

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
)	
(License Renewal for the In Situ Leach)	ASLBP No. 08-867-02-OLA-BD01
Facility, Crawford, Nebraska))	
)	

NRC STAFF'S PROPOSED FINDINGS OF FACT
AND CONCLUSIONS OF LAW

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November 23, 2015

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I. INTRODUCTION

1.1. The Atomic Safety and Licensing Board (ASLB) issues its Initial Decision on Contentions A, C, D, F, 1, 6, 9, 12, and 14. In these contentions, the Consolidated Intervenors (CI) and the Oglala Sioux Tribe (OST) (collectively, Intervenors) challenge the Environmental Assessment (EA) the U.S. Nuclear Regulatory Commission (NRC) staff (Staff) prepared for the proposed renewal of Crow Butte Resources, Inc.'s NRC-issued source and byproduct materials license. This initial decision rules on all admitted contentions in this 10 C.F.R. Part 2, Subpart L proceeding for the Crow Butte license renewal proceeding.

1.2. After consideration of all relevant evidence in the record, we resolve contentions A, C, D, F, 1, 6, 9, 12, and 14 in favor of the Staff and CBR, and affirm that the Staff has met its burden of demonstrating that the EA complies with the dictates of the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), and the Commission's regulations at 10 C.F.R. Part 51.

II. BACKGROUND

A. The Proposed Action

2.1. On November 27, 2007, Crow Butte Resources, Inc. (CBR) submitted an application to renew NRC Source Materials License SUA-1534, which authorizes operation of

CBR's in situ uranium recovery (ISR) facility in Crawford, Nebraska, for a period of ten years.¹ Source Materials License SUA-1534 was issued pursuant to 10 C.F.R. Part 40. It was initially issued to CBR in 1989, and was renewed in 1998 for a ten-year period.²

2.2. CBR intends to continue to recover uranium using the ISR process and to use the uranium to produce yellowcake. The existing CBR facility includes a Central Processing Plant, injection and recovery wells (in wellfields), evaporation ponds, deep disposal wells for liquid effluents, monitoring wells, and other infrastructure (e.g., additional buildings, pipelines, roads, and lighting). CBR's proposed activities include continued operation, aquifer restoration, and decommissioning of the CBR facility.³

2.3. CBR's uranium recovery method involves injecting lixiviant into an underground aquifer (ore body) containing uranium deposits. The lixiviant consists of ground water charged with sodium bicarbonate, with a hydrogen peroxide or oxygen oxidant. As lixiviant is pumped through the ore body, the uranium dissolves into the lixiviant. The uranium-bearing lixiviant is then pumped back to the surface, where the uranium is separated from the lixiviant using an ion exchange process, precipitated and dried into yellowcake, and shipped to other facilities to be enriched for use as reactor fuel. After the uranium is removed, the lixiviant is recharged with sodium and carbonate as required and re-injected into the ore zone to repeat the cycle.⁴

¹ Application for Renewal of Source Material License No. SUA-1534, Crow Butte Resources, Inc. (November 27, 2007). Supporting documentation for this application can be found in the Agencywide Documents Access and Management System by searching under Docket No. 04008943.

² See Ex. NRC-009 at ix. Because CBR submitted its LRA three months prior to the February 28, 2008, expiration date of the license issued in 1998, CBR was able to continue to operate its ISR facility during the Staff's review under the timely renewal provisions of 10 C.F.R. § 40.42(a).

³ Ex. CBR-011 at 1-12 to 1-13.

⁴ *Id.* at 3-22 to 3-26.

B. CBR's Application

2.4. CBR submitted a combined Technical Report and Environmental Report, referred to as the License Renewal Application (LRA), containing technical information to show that it meets NRC safety requirements for granting a renewed license, as well as information addressing the facility's anticipated impacts to the environment during the renewal period.⁵ The information addressing environmental impacts helps inform the Staff's independent environmental review of the LRA and thereby helps the Staff meet the requirements of the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321 *et seq.*

2.5. The safety requirements applicable to CBR's application are in 10 C.F.R. Part 20 and Part 40. These safety requirements include certain criteria in Appendix A to Part 40, which provides specific standards for operating uranium mills and disposing of waste material. Because an ISR facility like the CBR facility is not a conventional uranium mill, however, CBR is not required to satisfy all the criteria in Appendix A in order to receive a renewed NRC license.⁶

2.6. After CBR submitted its initial LRA, it supplemented the LRA with responses to the Staff's requests for additional information (RAIs) regarding both safety and environmental issues.⁷

C. The Staff's Safety Review

2.7. After receiving CBR's application for renewal of license SUA-1534, the Staff reviewed the application to determine whether CBR met the relevant criteria in 10 C.F.R. Parts

⁵ *Id.* at 1-1.

