

December 11, 2015

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:)	
)	Docket No. 40-8943
CROW BUTTE RESOURCES, INC.)	
)	ASLBP No. 08-867-02-OLA-BD01
(License Renewal))	

CROW BUTTE RESOURCES' PROPOSED REPLY
FINDINGS OF FACT AND CONCLUSIONS OF LAW

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I. INTRODUCTION

1.1 On November 23, 2015, the parties filed their respective proposed findings of fact and conclusions of law.¹ Crow Butte agrees with the NRC Staff's proposed findings of fact and conclusions of law, but does not agree with those presented by the intervenors. Rather than detail every mistake or omission in the intervenors' submission, we focus on the principal areas of disagreement with the intervenors' proposed findings of fact and conclusions of law.

1.2 As discussed below and in light of the reliable and probative evidence presented in this proceeding, we resolve all of the admitted contentions in this proceeding — Contentions A, C, D, F, 1, 6, 9, 12, and 14 — in favor of Crow Butte and the NRC Staff.

1.3 We conclude that the NRC Staff has taken the requisite "hard look" at the environmental impacts of license renewal as required by the National Environmental Policy Act ("NEPA") and the Commission's regulations at 10 C.F.R. Part 51. To the extent that the intervenors are seeking to have additional detail incorporated directly into the Environmental Assessment ("EA") (Exh. NRC-009), we note that an EA is not intended to be a "research

¹ "Crow Butte Resources' Proposed Findings of Fact and Conclusions of Law" ("CBR Prop. Findings"); "NRC Staff's Proposed Findings of Fact and Conclusions of Law" ("NRC Prop. Findings"); "Oglala Sioux Tribe and Consolidated Intervenors Joint Filing of Proposed Findings of Fact and Conclusions of Law" ("Int. Prop. Findings").

document” and need not address each and every issue in exhaustive detail.² It is enough that the EA describes the proposed action, identifies the sources of data used, assesses the likely impacts of the project across a range of resource areas, and briefly describes bases for its conclusions. Moreover, in NRC licensing proceedings, the ultimate NEPA judgments are made on the basis of the entire record before the presiding officer, such that the EA “can be deemed to be amended pro tanto.”³

1.4 We further find that the NRC Staff has satisfied the requirements of the National Historic Preservation Act (“NHPA”) and the Atomic Energy Act (“AEA”).

II. REPLY FINDINGS OF FACT

A. Contention A

2.1 Contention A asserts that “[t]here is no evidence based science for [the NRC Staff’s] conclusion that ISL mining has ‘no non radiological health impacts,’ or that non radiological impacts for possible excursions or spills are ‘small.’”

2.2 In addition, OST argues that there is no scientific basis for excluding uranium from the monitor well testing and that bi-weekly testing of monitoring wells is insufficient to identify potential contamination.

1. *Water Levels*

2.3 The intervenors assert (Int. Prop. Findings at 1) that “[r]educd water quality or lowered water levels in domestic and agricultural wells can cause economic hardship

² *Entergy Nuclear Generation Co. (Pilgrim Nuclear Power Station)*, CLI-10-22, 72 NRC 202, 208 (2010) (citing *Town of Winthrop v. FAA*, 533 F.3d 1, 13 (1st Cir. 2008)); *Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation)*, CLI-02-25, 56 NRC 340 (2002).

³ *Louisiana Energy Servs., L.P. (Nat’l Enrichment Facility)*, LBP-05-13, 61 NRC 385, 404 (2005).

to regional water users and present potential hazards to livestock.” However, the water level and water quality data for the Brule aquifer provided by Crow Butte (*see, e.g.*, Exhs. CBR-063 and CBR-064) do not suggest that water levels or water quality in the Brule aquifer, which is the primary source for domestic and agricultural wells near the Crow Butte site, have been adversely affected by mining operations.

2.4 In addition, the intervenors’ witnesses did not provide any evidence of reduced stream flow at the Crow Butte site or in nearby waterbodies. Dr. Kraemer’s anecdotal claims of shrinking reservoirs near the site based on “Google maps” not in evidence (Tr. at 2446, 2506, 2559) are not reliable or probative of the issues in this proceeding.

2.5 We therefore find that there is no indication that water levels in the Brule aquifer have been lowered due to mining activities in the Basal Chadron Sandstone or inadequate confinement. There also is no evidence to suggest that offsite wells or other waterbodies near the Crow Butte site have been adversely affected by mining activities.

2. *Uranium as Excursion Parameter and Bi-Weekly Testing*

2.6 The intervenors’ proposed findings did not address uranium as an excursion parameter of the adequacy of bi-weekly testing of monitoring wells. As a result, we consider this aspect of Contention A to have been abandoned.⁴

B. Contention C

2.7 Contention C asserts that “[the NRC Staff’s] characterization that the impact of surface waters from an accident is ‘minimal since there are no nearby surface water features,’ does not accurately address the potential for environmental harm to the White River.”

⁴ Where an intervenor chooses to file proposed findings (as OST and Consolidated Intervenors did here), the Board is entitled to take that filing as setting forth all of the issues that were contested. *Southern California Edison Co.* (San Onofre Nuclear Generating Station, Units 2 & 3), ALAB-717, 17 NRC 346, 371 (1983).

OST claims that, because the White River runs through the Pine Ridge Reservation, there is the potential for contamination of the White River from surface spills and subsurface migration. They argue that Crow Butte and the NRC Staff ignore the White River as a potential surface water that is affected in the event of an accident and claim that the White River alluvium should be evaluated for contamination.

1. Potentiometric Surface

2.8 The intervenors claim (Int. Prop. Findings at 5) that “[t]here is nothing in the record to indicate whether the high water table in the vicinity of English Creek and Mine Units 6 & 8 is the result of discharge from the Brule or the Basal Chadron/Chamberlain Pass Formation.” This is not true.

2.9 A Crow Butte witness, Wade Beins, testified (Tr. at 2471) that there are perched water tables in Mine Units 6 and 8 based on both water level data and well logs. Water quality from the springs that feed English Creek also is more consistent with that of the Brule Formation, than the Basal Chadron aquifer. And, the potentiometric surface of the Brule aquifer in Mine Units 6 and 8 creates a strongly downward hydraulic gradient that precludes the Basal Chadron aquifer as the source for the springs.

2.10 Moreover, contrary to the intervenors’ claims (Int. Prop. Findings at 5), the NRC Staff has specifically addressed the potential causes of excursions in Mine Units 6 and 8 in both the Safety Evaluation Report (“SER”) and EA. Exhs. NRC-009 at 124-127; NRC-010 at 77-79. The NRC Staff has also required in License Condition 11.12 that Crow Butte conduct more frequent testing and to include uranium among the parameters tested in Mine Units 6 and 8. Exh. NRC-009 at 126; Tr. at 1618, 1632.

2. *Monitoring Program*

2.11 Contrary to the intervenors' assertion that "[t]he water resource monitoring program is not designed to collect data to assess impacts to surface waters including seeps, springs and wetlands," Crow Butte performed preoperational water quality sampling and conducts quarterly sampling of Squaw and English Creeks both upstream (background) and downstream of the mine site. Exh. CBR-001 at 45-46. This data does not indicate impacts from Crow Butte's operations on water quality in either water body.

2.12 Crow Butte also takes quarterly water quality samples of impoundments located within the permit boundary, as well as annual sediment samples. *Id.* These data also do not indicate impacts from Crow Butte's operations. All of this data is presented in the semi-annual effluent monitoring reports that are submitted to the NRC. *See, e.g.,* Section 3.3 and Appendix H of 2013 *Semiannual Radiological Effluent and Environmental Monitoring Report for the Crow Butte Uranium Project* (ADAMS Accession No. ML14071A019) (Exh. CBR-018).

2.13 The intervenors also claim (Int. Prop. Findings at 6) that there are public water supply springs for Crawford that "may represent groundwater discharge, yet the water source of these discharge features is unknown due to a lack of sampling." The intervenors presented no testimony or evidence on this point. But, regardless of the source of the springs, they are located 2 miles from the mine site and are cross-gradient (not down-gradient) from the mine site with respect to groundwater flow directions in both the Brule and Basal Chadron aquifers. Exh. CBR-011 at 2-173, 2-185, 2-187; Exh. NRC-102. There is therefore no basis for presuming any impact from Crow Butte's operations.

