Opinion 4, OST010.

[4] See: Kreamer Opinion 1, OST003; Kreamer Opinion 4, OST003; Kreamer Opinion 5, OST003; Kreamer Opinion 7, OST003; Wireman Opinion 1, OST004; Wireman Opinion 2, OST004; Wireman Opinion 4, OST004; Wireman Opinion 5, OST 004; LaGarry Opinion 1, OST010; LaGarry Opinion 2, OST010; LaGarry Opinion 3, OST010; LaGarry Opinion 4, OST010; and LaGarry Opinion 5, OST010.

resources are inadequate.[5]

(2) the absence in CBR's technical report of an adequate description of the effective porosity, hydraulic porosity, hydraulic conductivity, and hydraulic gradient of site hydrogeology, along with other information relative to the control and prevention of excursions.[6]

(3) CBR has developed a scientifically flawed conceptual model of site hydrology that is adequately supported by site characterization data so as to demonstrate with scientific confidence that the area hydrogeology, including horizontal and vertical hydraulic conductivity, will result in the confinement of extraction fluids and expected operational and restoration performance.[7]

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[5] See: Kreamer Opinion 1, OST003; Kreamer Opinion 2, OST003; Kreamer Opinion 4, OST003; Kreamer Opinion 5, OST003; Kreamer Opinion 6, OST003; Wireman Opinion 1, OST004; Wireman Opinion 2, OST004; Wireman Opinion 4, OST004; Wireman Opinion 5, OST 004; LaGarry Opinion 1, OST010; LaGarry Opinion 2, OST010; LaGarry Opinion 3, OST010; LaGarry Opinion 4, and OST010; LaGarry Opinion 5, OST010.

[6] See: Kreamer Opinion 1, OST003; Kreamer Opinion 2, OST003; Kreamer Opinion 4, OST003; Kreamer Opinion 5, OST003; Kreamer Opinion 6, OST003; Kreamer Opinion 7, OST003; Wireman Opinion 2, OST004; Wireman Opinion 3, OST004; LaGarry Opinion 1, OST010; LaGarry Opinion 2, OST010; LaGarry Opinion 3, OST010; LaGarry Opinion 4, OST010; and LaGarry Opinion 5, OST010.

[7] See: Kreamer Opinion 1, OST003; Kreamer Opinion 2, OST003; Kreamer Opinion 3, OST003; Kreamer Opinion 4, OST003; Kreamer Opinion 5, OST003; Kreamer Opinion 6, OST003; Kreamer Opinion 7, OST003; Wireman Opinion 1, OST004; Wireman Opinion 2, OST004; Wireman Opinion 3, OST004; Wireman Opinion 4, OST 004; LaGarry Opinion 1, OST010; LaGarry Opinion 2, OST010; LaGarry Opinion 3, OST010; LaGarry Opinion 4, OST010; LaGarry Opinion 5, OST010; and LaGarry Opinion 6, OST010.

(4) the final EA contains unsubstantiated assumptions as to the isolation of the aquifers in the ore-bearing zones.[8]

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.

The Tribe submits that the opinions of Dr. Kreamer (OST003), Dr. LaGarry (OST010) and Mr. Wireman (OST004) support its contention that the Final EA is in adequate and violates NEPA.

Dr. Kreamer's Opinion states that, "The site characterization by Aqui-Ver, Inc., Marsland Hydrologic Test Report #8, written in 2011, revised in 2015, for the Marsland Expansion Area (MEA) [CBR016] is deficient and mischaracterizes the hydrogeologic environment at the MEA site." [OST003 at 1].

Among his many identified deficiencies, he points out that, "The report only analyzed selective portions of the data from the single pumping test. The report did not present analysis of the complete data set.

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[8] See: Kreamer Opinion 1, OST003; Kreamer Opinion 3, OST003; Kreamer Opinion 4, OST003; Kreamer Opinion 5, OST003; Kreamer Opinion 6, OST003; Kreamer Opinion 7, OST003; Wireman Opinion 1, OST004; Wireman Opinion 2, OST004; Wireman Opinion 3, OST004; LaGarry Opinion 1, OST010; LaGarry Opinion 2, OST010; LaGarry Opinion 3, OST010; LaGarry Opinion 4, OST010; LaGarry Opinion 5, OST010; and LaGarry Opinion 6, OST010.

The data the report selectively excluded can demonstrate, if analyzed, the lack of confinement of the Basal Chadron Sandstone Aquifer and production zone." [OST003 at 2].

These selective exclusions also apply to the Cooper-Jacob semi-logarithmic evaluation that were performed but not presented in the Report. Dr. Kreamer explains that these omitted analyses "can identify a recharge boundary." [OST003 at 2].

Further, Dr. Kreamer explains that due to the relatively small radius of influence of the single pump test, which he calls "poor professional practice" for so large a site, "The subsurface hydrogeological response of the large majority of the site to pumping remains unknown." [OST003 at 2] He goes on to support his opinion by observing that:

> Because of the elongated nature of the MEA, the cone of depression's radius of influence for the solitary pumping test extended significantly off-site, well past the boundaries of the narrow portion of the property. The pumping test drew water from these off-site locations. This is significantly impactful as much of the analyses selectively addressed only late time data, which is more influenced by off-site factors.