⁶ See *Hydro Resources, Inc.* (2929 Coors Road Suite 101 Albuquerque, New Mexico 87120), CLI-99-22, 50 NRC 3, 9 (1999) ("We agree that those requirements in Part 40, such as many of the provisions in Appendix A, that, by their own terms, apply only to conventional uranium milling activities, cannot sensibly govern ISL mining.").

⁷ Letter from Stephen Collings, CBR, to Ronald Burrows, NRC (May 12, 2009); Letter from Stephen Collings, CBR, to Ronald Burrows, NRC (July 13, 2009).

20 and 40. The Staff followed the guidance in NUREG-1569, "Standard Review Plan for In Situ Leach Uranium Extraction License Applications," in performing its review.

2.8. After evaluating CBR's application, as supplemented by its responses to the Staff's safety RAIs, the Staff found that CBR met the safety criteria for granting a renewed license.

2.9. The Staff documented its safety findings in a Safety Evaluation Report (SER) for the CBR license renewal. The Staff issued its SER in December 2012.⁸ In August 2014, the Staff issued a revised SER that amended several license conditions which fall outside the scope of the admitted contentions in this proceeding.⁹

D. The Staff's NEPA Review

2.10. The Staff also prepared an environmental assessment (EA) in connection with CBR's license renewal application. The EA addressed environmental impacts related to continued ISR operations at the CBR facility during the 10-year renewal period, as well as impacts associated with the methods proposed for restoration of aquifers used during ISR operations and decommissioning of the site.

2.11. On September 30, 2013, the Staff placed the draft cultural resources sections of the EA on the NRC website and provided a 30-day period for public review and comment.¹⁰

2.12. On October 31, 2014, the Staff issued the EA and a final finding of no significant impact (FONSI) for the CBR license renewal.¹¹

⁸ Safety Evaluation Report for License Renewal of the Crow Butte Resources ISR Facility, Dawes County, Nebraska, Materials License No. SUA-1534 (December 2012).

⁹ Ex. NRC-009; see *also* Letter from Marcia J. Simon, Counsel for the NRC Staff, to Administrative Judges and Parties (Nov. 6, 2014).

¹⁰ Ex. NRC-010 at 87.

¹¹ Exs. NRC-010, NRC-011.

E. The Staff's NHPA Review

2.13. As required under the National Historic Preservation Act (NHPA), the Staff evaluated how properties eligible for inclusion on the National Register of Historic Places (NRHP) may be affected by the CBR license renewal.

2.14. In January 2011, the Staff contacted 21 Tribes to invite them to participate in the NHPA consultation.¹² From January 2011 through October 2012, the Staff communicated with Tribal representatives through letters, phone calls, and face-to-face meetings. The Staff consulted with interested Tribes to provide them a reasonable opportunity to identify their concerns about historic properties that may be affected by the CBR license renewal.

2.15. The OST was one of the Tribes that accepted the Staff's invitation to consult. Exhibit NRC-038 provides a chronology of the Staff's consultation activities with the OST.

2.16. In October 2012, the Staff offered all consulting Tribes an opportunity to participate in a Traditional Cultural Properties (TCP) field survey of the CBR facility and proposed North Trend, Marsland, and Three Crow expansion areas.¹³ The purpose of this survey was to allow participating tribes to identify properties of religious or cultural significance to each tribe. Two Tribes, the Santee Sioux Nation (SSN) and Crow Nation (CN) accepted the invitation and participated in the survey, which was conducted in November and December 2012. The SSN prepared and submitted to the NRC a report summarizing the TCP survey.¹⁴

2.17. The Staff shared the unredacted SSN TCP survey report with all consulting Tribes and solicited comments.

2.18. In addition to receiving Tribal input, the Staff reviewed the baseline cultural resources data developed as a result of Class III field inventories in 1982 and 1987, conducted

¹² Ex. NRC-010 at 54 n.2; Ex. NRC-038.