2.14 The intervenors assert (Int. Prop. Findings at 6) that the "pre-operational potentiometric surface of the Basal Chadron/Chamberlain Pass Formation was above ground

level (NRC-009 at 61), indicating the potential for discharge from the Basal Chadron/Chamberlain Pass Formation to the Brule aquifer, the White River alluvium and streams that cross the license area” and that “[l]owering of this potentiometric surface reduces the volume of discharge that in turn results in reduced flow in streams, springs and seeps.” But, as the NRC Staff and Crow Butte witnesses testified, the pre-operational potentiometric surface for the Basal Chadron aquifer only was above ground level in the far northern portion of the mining area, in sections 11, 12, and the northern edge of section 13. And, operations have since lowered that potentiometric surface resulting in strongly downward vertical hydraulic gradients across the entire license area.

2.15 While the intervenors claim (Int. Prop. Findings at 6) that “discharge to the White River alluvium is likely where the Basal Chadron/Chamberlain Pass Formation subcrops under the alluvium a few miles northwest of Crawford,” there is no evidence to suggest that the Basal Chadron Sandstone is in contact with alluvial deposits from the White River. Discharge through such a subcrop discharge area would require migration of mining solution through the Basal Chadron Sandstone past the monitoring well ring to a point “a few miles northwest of Crawford.” Water levels taken for the North Trend permit and presented in the license renewal application show that groundwater flow in the Basal Chadron aquifer northwest of Crawford is to the southeast towards the mine. Exh. CBR-011 at 2-191. And, as shown in Figure 2.7-4b (*id.* at 2-185; Tr. at 1076, 1081), the current groundwater flow direction in the northern quarter of the mine site is to the southeast — that is, away from the White River and its alluvium.

2.16 With respect to the intervenors’ assertion (Int. Prop. Findings at 7) that the NRC does not require testing of the White River itself, we note that this does not mean that there

is no testing of the White River. As the NRC Staff indicated (Exh. NRC-001-R at 23), the South Dakota Department of Environmental and Natural Resources does test for uranium and other constituents associated with uranium mining activities in the White River and has not identified any issues. No data was presented by the intervenors' witnesses (or other witnesses) that shows impacts to the White River associated with Crow Butte's operations. Exh. CBR-001 at 46.

2.17 We find that the NRC Staff has considered reasonably foreseeable impacts of Crow Butte's operations on surface waters, including Squaw Creek, English Creek, and the White River, from an accident at Crow Butte. Crow Butte has taken active steps to minimize the potential for leaks and spills (underground or surface), and has a comprehensive monitoring program in place to detect any such leaks or spills should they occur. The NRC Staff has adequately considered the potential for contamination of the White River from surface spills and subsurface migration, as well as the potential impacts on downstream users.

C. Contention D

2.18 Contention D asserts that "[the NRC Staff] incorrectly states there is no communication among the aquifers, when in fact, the Basal Chadron aquifer, where mining occurs, and the aquifer, which provides drinking water to the Pine Ridge Indian Reservation, communicate with each other, resulting in the possibility of contamination of the potable water. Based on this potential communication between the aquifers, the EA's environmental justice analysis, including analysis of cumulative effects, should be expanded to consider potential impacts on the aquifer which provides drinking water to the Pine Ridge Indian Reservation."

2.19 Based on statements by Dr. LaGarry, OST claims that aquifers in this area are interconnected, and, as a result, there are potential pathways for contamination of the Pine Ridge water supply via faults and fractures. OST also asserts that Crow Butte failed to

adequately consider the White River Structural Feature, which may affect the control of fluid migration outside the mining area.

2.20 The contention also includes a piece related to the potential for contamination to cause environmental justice impacts outside the immediate vicinity of the site.

1. Faults and Fractures

2.21 The intervenors claim that the “the map drawn up for the Wyoming Fuels Company” “identifies numerous faults in the license area that have neither been explained nor refuted by the Applicant of NRC Staff.” Int. Prop. Findings at 8, citing INT-044 & INT-045. But, the map does not show any faults. Instead, the map includes “red lines” drawn on the map by Dr. LaGarry (Tr. at 1200-1201), who is postulating faults on the map based on nothing more than his interpretation of the meaning of kinks in the ore trend presented in the map.

2.22 Crow Butte explained (Exh. CBR-045 at ¶25) that the nearly 11,000 drill holes completed across the permit area, in addition to aquifer tests and other evidence, do not support the presence of a fault or faults within the permit area. Mr. Beins for Crow Butte also testified (Exh. CBR-045 at ¶26) that the generalized ore trend shown on the 1982 map does not fully define the complex nature of the roll-front ore deposit systems as mapped by Crow Butte geologists. Mr. Beins acknowledged that the general outline would lead one to believe that the ore trend is a solid zone of ore approximately a half mile wide. In reality, however, multiple roll-front ore deposits occur in stacked, offset groups that can be mapped to follow particular channel sandstone bodies and are controlled in some instances as sands thin and pinch out.

2.23 According to Crow Butte, the “kinks” observed in the 1982 map were based on a limited amount of data, and as further development of the mining wellfield has continued, those kinks are no longer interpreted to be present. *See* Exh. CBR-055 (ore maps for

main permit area). Dr. LaGarry acknowledged (Tr. at 1066) that he had “no data and no evidence” to contradict Crow Butte’s conclusions.

2.24 The intervenors also claim (Int. Prop. Findings at 8-9) that the NRC Staff relies on “hypothetical ‘self-healing’ properties of the clay in the upper confining unit to explain the lack of hydraulic connectivity.” But, neither Crow Butte nor the NRC Staff relied solely on the self-healing properties as the basis for confinement. Instead, they simply pointed out that this was one additional basis for concluding that faults or fractures in the upper confinement layer would be unlikely to transmit mining fluids.

2.25 Crow Butte witnesses testified that fractures typically only develop in materials having a significant silt and sand percentage (*e.g.*, siltstones and sandstones), not in the claystones that are common in the upper and lower confining units, which have very low permeability and higher plasticity. Exh. CBR-001 at 21. Moreover, Crow Butte testified that the sediments overlying the mined aquifer have not undergone complete lithification (the process by which loose sediments are converted into cemented rock), as observed in cores and drill cuttings during drilling investigations. Exh. CBR-001 at 21. These sediments tend to swell rapidly (*i.e.*, higher expansivity) when exposed to water, as evidenced by bridging within boreholes due to swelling clays. *Id.*; *see also* Tr. at 1134-35 (Mr. Beins discussing field observations of swelling); Tr. at 1103 (LaGarry acknowledging swelling of clays).

2.26 Crow Butte and NRC Staff witnesses also testified (Exh. CBR-045 at 5, 35; Tr. at 1152-53, 1303-04) that any significant faults or fractures present within the license renewal area would be obvious and manifest as significant boundary conditions in aquifer pump test data collected within the license area. No such boundary conditions were observed in the

aquifer testing data, as discussed further below. Exhs. CBR-045 at 5 and CBR-074 at 14; Tr. at 1303-04.

2. *Aquifer Pump Tests*

2.27 The intervenors raise a number of concerns regarding the four aquifer pump tests performed by Crow Butte. As an initial matter, the scope of the NRC review of a license renewal application differs from that of an initial license application. Licensees need not resubmit a complete application covering all aspects of facility operation, or reanalyze aquifer pump test data from decades prior. For this reason, we decline the intervenors' invitation that we reconsider the adequacy of the aquifer pump test analysis *de novo*. Crow Butte need not reproduce every data point or re-perform prior analyses using present-day methods.

2.28 Nevertheless, we solicited testimony on the aquifer pumping tests to ensure that NRC Staff took a hard look at the potential environmental impacts from Crow Butte's operations. We conclude that they did.