[OST003 at 2]. Enhancing the conclusion that the hydrogeologic characterization of the Marsland site is oversimplified and incomplete.

Important Legal Issues in Controversy

NUREG 1569 Section 2.7.3(3) provides that: "The applicant should describe all hydraulic parameters used to determine expected operational and restoration performance."

As described in Dr. Kreamer's Opinion this standard has not been met. Incomplete, oversimplified aquifer characterization invariably leads to inaccurate pore volume calculations that cascade into underperforming restoration goals and the need for ACLs. Accordingly, "expected" restoration performance will not be met. Unless, of course, that expectation is that

ACLs will be required, in which case that should be explicitly stated in the EA in accordance with NEPA's requirements.

NUREG 1569 Section 2.7.3(3) requires that: "It is important for the reviewer to ensure that where fitted curves deviate from measured drawdown, the applicant explains the probable cause of the deviation (e.g., leaky aquitards, delayed yield effects, boundary effects, etc.)."

Dr. Kreamer's opinion points out the failure to achieve this standard:

> The measured water levels in the MEA aquifer test monitoring wells break significantly from the expected Theis curve. [CBR016 at 80-96] This change in the level of water from the Theis curve is consistent with a lack of confinement of the aquifer. The authors of the report acknowledge this flattening of the data, but present only one possible explanation and do not discuss or analyze the possibility of lack of confinement.

[OST003 at 6]. Dr. Kreamer offers a detailed examination of the failure to adequately explain the obvious deviations from the fitted curves in the MEA pump test, utilizing the same failed discussion from previous pump tests at the existing CBR facility. [OST003 at 2-6].

Additionally Dr. Kreamer points out that due to the relatively small portion of the MEA site subjected to the pump test, "The hydrologic response of more of the MEA's subsurface can only be guessed." [OST003 at 2] Certainly, NUREG 1569 requires a more thorough picture of the hydrogeologic environment before issuing a license. [See NUREG 1569 Section 2.7.1] Likewise, NEPA's "hard look" requirements do not allow such extrapolation and guesswork.

NUREG 1569 Section 2.7.2(3) specifies that:

> Evaluate the site hydrogeologic conceptual model for ground-water flow in potentially affected aquifers. Review available data from well logs and hydrologic tests and measurements to obtain confidence that sufficient data have been

> collected and that the data support the applicant's hydrologic conceptual model for ground-water flow within and around the permit boundary. The applicant's interpretation of ground-water hydraulic gradients (used to infer flow direction), horizontal hydraulic conductivity, and the thickness, areal extent, and vertical hydraulic conductivity of confining formations should be evaluated. Examine pumping tests, analyses, and/or other measurement techniques used to determine the hydrologic properties of the local aquifers and aquitards that affect or may be affected by the proposed *in situ* leach activities. Also examine pumping tests that are used to investigate vertical confinement or hydraulic isolation between the ore production zone and upper and lower aquifers.

Dr. Kreamer's Opinion points out that these requisite evaluations were not done, or where done to any degree, are lacking in scientific rigor. He states that, "Rigorous analyses for anisotropy were not demonstrated or undertaken for the EA or hydrologic report, and the nature of directional hydraulic conductivity differences remains undefined and not quantified, particularly in the vertical direction." [OST003 at 6].

He further identifies that, "The argument put forth in the Aqui-Ver Report [OST009 at 18], and accepted in the EA [NRC006 at 70 & 255], that no anisotropy exists in the small area of the MEA which underwent a pumping test was based on a 2-dimensional, hand-drawn visual rendering with very few data points [OST009 at 48] rather than a standard, serious, data based evaluation. This is not consistent with professional practice. " [OST003 at 6-7].

These are strong criticisms leveled at many of the deficiencies in the data used to characterize the hydrogeology of the proposed mining site. NUREG 1569 requires a more complete, scientifically supported, view of the applicants hydrogeologic data prior to evaluation by NRC Staff. NEPA requires that NRC Staff's analysis be rigorous and thorough. Neither standard was met here.

Therefore, NRC should not be able to meet its burden of proof as to the Final EA. 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.

A NEPA compliant environmental assessment 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").

NEPA also requires that the Final EA 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 (9th Cir. 2009); *Limerick Ecology Action, Inc. v. U.S. N.R.C.*, 869 F.2d 719 (3rd 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.

VI. CONCLUSION

The Board should rule in favor of the Tribe, against Crow Butte and NRC Staff on contention 2, revoke the license amendment for the MEA, and affirm that the NRC Staff failed to comply with the Atomic Energy Act and NEPA.

Dated this 17th day of August, 2018.

Respectfully submitted,

_____/s/_____

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket No. 40-8943-MLA-2
	)	
CROW BUTTE RESOURCES INC.	)	ASLBP No. 13-926-01-MLA-BD01
	)	
(Marsland Expansion Project)	)	August 17, 2018

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing '**OGLALA SIOUX TRIBE'S INTIAL POSITION STATEMENT**', in the captioned proceeding were served via email on the 17th day of August, 2018 and will be served via the EIE as soon as practicable.

Respectfully submitted,

~signed electronically

_____

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