¹³ Ex. NRC-010 at 57.

¹⁴ Ex. NRC-052.

a literature review to identify potential cultural or historic resources that may not have been considered during previous reviews, and conducted site visits through its contracted cultural resources expert.¹⁵

2.19. As a result of its review, the Staff concluded that no sites were eligible for listing in the NRHP.¹⁶ The Nebraska State Historic Preservation Office (SHPO) reviewed and concurred with the Staff's finding on July 15, 2013.¹⁷

F. Issuance of the Renewed License

2.20. On November 5, 2014, pursuant to 10 C.F.R. 2.1202(a), the Staff issued renewed license SUA-1534 to CBR.¹⁸ The license authorizes CBR to possess uranium source and byproduct materials at the CBR ISR facility for 10 years from the date of issuance.¹⁹

2.21. On November 11 and November 14, 2015, the OST and CI filed motions to stay the effectiveness of the renewed license.²⁰ The Staff and CBR responded on November 24, 2014.²¹ The Board held an oral argument on the motions on December 19, 2014.²² On January

¹⁵ Ex. NRC-010 at 87.

¹⁶ *Id.* at 86-87.

¹⁷ *Id.* at 87.

¹⁸ Ex. NRC-012.

¹⁹ *Id.* at 1.

²⁰ Application of the Oglala Sioux Tribe for a Stay of the Issuance of License No. SUA-1534 Under 10 CFR Section 2.1213 (Nov. 11, 2014); Consolidated Intervenor's Application for a Stay of the Issuance of License No. SUA-1534 Under 10 CFR Section 2.1213 (Nov. 14, 2014).

²¹ NRC Staff's Opposition to Applications for a Stay (Nov. 24, 2014); Crow Butte Resources' Response Opposing Motions for Stay of Effectiveness of Renewed License (Nov. 24, 2014).

²² Official Transcript of Proceedings for Crow Butte Resources, Inc. (Docket No. 40-8943-OLA) (Tr.) at 507-564.

21, 2015, we issued a memorandum and order denying these motions.²³ On August 6, 2015, the Commission denied the OST's petition for interlocutory review.²⁴

III. PROCEDURAL HISTORY

3.1. On May 27, 2008, the NRC issued a *Federal Register* notice offering an opportunity to request a hearing regarding the renewal of Source Materials License SUA-1534 for the CBR facility.²⁵ On July 28, 2008, the OST and CI filed timely hearing requests, which contained numerous contentions raising a variety of safety and environmental challenges to CBR's license renewal application.²⁶

3.2. On November 21, 2008, we issued a decision admitting the OST and CI as parties to this proceeding and admitting, as reformulated, five of the OST's proffered contentions.²⁷ We also admitted two of CI's proffered contentions in their entirety and two in part.²⁸ On appeal, the Commission reversed our decision to admit OST Environmental Contentions A and E, and Consolidated Petitioners' Environmental Contention E, Miscellaneous Contention K, and late-filed Safety Contention A.²⁹ The Commission also directed us to grant

²³ *Crow Butte Resources, Inc.* (In Situ Leach Facility, Crawford, Nebraska), LBP-15-2, 81 NRC 48, 58 (2015).

²⁴ *Crow Butte Resources, Inc.* (In Situ Leach Facility, Crawford, Nebraska), CLI-15-17, 82 NRC ____ (August 6, 2015) (slip op. at 20).

²⁵ 73 Fed. Reg. 30,426 (May 27, 2008).

²⁶ Consolidated Request for Hearing and Petition for Leave to Intervene (July 28, 2008); Request for Hearing and/or Petition to Intervene, Oglala Sioux Tribe (July 28, 2008) (OST 2008 Petition). We also denied a hearing request submitted by the OST Treaty Delegation. Although we admitted the Delegation to the proceeding as an interested governmental entity under 10 C.F.R. § 2.315(c), it did not participate in the hearing.

²⁷ *Crow Butte Resources, Inc.* (In Situ Leach Facility, Crawford, Nebraska), LBP-08-24, 68 NRC 691, 760 (2008) (LBP-08-24).

²⁸ *Id.* at 760-61. In a separate decision, we admitted Consolidated Petitioners' late-filed Safety Contention A. *Crow Butte Resources, Inc.* (In Situ Leach Facility, Crawford, Nebraska), LBP-08-27, 68 NRC 951, 957 (2008).