2.29 Crow Butte performed four groundwater pumping tests between 1982 and 2002 in order to comply with the requirements of the Nebraska Department of Environmental Quality ("NDEQ") Underground Injection Control ("UIC") permit (Exh. CBR-017).⁵ Crow Butte and the NRC Staff relied on the aquifer test report results as part of the basis for adequate confinement. The NRC Staff testified that these four aquifer pumping tests were long-term tests (51 to 72 hours) with high pumping rates (23.8-51.2 gallons per minute) that significantly stressed the Basal Chadron Sandstone aquifer over large radii of influence (4,000-5,700 feet). Ex. NRC-076-R2 at 37. The aquifer pumping tests were designed, operated, and analyzed followed widely accepted practices that are incorporated into American Society of Testing and

⁵ Crow Butte has performed additional aquifer tests within the region, but no additional tests have been conducted at the license renewal area.

Materials (“ASTM”) standards. *Id.* at 35-36. As discussed and confirmed by the Crow Butte and NRC Staff witnesses, all four pump tests conclude that there is no hydraulic connection between the Brule and the Basal Chadron Sandstone.

2.30 Although the intervenors’ witness, Dr. Kreamer, had several concerns with the aquifer pump tests, all of his issues were adequately explained by Crow Butte and the NRC Staff. For example, Dr. Kreamer relied on early-drawdown data in reaching his conclusions, but never accounted for the effects of wellbore storage. Exh. CBR-074 at 11; Exh. NRC-103 at 16-17. Nor did he account for the fact that relying upon early time drawdown data is inconsistent with aquifer testing guidance, which concludes that the use of late-time drawdown data is superior for analytical curve-matching purposes. Exh. CBR-074 at 11; Exh. NRC-103 at 16-17.

2.31 And, while Dr. Kreamer acknowledges that decreased drawdown might be due to a vertical enlargement (greater aquifer thickness) in the aquifer radially outward from the pumping well, he never recognizes that the authors of the aquifer pumping test reports expressly accounted for this through use of a two-stage Theis type-curve analysis. Exh. CBR-074 at 13; Tr. at 2533-34.

2.32 We find that the results from the four aquifer pump tests, along with long-term operation of the site, demonstrate that there is no hydraulic connection between the Brule and Basal Chadron Sandstone. Dr. Kreamer’s claims are not supported by the record before us. Moreover, we find that any “leakage” is insignificant and could, in any event, only result from the downward movement of water from the shallow aquifer to the production aquifer. Upward leakage of groundwater (and mining solution) is not possible under the observed natural and induced downward vertical hydraulic gradients in the mine area. Exh. CBR-001 at 16. We

therefore find that mining fluids would not migrate upward into the shallow aquifer during Crow Butte's operations even if a hydraulic connection were found to exist.

3. *White River Structural Feature*

2.33 Intervenor assert (Int. Prop. Findings at 12) that the NRC Staff and Crow Butte are “unable to characterize the structure of the White River Feature” and “unable to determine the effect the feature has on groundwater flow in the Basal Chadron/Chamberlain Pass Formation, including the effect on the potentiometric surface.” This is simply not the case.

2.34 Crow Butte performed an in-depth investigation of the potential for the White River Structural Feature, which is located approximately two miles from the Crow Butte site, to be a contaminant pathway as part of the license renewal review. The investigation included drilling 70 borehole locations spatially distributed within the footprint of the fold structure. Exh. CBR-001 at 24. Crow Butte concluded that the feature, which at depth offsets the Pierre Shale, is manifested at shallower depths as a northeast trending, subsurface fold within the formations of interest near the license areas. Exh. CBR-001 at 23.

2.35 Crow Butte witnesses testified that the White River Structural Feature is not acting as a discharge location for groundwater in the Basal Chadron Sandstone, as evidenced by contoured groundwater levels and artesian conditions, which indicate a consistent flow direction and consistently confined aquifer conditions across the structure. Exh. CBR-001 at 23; ARCADIS, *Petition for Aquifer Exemption – North Trend Expansion Area* at Figure 22 (Exh. CBR-013). Crow Butte witnesses stated that the increased gradient in the vicinity of the structure is likely the result of reduced transmissivity due to structural thinning of the Basal Chadron Sandstone along the fold limb. Exh. CBR-001 at 23.

2.36 Crow Butte witnesses also pointed to 3D modeling of the structural feature that utilized the elevations of the top and bottom contacts for the production zone based on the geophysical signatures of the borehole locations. Exh. CBR-001 at 24. The 3D analysis permits a sophisticated evaluation of the spatial distribution and lateral correlation of marker horizons between borehole locations. Based on the 3D modeling and the very tight clustering of borehole locations across the fold structure at the North Trend Expansion Area, the witnesses conclude that a linear offset feature (*i.e.*, a fault) is not present within the White River Structural Feature at stratigraphic horizons above the Pierre Shale. Exh. CBR-045 at 9.

2.37 The NRC Staff agreed, noting in its EA (Exh. NRC-010 at 27, 38-39) that the White River Structural Feature does not include an offset of the geologic contact between the Pierre Shale and the Chadron Formation, nor offset of members of the Chadron or Brule formations. The NRC concluded that the feature does not affect hydraulic confinement of the Basal Chadron Sandstone aquifer. *Id.*; *see also* Exh. NRC-001 at 36-39.

2.38 Crow Butte's witnesses also testified that, even assuming hypothetically that a fault across the Chadron Formation were present at this location, the observed consistent northwest dip of the production zone unit within the fold structure would require that little to no fault offset be present based on the distribution of marker horizons. Exh. CBR-045 at 9.

2.39 Crow Butte witnesses further explained that the age of the structure is a strong argument for the lack of a transmissive pathway, such as a fault. At the hearing, Mr. Wireman noted (Tr. at 1186-1187) that faults tend to become less transmissive with age. According to Crow Butte witnesses and controverted by the other witnesses, the fold structure is very old, between 30-32 million years old, and the age of the fold is tightly constrained by

regional dating (paleo fauna and flora) of the age of the Chamberlain Pass, Chadron, and Brule formations. Exh. CBR-067 at 15.

2.40 At the evidentiary hearing (Tr. at 1172-73), Mr. Wireman withdrew the portion of his testimony (Exh. INT-070 at 1) asserting that Crow Butte should conduct drilling near the feature. Mr. Wireman acknowledged that Crow Butte had in fact conducted a drilling campaign to assess the White River Structural Feature. Dr. LaGarry had no testimony specifically related to the interpretation of the drilling campaign or interpretations of the White River Structural Feature advanced by Crow Butte and the NRC Staff. Tr. at 1173-74, 1184.

2.41 We find that Crow Butte and the NRC Staff have conducted a thorough assessment of the potential effects of the White River Structural Feature. And, even giving no weight to the NRC Staff modeling efforts, we find that the NRC Staff has given substantial consideration to the potential effects of the White River Structural Feature on confinement and offsite transport of mining fluids. The intervenors have presented nothing to undermine the conclusions in the EA or the SER with respect to the White River Structural Feature.

4. *Environmental Justice*

2.42 The intervenors assert that the “failure of the consultation process also constitutes a failure of the EJ analysis as it is lacking of crucial information necessary to make the analysis.” But, this claim is wholly unmoored from any statutory or regulatory requirement. The purpose of the NEPA analysis, and the environmental justice analysis in particular, is to identify impacts to minority and low-income populations. But, as we find elsewhere in this decision, there is no evidence of any offsite impacts, much less impacts on the reservation 50

miles from the site.⁶ In the absence of any “off-site” impacts that could contaminate the White River or drinking water supplies at Pine Ridge, there would be no environmental justice impacts from Crow Butte’s operations.

2.43 Furthermore, we find that the NRC Staff followed appropriate guidance in NUREG-1748, Appendix C, in conducting the environmental justice analysis, including the selection of a 4-mile radius for evaluating impacts. The NRC Staff acknowledged the existence of OST on the Pine Ridge Reservation, but concluded based on the distance from the facility to the reservation and the absence of any offsite impacts that individuals on the reservation would not be adversely affected by Crow Butte’s operations. *See* NRC Prop. Findings at ¶¶6.111-6.114.

2.44 We also find that the NRC Staff had an adequate basis for concluding that there would be no significant impacts to water quality, and, therefore, that the NRC Staff appropriately concluded there were no “disproportionately high and adverse” impacts to address in the context of environmental justice.

2.45 Overall, we find that there is no evidence of impacts to drinking water on the Pine Ridge Reservation from Crow Butte’s operations (as opposed to naturally-occurring radionuclides). Because of the absence of any impacts beyond the mining area, much less impacts over 30 miles away at the Pine Ridge Reservation, we find that there was no need for the NRC Staff to include the Pine Ridge Reservation in the environmental justice analysis.

⁶ Dr. LaGarry did not allege a direct connection between the Basal Chadron Sandstone and drinking water aquifers at the reservation. Instead, he posited a series of hydraulic connections such that “water could migrate through Chamberlain Pass, through a fault, through Chamberlain Pass, through a fault, through Chamberlain Pass, through a fault, through Chamberlain Pass to the reservation.” Tr. at 1220-21. However, at the supplemental hearing, Dr. LaGarry acknowledged that “lateral migration of contaminated water from the license area somehow around, or over, or through the Chadron Arch onto the reservation is extremely unlikely.” Tr. at 2582.

D. Contention F

2.46 Contention F is a technical contention entitled “Failure to Include Recent Research.” The contention is based on claims by Dr. LaGarry that Crow Butte (as well as the NRC and NDEQ) are relying on old data and old research when there is more recent research on regional geology.⁷

2.47 In discussing site geology, Crow Butte and the NRC Staff state that they continue to use the nomenclature found in the prior license applications for consistency and to prevent confusion as to where mining is occurring (for both the public and regulators). *See, e.g.*, Exh. CBR-001 at 31. However, they both acknowledge revisions to the local stratigraphy and provide tables correlating the nomenclature for the various units. *See, e.g.*, MEA Technical Report, Table 2.6-2, *Representative Stratigraphic Section* (Exh. CBR-015).

2.48 At the supplemental hearing, Dr. LaGarry acknowledged that he was satisfied that Crow Butte and the NRC Staff had done their “due diligence” regarding the revised nomenclature by using the terminology in its historical context. Tr. at 2570. This admission effectively moots the contention.

2.49 Overall, we find that it is appropriate for Crow Butte and the NRC Staff to continue to use historical nomenclature in documentation for consistency and ease of understanding for the public and regulators, particularly in light of the fact that they both acknowledge and correlate their descriptions among various naming conventions.

⁷ Contention F also included a claim that references in the LRA (Exh. CBR-011) were to outdated EPA guidance documents for taking groundwater samples from 1974 and 1977 and that the LRA should have cited more recent guidance from 1992 and 2000. The intervenors provided no proposed findings on this point and we therefore consider this aspect of the contention to have been waived. *San Onofre*, ALAB-717, 17 NRC at 371.

E. Contention 1

2.50 Contention 1, which was merged with Contention 2, addresses “[w]hether the cultural surveys performed and incorporated into the EA formed a sufficient basis on which to renew Crow Butte’s permit.” The intervenors contend that the EA lacks an adequate description of either the affected environment or the impacts of the project on archaeological, historical, and traditional cultural resources. Intervenors maintain that surveys from 1982 and 1987 do not provide proper baseline information, and claim that the NRC Staff should have conducted a new survey of the license area. The intervenors also contend that the NRC failed to engage in meaningful consultation with the Oglala Sioux Tribe.

1. *Identification of Cultural Resource*

2.51 The intervenors allege (Int. Prop. Findings at 24) that “[n]o specific survey was performed for this license renewal in order to demonstrate that archaeological sites within the project area are properly identified, evaluated and protected and to show that it has submitted a proper analytic discussion under 10 C.F.R. §§ 51.45 and 51.60.” The basis for this assertion is the Final EA’s reliance on cultural resource surveys from 1982 and 1987.

2.52 But, the NRC Staff and Crow Butte explained that Crow Butte did not conduct additional field studies because the results of the prior surveys remained applicable. Exh. CBR-007 at 8. There were no major changes in site activities or disturbed areas since initial surveys were performed and the site was constructed.

2.53 The NRC Staff also specifically reviewed the results of the field identifications conducted in 1982 and 1987 “to verify the extent and intensity of the original field inventories in relation [to] the current operating conditions.” Exh. NRC-001-R at 67, 72. The NRC Staff concluded that “the results from the 1982 and 1987 field inventories, as reported in

1987, are complete, thorough, and fully adequate for describing baseline conditions for the occurrence, distribution, and condition of archaeological and historical sites.” *Id.* at 72. The NRC Staff also noted that “little or no physical change has occurred on the landscape since the Class III inventories were conducted, with the exception of ongoing CBR mining operations that have continuously avoided all known cultural site locations.” *Id.* at 72-73.

2.54 The intervenors claim (Int. Prop. Findings at 24) that “12 of the 18 sites listed in the Bozell study as potentially needing protection, including a potential burial site, were excluded without explanation from the historic resources project resources map in or near the Crow Butte license renewal area and that require further investigation.” But, that is simply not the case. The treatment of each of the 18 sites were specifically discussed in the Bozell and Pepperl report. Exhs. CBR-027 and CBR-028.

2.55 Six of the 18 sites, including three Native American and three historic period locales, located within the affected area were evaluated as being “potentially eligible” for the NRHP, requiring further field assessment for a full evaluation as being “eligible.” Four of these sites (25DW114, 25DW192, 25DW194, and 25DW198) were evaluated as having potential importance for the recovery of archaeological data, and sites 25DW112 and 25DW00-25 have possible architectural values. The “potentially eligible” Native American and historic period sites were treated as “eligible,” pending further actual determination of their eligibility status. Bozell and Pepperl, Main Report, at 69-77 (Exh. CBR-027).

2.56 Crow Butte explained that the six original “potentially eligible sites” were designated for avoidance during construction activities, both at the time and for the future. Only

one site, 25DW192, was located entirely in an area of potential disturbance at the time. This property was and remains protected by a fenced perimeter. Exh. CBR-007 at 11.⁸

2.57 Crow Butte has since been able to avoid each of the remaining “potentially eligible” archaeological sites during the construction and operation phases of the project. Exh. CBR-007 at 12. Documented field visits by the NRC made to each of the five “potentially eligible” sites in August 1995, and again in 2010, 2011, and 2012, confirmed that the sites did not incur any impacts during construction and operation. Exh. NRC-056.

2.58 The intervenors claim (Int. Prop. Findings at 24) that the “name and credentials of the person supervising the ‘class III’ survey have not been provided” and that without such information, it is not possible for Tribe, Consolidated Intervenors, or the public to evaluate the nature and extent of the surveys that have been performed. But, this concern was addressed at the evidentiary hearing. Dr. Redmond indicated that he had no issue with the qualifications of Bozell or Pepperl, who performed the Class III archeological surveys. Tr. at 989.

2.59 And, to the extent that Dr. Redmond was referring to the Traditional Cultural Property (“TCP”) survey performed by the Crow and Santee Sioux Nation tribes,⁹ that

⁸ One of the six potentially eligible archaeological sites from the 1987 evaluation, Site 25DW198, was subsequently found to be in an area of new CBR well-drilling activities. This site received additional evaluative field testing in 2003. Späth and Walth, “Crow Butte Resources Evaluative Testing of Site 25DW198, Dawes County, Nebraska” (June 2003) (Exh. CBR-032). Site 25DW198 was again subjected to an intensive inventory of the previously mapped site surface and the adjacent areas, followed by excavation of four subsurface test units. Based on the findings of this field effort, a recommendation was made that the site lacked the potential to yield information important to the region’s prehistory and that it was not eligible for listing on the NRHP. The NE SHPO concurred with this recommendation and the archaeological site was removed from the project list of potentially eligible archaeological sites. Letter from NE SHPO to Späth, “Site Testing,” dated June 16, 2003 (Exh. CBR-035).

survey was not intended to be a Class III survey. TCP surveys are not subject to the qualification requirements applicable to Class III surveys. Exh. NRC-076-R2 at 58.