²⁹ *Crow Butte Resources, Inc.* (In Situ Leach Facility, Crawford, Nebraska), CLI-09-9, 69 NRC 331, 366 (2009) (CLI-09-9).

CBR's motion for summary disposition on Consolidated Petitioners' Miscellaneous Contention G.³⁰

3.3. The OST's Environmental Contentions A, C, and D, as admitted by the Board and affirmed by the Commission, challenged CBR's excursion monitoring program, CBR's assessment of potential impacts to the White River, and CBR's ability to contain production fluids within the mined aquifer and prevent contamination of drinking water aquifers on the Pine Ridge Reservation.³¹

3.4. CI's Technical Contention F, as admitted by the Board and affirmed by the Commission, asserted that the applicant failed to use recent geological research in describing the geology and hydrogeology at the site.³²

3.5. On January 5, 2015, after the issuance of the Staff's FONSI and EA, the Intervenors filed additional contentions challenging the Staff's NEPA review and EA.³³ OST filed new Contention F related to treaty rights,³⁴ and both OST and CI filed new Contentions 1 through 14 challenging the EA on issues related to cultural resources, environmental justice, baseline water quality, impacts to surface and ground water, ground water quantity impacts, clarity of information, air quality impacts, mitigation measures, cumulative impacts, reasonable alternatives, impacts of land application of ISR wastewater, tornados, impacts to wildlife, and earthquakes.³⁵

³⁰ *Id.*

³¹ *Id.* at 346-347, 351, 352.

³² *Id.* at 357-58.

³³ Consolidated Intervenors' New Contentions Based on the Final Environmental Assessment (October 2014) (Jan.5, 2015) (CI New Contentions); The Oglala Sioux Tribe's Renewed and New Contentions Based on the Final Environmental Assessment (October 2014) (Jan. 5, 2015) (OST New Contentions).

³⁴ OST New Contentions at 4.

³⁵ See *generally* OST New Contentions.

3.6. On March 16, 2015, we issued a decision ruling on migration of already-admitted contentions and admissibility of newly proffered contentions.³⁶ We ruled that OST Environmental Contentions A, C, and D, and CI Technical Contention F migrated from a challenge to CBR's LRA to a challenge to the Staff's EA.³⁷ We also admitted new contentions 1 and 2 (cultural resources) in part and combined them into a single contention identified as Contention 1; admitted new contentions 3, 5, and 10 in part and merged them into existing OST Contention D; admitted new contentions 6, 9, and 12 in part; and admitted new contention 14 as proffered.³⁸ Finally, we found new EA contentions F, 4, 7, 8, 11, and 13 inadmissible.³⁹

3.7. On March 16, 2015, CI moved to file 11 additional new contentions⁴⁰ based on a proposed EPA rule, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings."⁴¹ The Staff and CBR responded to the motion on March 27, 2015.⁴² On April 28, 2015, we issued a decision ruling that all of these new contentions were inadmissible.⁴³

³⁶ *Crow Butte Resources, Inc.* (In Situ Leach Facility, Crawford, Nebraska), LBP-15-11, 81 NRC 401 (2015) (LBP-15-11).

³⁷ *Id.* at 5.

³⁸ *Id.* at 12-17 (Contentions 1 and 2), 17-19 (Contention 3), 21-27 (Contention 5), 27-31 (Contention 6), 35-38 (Contention 9), 38-40 (Contention 10), 41-52 (Contention 12), 57-59 (Contention 14).

³⁹ *Id.* at 10-12 (OST Contention F), 20-21 (Contention 4), 31-32 (Contention 7), 32-34 (Contention 8), 40-41 (Contention 11), 52-56 (Contention 13).

⁴⁰ Consolidated Intervenor's Motion for Additional Contentions Based on EPA Proposed Rules (Mar. 16, 2015).

⁴¹ 80 Fed. Reg. 4156 (Jan. 26, 2015) (proposed rule).

⁴² NRC Staff's Answer to Consolidated Intervenor's New Contentions Based on Proposed EPA Rule (Mar. 27, 2015); Crow Butte Resources' Response to Motion for Additional Contentions Based on EPA Proposed Rules (Mar. 27, 2015).