2.60 The intervenors claim that a “proper survey” for traditional cultural properties must involve the Tribal elders of the Lakota people and their extended families and extended site visits by them. However, the intervenors never acknowledge that the NRC Staff provided them with an equal opportunity to participate in the development of a Statement of Work or to conduct their own site investigation. *See, e.g.*, Exh. NRC-001R at 64-65.

2.61 The NRC Staff’s approach to TCPs was designed to address two concerns that had been raised by tribes: (1) that the tribes wanted to be in charge of their own TCP survey (*i.e.*, not the applicant or the applicant’s contractor and not the NRC Staff or its contractor); and (2) that the tribes did not want a phased approach. Tr. at 2252. The NRC Staff witness, Mr. Goodman, testified that the open site approach used by the NRC Staff would accommodate both of these requests. *Id.* Crow Butte even offered to pay for tribes to participate in Traditional Cultural Property surveys and changed both the method by which it would pay (to an honorarium) and the amounts it would pay in response to feedback from the NRC Staff and tribes. *Id.* at 66; Tr. at 2222-23, 2229, 2232-33, 2314-15.

2.62 At least two tribes in fact conducted field surveys, as noted above. Exh. NRC-052. OST, however, voluntarily elected not to submit a proposed Statement of Work or to

⁹ Santee Sioux Nation, Tribal Historic Preservation Office, “TCP Survey Report” (2013) (Public) (ADAMS Accession No. ML13093A123) (Exh. NRC-052). Reconnaissance of the existing license area by the Crow Nation field crew determined that the project area is heavily impacted by past Euro-American settlement and farming practices, CBR project mining, and other activities over the past 25 years to the extent that little or no undisturbed areas exist. The Tribal field crews determined that additional field inspection of the existing license area for potential places of religious or cultural places beyond those previously identified was not practical.

participate in a field survey. OST witnesses could not explain why OST declined to participate.¹⁰ Tr. at 2181-86, 2190-91.

2.63 We find that, because the Crow Butte project area has been subjected to intensive cultural resources field surveys for archaeological and historical sites and because the five remaining properties evaluated as “potentially eligible” for the National Register of Historic Places are being actively avoided during all phases of the overall project, there will be no effects to the known and recorded cultural resource sites from license renewal. We further find that OST’s decision not to participate in TCP surveys does not undermine the adequacy of the EA. The NRC Staff provided a reasonable opportunity for OST conduct its own surveys or propose a different approach, but OST did not avail itself of that opportunity.

2. *Adequacy of Consultation*

2.64 As an initial matter, the intervenors are wrong when they assert (Int. Prop. Findings at 28) that “[f]ree, prior, informed, consent is required by the Oglala Sioux Tribe to the renewal of the activities at the Crow Butte site.” Agencies must ensure that a tribe has “a reasonable opportunity to identify its concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate its views on the undertaking’s effects on such properties, and participate in the resolution of adverse effects.” 36 C.F.R. § 800.2(c)(2)(ii)(A). But, there is no statutory or regulatory support for the notion that OST must affirmatively consent to license renewal. In fact, the Advisory Council for Historic Preservation (“ACHP”) has made clear that a

¹⁰ The NRC Staff is not required to delay its evaluation until every consulting tribe is satisfied with the agency’s approach. Neither NEPA’s “hard look” standard nor the NHPA’s “reasonable and good faith effort” standard required the NRC Staff to devote virtually infinite study to cultural resources. *Entergy Nuclear Generation Co. (Pilgrim Nuclear Power Station)*, CLI-10-11, 71 NRC 287, 315 (2010).

reasonable and good faith identification effort does not require the approval of a Tribal Historic Preservation Officer or other consulting parties. NRC Staff Prop. Findings at ¶4.14-¶4.16.

2.65 The intervenors also complain (Int. Prop. Findings at 29) that “[t]he ‘consultation’ process was one involving a single large collective meeting involving the NRC, several tribes and representatives of more than one uranium company (Crow Butte and Powertech-Dewey Burdock) in June 2011.” But, the intervenors point to no legal error associated with holding a combined meeting. In fact, the NRC Staff’s practice of consolidating topics for discussion was intended to reduce the resource and financial burden on, and facilitate participation by, tribal representatives.

2.66 And, while the intervenors cite the Board decision in *Powertech* to support their claim that the failure of OST to participate in the TCP survey undermines the adequacy of the consultation process for license renewal, there are significant differences between the Dewey-Burdock initial licensing proceeding and this license renewal proceeding. The factual circumstances are not, as intervenors claim (Int. Prop. Findings at 31), “identical.”

2.67 Dewey-Burdock is a new facility, and construction and operation will therefore entail some new ground disturbance. In contrast, Crow Butte is an existing facility that has been in operation for decades with no plans to construct additional wellfields or engage in substantial new ground disturbing activities.

2.68 Dewey Burdock also involved a Programmatic Agreement, which is not used at Crow Butte. Tr. at 2173-74.

2.69 Finally, unlike for Dewey-Burdock, OST never submitted (directly or on its behalf by others) a proposed Statement of Work for conducting TCP surveys at the license renewal site. Tr. at 2181-83; 2190.

2.70 To the extent that intervenors are claiming (Int. Prop. Findings at 32; Tr. at 2101-02) that the NRC has delegated the government’s consultation responsibilities to Crow Butte’s contractor, SRI Foundation, they are mistaken. The NRC Staff testified that SRI Foundation “had no role in the Staff’s decision,” and instead served only as an advisor to Crow Butte. Exh. NRC-076-R2 at 52. In any event, there is no law, regulation, or guidance document that prohibits participation by the applicant in the consultation process. In fact, ACHP regulations expressly permit agencies to use consultants and applicants to assist federal agencies in their consultation activities.¹¹

2.71 And, contrary to the intervenors claims (Int. Prop. Findings at 32), the NRC Staff did not “refuse[] to accept, or fund, the TCP survey design protocol proposed by the tribes as to their own cultural resources.” OST never submitted a proposed Statement of Work for the Crow Butte license renewal area or participated in a field survey. OST witnesses could not explain why OST declined to participate. Tr. at 2181-86, 2190-91.

2.72 In contrast, the NRC followed its Tribal Protocol Manual and initiated formal consultation on January 13, 2011, in a letter from the NRC Division Director responsible for Crow Butte’s license renewal to OST President Theresa Two Bulls, with copy to the OST THPO.¹² The NRC Staff communicated with OST on a regular basis and dozens of occasions

¹¹ 36 C.F.R. § 800.2(a)(3) states:

[the] agency official may use the services of applicants, consultants, or designees to prepare information, analyses and recommendations under this part. The agency official remains legally responsible for all required findings and determinations. If a document or study is prepared by a non-Federal party, the agency official is responsible for ensuring that its content meets applicable standards and guidelines.

¹² Exh. NRC-039. The ACHP’s regulations (36 C.F.R. § 800.16(w)) define the THPO as “the tribal official appointed by the tribe’s chief governing authority or designated by a tribal ordinance or preservation program who has assumed the responsibilities of the

via letters, phone calls, teleconferences, and face-to-face meetings. Exh. NRC-038. The NRC Staff held an NHPA consultation meeting specifically for tribal leaders. Exhs. INT-052 and INT-053. The NRC Staff also took steps to ensure that appropriate NRC officials attended these meetings. Tr. at 2127-30. The NRC Staff also agreed to tribal requests for an open-site approach to the Traditional Cultural Properties (TCP) survey and multiple site visits to the Crow Butte facility. Exh. NRC-001-R at 63-64.

2.73 Overall, the NRC Staff provided OST with a meaningful opportunity to participate in the consultation process and engaged with OST on a government to government basis. We find that the NRC Staff consulted extensively, and in good faith, with federally recognized tribes, including OST, throughout the Section 106 process.

F. Contention 6

2.74 Contention 6 is entitled “[t]he EA violates NEPA in concluding that the short-term impacts from consumptive ground water use during aquifer restoration are MODERATE.” The Licensing Board admitted Contention 6 based on references to EA Sections 4.6.2.2.1 and 4.6.2.3 (Exh. NRC-010). The former section addresses consumptive water use during operations, and the latter section of the EA addresses ground water quantity impacts from consumptive use during restoration.

2.75 The EA indicates, based on past experience, that restoration of a mine unit will need at least eleven pore volumes and that Crow Butte may need to extract “more than

SHPO for purposes of section 106 compliance on tribal lands in accordance with section 101(d)(2) of the act.” As OST witnesses acknowledge (Tr. at 2134-35), the OST THPO’s office has taken on the responsibilities for Section 106. The OST’s THPO office is therefore the tribal official designated as responsible for engaging in consultation under Section 106. By working through the THPO, the NRC Staff was engaging in government-to-government between designated representatives of the U.S. Government and the OST

eleven restoration pore volumes for all mine units.”¹³ The EA described this short term impact from consumptive ground water use as a MODERATE impact.

2.76 The contention asserts that the experience at Crow Butte indicates that the restoration consumptive use is greater than expected by the NRC Staff in the EA, and therefore the impact is greater than MODERATE. The contention also challenges the NRC Staff conclusion that water levels would eventually recover after aquifer restoration, resulting in an overall SMALL impact from consumptive water use.

1. Consumptive Use

2.77 The intervenors complain (Int. Prop. Findings at 36) that “the NRC Staff accepted Applicant’s model-based pore volume estimate despite it being less than 1/3 of the pore volumes actually used in the mine units restored or nearing the end of restoration.” But Crow Butte explained the basis for its pore volume estimates going forward.

2.78 Crow Butte testified that initial groundwater restoration efforts were relatively inefficient, resulting in an excessive number of pore volumes being treated to achieve the restoration results needed. Exh. CBR-008 at 18. As a result, Crow Butte developed a site groundwater flow model to optimize restoration well locations, injection and extraction rates, and the overall sequence of treatment activities for each mine unit (Exh. CBR-041). Use of this model led to significant improvements in restoration efficiency for Mine Units 2, 3, 4, and 5 to date. *Id.* at 19. The model greatly improved restoration efficiency by strategically focusing on water that needs to be treated and minimizing water that is treated multiple times. The plan is adjusted given certain practical limitations on treatment rates, disposal capacity, and existing

¹³ A pore volume is defined as the volume of water contained in the pore space of the aquifer affected by mining and required to be restored. The pore volume is calculated by multiplying the area of the ore zone aquifer by the aquifer thickness and the porosity.

well injection and extraction rates. The model is also re-calibrated periodically to reflect current mine conditions.

2.79 For example, restoration of Mine Units 2 and 3 was achieved after 2.25 and 1.71 pore volumes of groundwater treatment, respectively, following implementation of the Model Based Restoration Plan (“MBRP”). Exh. CBR-008 at 21. The report also addresses pore volume restoration requirements for other mine units. Crow Butte concluded that the theoretical number of pore volumes of groundwater treatment needed to restore a mine unit ranges from 1.54 to 3.00 pore volumes. *Id.*

2.80 The intervenors also complain (Int. Prop. Findings at 36) that “[n]o actual water balance is included in the record.” But, the NRC Staff included a discussion of the water balance in the SER. Exh. NRC-101 at 82. And, the various components of the water balance were discussed at length in the parties’ testimony and at the hearing.

2.81 The consumptive use from the bleed has been about 0.5 percent to 1.5 percent (generally, closer to 0.5%). At a processing rate of 5,000 gpm this results in a consumptive use around 25 gpm (or 50 gpm at 1% bleed). Tr. at 1460. This small consumptive use from bleed will remain essentially the same in the renewal period, eventually declining as mining is completed in the currently operating units. Tr. at 2497.

2.82 Given current Reverse Osmosis (“RO”) capacity of 1150 gpm (Tr. at 1730) and assuming an 80/20 efficiency rate, Crow Butte generates approximately 230 gpm of brine. Tr. at 1460. This is the consumptive use of restoration. Total consumptive use therefore is approximately 255 gpm at present, and could increase to approximately 300 gpm during restoration of the largest mine units. Tr. at 2498.

2.83 Crow Butte currently disposes of permeate and brine by injection of the wastes into the three waste disposal ponds and then into two NDEQ-permitted non-hazardous on-site deep disposal wells or directly into the deep disposal wells. Exh. CBR-008 at 14. The waste disposal ponds comply with the design, installation, and operation criteria specified in NRC Regulatory Guide 3.11. *Id.* Evaporation pond consumptive use is approximately 25 gpm (averaged on an annual basis). Tr. at 1393. The two deep disposal wells handle approximately 200 to 250 gpm. Tr. at 1394.

2.84 Based on the improvements in restoration efficiency and upgrades to restoration infrastructure, we find that the NRC Staff evaluation of the consumptive use from restoration is reasonable. If anything, evidence from Crow Butte suggests that NRC Staff's EA is conservative in its assumptions and conclusions with respect to pore volume estimates for future restorations in light of recent improvements in restoration efficiency.

2. *Drawdown and Recovery*

2.85 The evidentiary hearing included significant discussion regarding the drawdown in the Basal Chadron aquifer from consumptive use and the timing of recovery. However, the intervenors did not present any proposed findings on these topics. We therefore consider this aspect of the proposed contention to have been abandoned.¹⁴

2.86 Overall, we find the NRC Staff's conclusion that that the short-term impact from consumptive use in restoration may be MODERATE to be reasonable. We also find the NRC Staff's conclusion that water levels would eventually recover after aquifer restoration, resulting in an overall SMALL impact from consumptive water use, to be reasonable.

¹⁴ *San Onofre*, ALAB-717, 17 NRC at 371.

G. Contention 9

2.87 Contention 9 is entitled “the EA violates 10 C.F.R. §§ 51.10, 51.70 and 51.71, and NEPA and implementing regulations by failing to include the required discussion of ground water restoration mitigation measures.” The Board admitted Contention 9 to the extent it alleges that the EA’s discussion of ground water restoration mitigation measures is inadequate.

2.88 For Contention 9, the intervenors state (Int. Prop. Findings at 37) that the “LRA and EA describe the first step of the restoration process as ‘ground water transfer’ though that step will not be available during actual restoration.” But, Crow Butte explained that, while it has used groundwater transfer¹⁵ in the past, it will not do so for future mine units because there are no new wellfields coming online that could be used as a source of fresh groundwater to be transferred. Tr. at 1735-36.

2.89 The intervenors also claim (Int. Prop. Findings at 37) that, “[b]ased on the MBRP, the Applicant is likely to request ACLs earlier than with previous mine unit restorations.” This significance of this assertion is not clear. To the extent that Crow Butte is able to complete restoration in fewer pore volumes, that would reduce overall groundwater consumption from Crow Butte operations and would lessen environmental impacts.

2.90 Moreover, under 10 C.F.R. Part 40, Appendix A, Criterion 5B(5), restoration will necessarily leave groundwater in a condition that is protective of human health and safety. Crow Butte must restore the aquifer so that concentration of each hazardous constituent do not exceed (a) the background concentration, (b) the maximum values in the

¹⁵ Ground water transfer is the process of transferring ground water from the underground aquifer (typically from a mine unit commencing operations) to the mine unit undergoing restoration. Exh. CBR-008 at 12-13. Higher TDS water from the mine unit in restoration will be injected into the mine unit commencing operation. This will lower the TDS in the restoration mine unit by displacing water affected by mining with baseline quality water.

Criterion 5C Table, if the constituent is listed in the table and the background level is lower than the value in the table, or (c) an alternate concentration limit (“ACL”) proposed by the licensee and established in accordance with Criterion 5B(6) of Part 40, Appendix A. To be approved for an ACL, Crow Butte must demonstrate that for a constituent of concern it has made a reasonable effort to return the constituent to pre-operational baseline levels or to the Appendix A, Table 5C value (if applicable). Exh. CBR-008 at 11. An ACL will therefore, by definition, be protective of public health and safety.