⁴³ *Crow Butte Resources, Inc.* (In Situ Leach Facility, Crawford, Nebraska), LBP-15-15, 81 NRC 598, 600 (2015).

3.8. As a result of our rulings, the scope of the hearing was limited to those issues that have been pled with particularity in Contentions A, C, D, F, 1, 6, 9, 12, and 14.⁴⁴ The contentions admitted for hearing are as follows:

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

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

Contention D: [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.

Contention F: Failure to include recent research.

Contention 1: Whether the cultural surveys performed and incorporated into the EA formed a sufficient basis on which to renew Crow Butte's permit.

⁴⁴ See *Southern Nuclear Operating Co.* (Early Site Permit for Vogtle ESP Site), CLI-10-05, 71 NRC 90, 100-01 (2010):

The scope of a contention is limited to issues of law and fact pled with particularity in the intervention petition, including its stated bases, unless the contention is satisfactorily amended in accordance with our rules. . . . Parties and licensing boards must be on notice of the issues being litigated, so that parties and boards may prepare for summary disposition or for hearing. Our procedural rules are designed to ensure focused and fair proceedings.

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

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

Contention 12: The Final 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 14: The Final EA violates the National Environmental Policy Act in its failure to provide an analysis of the impacts on the project from earthquakes; especially as it concerns secondary porosity and adequate confinement. These failings violate 10 C.F.R. §§ 51.10, 51.70 and 51.71, and the National Environmental Policy Act, and implementing regulations.

3.9. On May 8, 2015, the parties (Staff, CBR, and the Intervenors) filed direct testimony⁴⁵ and exhibits. The parties also filed Initial Statements of Position.⁴⁶

3.10. On June 8, 2015, the parties filed rebuttal testimony,⁴⁷ additional supporting exhibits, and Rebuttal Statements of Position.⁴⁸ On June 15, 2015, the Staff filed a Motion in

⁴⁵ Exs. NRC-001-R, CBR-001, CBR-007, CBR-008, INT-021, INT-031, INT-032, INT-043, INT-046, INT-047, INT-048, OST-001.

⁴⁶ NRC Staff's Initial Statement of Position (May 8, 2015); Crow Butte Resources' Initial Statement of Position (May 8, 2015); Consolidated Intervenors' and Oglala Sioux Tribe's Joint Position Statement (May 8, 2015) (Joint Position Statement); Oglala Sioux Tribe's Supplemental Position Statement (May 8, 2015).

⁴⁷ Exs. NRC-076-R2, CBR-045, CBR-051, CBR-052, INT-069, INT-070, INT-071.

⁴⁸ NRC Staff's Rebuttal Statement of Position (June 8, 2015); Crow Butte Resources' Rebuttal Statement of Position (June 8, 2015); Consolidated Intervenors' Rebuttal Statement (June 8, 2015).

Limine seeking to exclude several of the Intervenor's exhibits in whole or in part.⁴⁹ On June 25, 2015, CI and the OST filed responses to the NRC Staff's Motion in Limine.⁵⁰

3.11. On July 23, 2015, the Staff filed an Errata to its Environmental Assessment (EA) correcting information in Section 2.4.1 concerning the terms of CBR's National Pollution Discharge Elimination System (NPDES) permit for land application of treated process wastewater.⁵¹ On July 31, 2015, in response to the Staff's errata, Consolidated Intervenor's filed the rebuttal statement of Linsey McLean (Ex. INT-071). On August 7, 2015, the Staff filed a Motion to Strike portions of Exhibit INT-071.⁵²

3.12. In a pre-hearing teleconference on August 18, 2015, we admitted into evidence the pre-filed testimony and exhibits of the Staff, CBR, and the Intervenor's, with the exception of Exhibits INT-001, INT-010, INT-012, INT-030, and INT-051.⁵³ We struck those exhibits in a partial ruling on the Staff's motion in limine, and deferred our ruling on the remainder of the Staff's motion until after the hearing.⁵⁴

3.13. From August 24 to August 28, 2015, we held an evidentiary hearing in Crawford, Nebraska, wherein the parties presented additional testimony on Contentions A, C, D, F, 1, 6, 9, 12, and 14.⁵⁵

⁴⁹ NRC Staff's Motion in Limine to Exclude Certain Exhibits Filed by Consolidated Intervenor's and the Oglala Sioux Tribe (June 15, 2015).