2.91 The intervenors did not present any findings on leaks or spills during operations, and we therefore consider that aspect of the contention to have been waived.¹⁶

2.92 Overall, we find that the NRC Staff’s evaluation of groundwater restoration impacts (and mitigation of those impacts) is reasonable. Crow Butte developed a calibrated groundwater flow model that will be applied to restoration activities going forward. The effectiveness of the model has been demonstrated for Mine Units 2 and 3. Application of the model will minimize the number of pore volumes necessary for restoration, as well as related impacts on consumptive use.

2.93 With respect to groundwater quality, we find that Crow Butte must restore groundwater quality to levels that satisfy the conditions set in its NRC license. Those restoration standards are linked to baseline conditions/background, the maximum values for groundwater protection in Part 40, Appendix A, Table 5C, or alternate concentration limits (ACLs) established by the NRC.¹⁷ Restoration to those standards — levels that are either consistent with

¹⁶ *San Onofre*, ALAB-717, 17 NRC at 371.

¹⁷ ACLs will, as previously discussed, require an additional regulatory approval only that will be granted only after Crow Butte demonstrates, among other requirements, that the limits are “as low as reasonably achievable” and that the constituent “will not pose a

baseline conditions or, by definition, protective of human health and the environment — will result in SMALL environmental impacts.

H. Contention 12

2.94 Contention 12 is entitled “[t]he EA omits a discussion of the impact of tornadoes on the license renewal area, and inadequately discusses the potential impacts from land application of ISL mining wastewater.” Contention 12 therefore involves two distinct issues: tornados and land application. While the LRA and the Safety Evaluation Report both address the risks associated with tornados, the EA itself does not explicitly discuss them. The intervenors also argue that the NRC Staff failed to account for potential impacts from land application of wastewater, including selenium.

1. *Tornados*

2.95 While the intervenors claim that the EA improperly omitted discussion of tornadoes, they did not present any affirmative evidence, facts, or expert opinion to suggest that tornados pose a significant risk of an environmental impact at the site, nor do they rebut any of Crow Butte’s statements about tornados in the LRA or the NRC Staff’s discussion of tornados in the SER.

2.96 Because the intervenors did not present any testimony on tornadoes in their direct, rebuttal, or supplemental testimony, they have waived this issue in this proceeding. *See Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), LBP-82-115, 16 NRC 1923, 1935, 1936 (1982) (An intervenor’s intentional waiver of the right to present witnesses amounts to an effective abandonment of their contention).

substantial present or future hazard to human health or the environment.” Part 40, Appendix A, Criterion 5B(6).

2.97 Regardless, the NRC Staff in Section 3.3.4 of the EA described the wind characteristics of the Crow Butte site and discussed potential impacts from wind (*e.g.*, soil erosion) in Section 4.3.2 of the EA.¹⁸ The NRC Staff also explained that the annual probability of a tornado at the site, though perhaps higher than that described in the SER based on the discussion at the hearing, is still low enough that additional protections are not warranted.¹⁹ Tr. at 2003-04.

2.98 In addition, Crow Butte noted that the site maintains appropriate emergency response plans and procedures in case of a natural disaster, such as a tornado. Exh. CBR-010 at 4. These Emergency Response Plans, which address the need to contain potential or uncontrolled releases and take other corrective actions as necessary and appropriate, would be used to avoid or mitigate impacts from a tornado or other natural hazards (*e.g.*, wildfire). *Id.*

2.99 Overall, we find that the NRC Staff has adequately considered the potential impacts from high winds, including tornados, in the EA.

2. *Land Application*

2.100 The intervenors did not present any proposed findings relating to land application. We therefore consider this aspect of Contention 12 to have been abandoned.²⁰

¹⁸ NUREG-1748, which provides guidance on the NRC Staff's environmental review of Crow Butte's application, acknowledges that it may not be necessary to specifically evaluate the potential environmental impacts of severe weather phenomena such as tornadoes. Exh. NRC-014 at 6-12

¹⁹ At the evidentiary hearing, there was some discussion of the applicability of NUREG-1520 to uranium recovery facilities. *See* Exh. BRD-011. NUREG-1520 guidance, however, is specific to fuel cycle facilities regulated under 10 C.F.R. Part 70, which are licensed to possess a critical mass of special nuclear material, and does not apply to uranium recovery facilities licensed under 10 C.F.R. Part 40. NUREG-1520, Rev. 2, at 1 (ADAMS Accession No. ML15176A258).

²⁰ *San Onofre*, ALAB-717, 17 NRC at 371.

I. Contention 14

2.101 Contention 14 asserts that “[t]he EA violates NEPA in its failure to provide an analysis of the impacts on the project from earthquakes; especially as it concerns secondary porosity and adequate confinement.”²¹ The only basis for the contention is the claim that the EA omitted two earthquakes near Chadron in 2011 (the LRA was submitted in 2007). The Licensing Board also raised an issue regarding the EA’s focus on seismology in Nebraska, rather than other nearby states.

2.102 The intervenors claim (Int. Prop. Findings at 39) that the change in flow patterns in Chadron Creek was altered, and suggest that it may have been the result of seismic activity. There is, however, no evidence in the record to support that claim. And, even Dr. LaGarry acknowledged that “the exact cause of that event is still under investigation.” Tr. at 1666.

2.103 The intervenors also assert that earthquakes located only a short distance from Crow Butte, but across the South Dakota state line, were not evaluated in the EA and that there is no evidential support in the record for the NRC Staff’s conclusions. But, as even the intervenors acknowledge (Int. Prop. Findings at 39), the NRC Staff testified that it did in fact consider earthquakes in Wyoming and South Dakota in preparing its testimony and presenting its views on the contention. Tr. at 1661. The NRC Staff also provided as an exhibit a table summarizing historical earthquakes within 100 miles of the CBR facility, along with a histogram of earthquake magnitudes for those earthquakes created from the data in the table. Exh. NRC-066.

²¹ In many ways, this contention overlaps with Contention D, which alleges the potential for contamination via faults and fractures (secondary porosity).

2.104 Ultimately, the NRC Staff concluded that providing information on all earthquakes within 100 miles of the site, regardless of geographic boundary, would not significantly change the characterization of seismic activity in the EA. Ex. NRC-001-R at 108-109; Tr. at 1656-57, 1660-62.

2.105 The Intervenors provided no testimony to refute the NRC Staff's conclusions, and have thus failed to demonstrate the materiality or significance of the initial (and now corrected) omission. We therefore find that the NRC Staff has adequately considered the seismology at the site despite the omission of the two recent earthquakes in the EA. We conclude that the discussion of seismology in the LRA, EA, and SER, as supplemented by the testimony at the evidentiary hearing, provides a reasonable basis for concluding that impacts from earthquakes will be SMALL.

III. CONCLUSIONS OF LAW

3.1 We have considered all of the evidence presented by the parties on Contentions A, C, D, F, 1, 6, 9, 12 and 14. Based upon our review of the entire record in this proceeding, which are supported by reliable, probative, and substantial evidence in the record, we decided all matters in controversy concerning the admitted contentions.

A. Contention A

3.2 We conclude that the available data and evidence demonstrate that the non-radiological (as well as the radiological) impacts of Crow Butte's operations are SMALL. Crow Butte has established through multiple lines of evidence that the Basal Chadron Sandstone aquifer, where mining occurs, is isolated from overlying aquifers. In addition, Crow Butte maintains an extensive environmental monitoring network to confirm control over mining fluids such that they will not migrate beyond the license area or contaminate the aquifers that supply

drinking water to the Pine Ridge Reservation. As importantly, Crow Butte's operations have not contaminated the drinking water at the Pine Ridge Reservation.

3.3 For these reasons, we conclude that NRC Staff and Crow Butte have shown, by the preponderance of the evidence, that the NRC's EA, as supplemented by the testimony and evidence in this proceeding, reflects the requisite "hard look" at the non-radiological impacts of Crow Butte's operations. Contention A is resolved in favor of Crow Butte and the NRC Staff.