⁵⁰ See Consolidated Intervenor's Answer to NRC Staff's Motion in Limine (June 25, 2015); The Oglala Sioux Tribe Response to NRC Staff's Motion in Limine to Exclude Certain Exhibits Filed by Consolidated Intervenor's and the Oglala Sioux Tribe (June 25, 2015).

⁵¹ NRC Staff's Notice to Board re Errata to the EA (July 23, 2015).

⁵² NRC Staff's Motion to Strike Portions of Rebuttal Statement of Linsey McLean (Aug. 7, 2015).

⁵³ Tr. at 928-934.

⁵⁴ *Id.*

⁵⁵ *Id.* at 945-2375.

3.14. During the August 2015 evidentiary hearing, the following new exhibits were introduced and marked for identification: Board exhibits BRD-001 through BRD-029; CBR exhibits CBR-061 through CBR-064, and Intervenor exhibits INT-072 through INT-078. On September 4, 2015, we issued an Order admitting exhibits identified during the hearing, with the exception of exhibits BRD-010 and INT-078, as evidence in this proceeding, directing the parties to provide supplemental testimony on six issues related to hydrogeology, and ordering a one-day supplemental hearing to be held on these issues.⁵⁶

3.15. During the August hearing, the Staff agreed to prepare and file as an exhibit a report describing various aspects of its modeling of the White River structural feature.⁵⁷ On September 8, 2015, the Staff filed its report as Exhibit NRC-093, along with an additional exhibit (NRC-094) related to the modeling. On September 10, 2015, we issued an Order admitting these exhibits, along with Exhibits BRD-010A through BRD-010S and INT-072 through INT-077, as evidence in this proceeding, and offering the parties an opportunity to file written objections to the exhibits that had been admitted in our September 4 and 10 Orders.⁵⁸

3.16. On September 18, 2015, the parties filed supplemental direct testimony⁵⁹ and exhibits, and on September 28, 2015, the parties filed supplemental rebuttal testimony⁶⁰ and exhibits. In a teleconference on October 8, 2015, we admitted all of the

⁵⁶ Order (Admitting Exhibits; Scheduling Supplemental Testimony and October Hearing Day) at 1-2 (September 4, 2015) (unpublished).

⁵⁷ Tr. at 1904-05.

⁵⁸ Order (Admitting Remaining Exhibits; Scheduling Transcript Corrections) at 1-2 (September 10, 2015) (unpublished).

⁵⁹ Exs. NRC-095, CBR-067, INT-079, INT-080, INT-081.

⁶⁰ Exs. NRC-103, CBR-074, INT-082-R, INT-083.

supplemental exhibits as evidence in this proceeding, and directed the Intervenors to file Exhibits INT-082-R, INT-084, and INT-085.⁶¹ On October 13, 2015, we issued orders admitting Exhibits INT-082-R, INT-084, and INT-085, and offering CBR and the Staff an opportunity to file written objections to those newly admitted exhibits.⁶²

3.17. On October 9, 2015, the parties filed joint proposed corrections to the transcript for the August 2015 evidentiary hearing.⁶³

3.18. On October 23, 2015, the Board held the one-day supplemental evidentiary hearing in Rockville Maryland, with parties other than the NRC Staff participating remotely via videoconference.

3.19. On November 9, 2015, the parties submitted joint proposed corrections to the transcript for the October 23 supplemental evidentiary hearing.⁶⁴

IV. LEGAL STANDARDS

4.1. Contentions A, C, D, F, 1, 6, 9, 12, and 14 raise challenges to the Crow Butte License Renewal Application (LRA) under the Atomic Energy Act of 1954, as amended (AEA),⁶⁵ the National Environmental Policy Act of 1969 (NEPA),⁶⁶ the National Historic Preservation Act of 1966 (NHPA),⁶⁷ and the NRC regulations and guidance documents implementing the

⁶¹ Tr. at 2380-83.

⁶² Order (Memorializing Admitted Exhibits, Admitting Additional Exhibits, and Setting Filing Dates) at 1-2 (October 13, 2015) (unpublished); Order (Admitting Revised Testimony) (October 13, 2015) (unpublished).

⁶³ Joint Proposed Transcript Corrections (October 9, 2015).

⁶⁴ Joint Proposed Transcript Corrections (November 9, 2015).