B. Contention C

3.4 We conclude that Crow Butte has taken active steps to minimize the potential for surface and subsurface leaks or spills that have the potential to cause environmental harm to the White River. Regular monitoring of Squaw and English Creeks shows that Crow Butte's operations are not adversely impacting surface waters in the mine area. If leaks and spills were to occur, Crow Butte is required to take immediate corrective actions, including restoration of the environment. We find that there is no data to indicate impacts from Crow Butte's operations to the White River, the White River alluvium, or the Brule aquifer outside the mine site.

3.5 For these reasons, we conclude that Crow Butte and the NRC Staff have shown, by the preponderance of the evidence, that the NRC Staff's EA, as supplemented by the testimony and evidence in this proceeding, adequately characterizes the risk of harm to surface waters, including from surface spills and subsurface migration. The EA reflects the requisite "hard look" at the potential impacts of Crow Butte's operations on nearby surface water features. Contention C is resolved in favor of Crow Butte and the NRC Staff.

C. Contention D

3.6 We conclude, based on multiple lines of evidence, that the Basal Chadron aquifer, where mining occurs, is hydrologically isolated from overlying aquifers and that Crow Butte conducts its operations to maintain hydraulic control over mining fluids and maintains an extensive environmental monitoring network to confirm control over mining fluids. There is no evidence of faults or fractures that could transmit mining fluid into aquifers that provide drinking water to the Pine Ridge Reservation. Because of the absence of any impacts beyond the mining area, much less impacts over 30 miles away at the Pine Ridge Reservation, there was no need for the NRC Staff to include the Pine Ridge Reservation in the environmental justice analysis.

3.7 For these reasons, we conclude that Crow Butte and the NRC Staff have shown, by the preponderance of the evidence, that the NRC Staff's EA, as supplemented by the testimony and evidence in this proceeding, adequately characterizes the risk of communication among aquifers. The EA reflects the requisite "hard look" at the potential impacts of Crow Butte's operations on nearby aquifers and environmental justice populations. Contention D is resolved in favor of Crow Butte and the NRC Staff.

D. Contention F

3.8 We conclude that, while there have been recent studies of the regional geology that have resulted in the proposal of a new nomenclature for some of the geologic units within the license area, including proposals by Dr. LaGarry, these studies do not indicate that any portion of the application was inadequate. In discussing regional geology, Crow Butte, the NRC Staff, and NDEQ continue to use the nomenclature found in the prior license applications for consistency and to facilitate public review and comparison.

3.9 We therefore conclude that the NRC Staff in its SER, as supplemented by the testimony and evidence in this proceeding, has by the preponderance of the evidence demonstrated that Crow Butte’s application satisfies NRC requirements. Contention F is resolved in Crow Butte’s favor.

E. Contention 1

3.10 Because the Crow Butte project area has been subjected to intensive cultural resources field surveys for archaeological and historical sites and because the five remaining properties evaluated as “potentially eligible” for the National Register of Historic Places (“NRHP”) are being actively avoided during all phases of the overall project, there will be no effects to the known and recorded cultural resource sites from license renewal.

3.11 We conclude that the NRC Staff made a reasonable and good faith effort to identify and evaluate properties eligible for inclusion on the NRHP. The NRC Staff invited all interested tribes, including OST, to participate in the identification efforts. The NRC Staff also provided all interested tribes a reasonable opportunity to identify historic properties, advise on the identification and evaluation of such properties, and comment on the draft evaluation. OST voluntarily elected not to participate in the consultation process by providing comments on the draft EA, by submitting a proposed Statement of Work for a TCP survey, or by conducting a TCP survey.

3.12 We further conclude that the NRC Staff engaged with the tribes, including OST, on a government-to-government basis through the consultation process. The NRC Staff invited the tribes to participate on a government-to-government basis, treated them as separate and independent governmental entities (*i.e.*, did not communicate with them through the Department of Interior), corresponded directly with both tribal leaders and THPOs (the tribe’s

designated representatives for Section 106 matters), and ensured that NRC officials with appropriate decision-making authority were present during meetings with tribes.

3.13 Based on the above, we conclude that the NRC Staff's EA, as augmented by the testimony and evidence in this proceeding, reasonably considers the impacts to known and recorded cultural resources, including traditional cultural properties. We further conclude that the NRC Staff has, by the preponderance of the evidence, demonstrated that overall impacts to historic and cultural resources from the relicensing of the Crow Butte facility would be SMALL and that the NRC Staff satisfied the consultation requirements of the NHPA.

3.14 For these reasons, the EA reflects the requisite "hard look" at impact to cultural resources and the NRC Staff has complied with the NHPA. Contention 1 is resolved in favor of Crow Butte and the NRC Staff.

F. Contention 6

3.15 We conclude that the NRC Staff and Crow Butte have considered the environmental impacts of consumptive water use during restoration in both the short term and the long term. We find the NRC Staff's conclusions that short term impact from consumptive ground water use is MODERATE and the long-term impact is SMALL to be reasonable.

3.16 For these reasons, we conclude that the NRC Staff and Crow Butte have shown by the preponderance of the evidence that the NRC Staff's EA, as supplemented by the testimony and evidence in this proceeding, adequately characterizes the impacts of consumptive use during restoration. The EA reflects the requisite "hard look" at the impacts of consumptive use. Contention 6 is resolved in favor of Crow Butte and the NRC Staff.

G. Contention 9

3.17 We conclude that the NRC Staff and Crow Butte have considered the environmental impacts of restoration. The EA, as supplemented by the testimony in this proceeding, adequately describes the restoration standards, the restoration process, and reasonable measures to mitigate the impacts of consumptive water use and to control and to mitigate impacts on groundwater water quality (*e.g.*, monitoring, treatment, and standards).

3.18 For these reasons, we conclude that the NRC Staff and Crow Butte have shown by the preponderance of the evidence that the NRC Staff's EA, as supplemented by the testimony and evidence in this proceeding, adequately characterizes the potential impacts of restoration. The EA reflects the requisite "hard look" at the impacts of the restoration process. Contention 9 is resolved in favor of Crow Butte and the NRC Staff.

H. Contention 12

3.19 The intervenors did not present any affirmative evidence, facts, or expert opinion to suggest that tornados pose a significant risk of an environmental impact at the site, nor do they rebut any of Crow Butte's statements about tornados in the LRA or the NRC Staff's discussion of tornados in the SER. Having failed to do so, they have waived this issue in this proceeding.

3.20 Regardless, we conclude that the NRC Staff's SER and EA, as supplemented by the record in this proceeding, demonstrate by the preponderance of the evidence that the risk of a tornado impact is low and that there are adequate emergency response plans and procedures in place in case of a natural hazards phenomenon, such as a tornado, that would mitigate the impact if a tornado did occur at the site. Contention 12 is resolved in favor of Crow Butte and the NRC Staff.

I. Contention 14

3.21 We find that the NRC Staff and Crow Butte have adequately considered the potential impacts of earthquakes at the site.

3.22 We find by the preponderance of the evidence that the NRC Staff's EA adequately characterizes the risk of earthquakes and reflects the requisite "hard look" at the potential impacts of earthquakes on Crow Butte's operations. For these reasons, Contention 14 is resolved in favor of Crow Butte and the NRC Staff.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:)	
)	Docket No. 40-8943
CROW BUTTE RESOURCES, INC.)	
)	ASLBP No. 08-867-02-OLA-BD01
(License Renewal))	

CERTIFICATE OF SERVICE

I hereby certify that copies of “CROW BUTTE RESOURCES’ PROPOSED REPLY FINDINGS OF FACT AND CONCLUSIONS OF LAW” in the captioned proceeding have been served this 11th day of December 2015 via electronic mail to Consolidated Intervenors’ counsel at davidcoryfrankel@gmail.com, Arm.legal@gmail.com, and harmonicengineering@gmail.com, and via the Electronic Information Exchange (“EIE”), which to the best of my knowledge resulted in transmittal of the foregoing to all those on the EIE Service List for the captioned proceeding other than Consolidated Intervenors.

/s/ signed electronically by _____
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RESOURCES, INC.