⁶⁵ 42 U.S.C. § 2011 *et seq.*

⁶⁶ 42 U.S.C. § 4321 *et seq.*

⁶⁷ 54 U.S.C. § 300101 *et seq.* We note that until December 19, 2014, the NHPA was codified at 16 U.S.C. § 470 *et seq.*

agency's responsibilities pursuant to these Acts.⁶⁸ “Together, these statutes and the corresponding agency regulations govern an applicant's and the NRC Staff's roles in considering the safety and environmental effects of a proposed agency ISL licensing action under 10 C.F.R. Part 40.”⁶⁹ The NRC has a statutory obligation to assess each site-specific license application to ensure it complies with NRC regulations before issuing a license.⁷⁰

A. AEA Requirements

4.2. The AEA and the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA)⁷¹ authorize the NRC to issue licenses for the possession and use of source material and byproduct material.⁷² These statutes require the NRC to license facilities that meet NRC regulatory requirements developed to protect public health and safety from radiological hazards. To operate, ISR facilities must meet NRC regulatory requirements and obtain a source materials license.

4.3. The AEA also provides hearing rights in licensing actions concerning “the granting . . . of any license . . . upon the request of any person whose interest may be affected by the proceeding.”⁷³ These hearing rights attach to the licensing action in dispute here, the issuance of a renewed combined source and 11e.(2) byproduct materials license for the CBR facility. ISR license applications require a safety review to determine if a license applicant has met all relevant criteria in 10 C.F.R. Parts 20 and 40. These safety requirements include certain criteria in Appendix A to Part 40, which provides specific standards for operating uranium mills

⁶⁸ 10 C.F.R. Part 51.

⁶⁹ *Powertech USA, Inc.* (Dewey-Burdock In Situ Uranium Recovery Facility), LBP-15-16, 81 NRC 618, 636 (2015).

⁷⁰ *Id.*

⁷¹ Uranium Mill Tailings Radiation Control Act of 1978, 42 U.S.C. §§ 2022 et seq., 7901 et seq.

⁷² Section 11e.(2) byproduct material is regulated by the NRC under 10 C.F.R. Part 40.

⁷³ 42 U.S.C. § 2239a(1)(a).

and disposing of waste material. However, because the CBR facility project is not a conventional uranium mill, not all criteria in Appendix A must be met.⁷⁴

B. NEPA Requirements

4.4. NEPA requires federal agencies to take a “hard look” at the environmental impacts of a proposed action, as well as reasonable alternatives to that action.⁷⁵ This “hard look” is intended to “foster both informed agency decision-making and informed public participation” so as to ensure that the agency does not act upon “incomplete information, only to regret its decision after it is too late to correct.”⁷⁶ This “hard look” is, however, subject to a “rule of reason”⁷⁷ in that consideration of environmental impacts need not address every environmental effect that could potentially result from the proposed action.⁷⁸ Rather, a federal agency need only provide “[a] reasonably thorough discussion of the significant aspects of the probable environmental consequences[.]”⁷⁹

4.5. Furthermore, “NEPA gives agencies broad discretion to keep their inquiries within appropriate and manageable boundaries.”⁸⁰ To this end, “NEPA does not call for

⁷⁴ See *Hydro Resources, Inc.*, CLI-99- 22, 50 NRC 3, 9 (1999) (“We agree that those requirements in Part 40, such as many of the provisions in Appendix A, that, by their own terms, apply only to conventional uranium milling activities, cannot sensibly govern ISL mining.”).

⁷⁵ See *Louisiana Energy Servs., L.P.* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 87-88 (1998).

⁷⁶ *Id.* at 88 (quoting *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 371 (1989)).

⁷⁷ See, e.g., *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), ALAB-156, 6 AEC 831, 836 (1973).

⁷⁸ *Ground Zero Ctr. For Non-Violent Action v. U.S. Dept. of the Navy*, 383 F.3d 1082, 1089-90 (9th Cir. 2004) (citing *NoGWEN Alliance of Lane County, Inc. v. Aldridge*, 855 F.2d 1380, 1385 (9th Cir. 1988)).

⁷⁹ *Trout Unlimited v. Morton*, 509 F.2d 1276, 1283 (9th Cir. 1974); *Warm Springs Dam Task Force v. Gribble*, 621 F.2d 1017, 1026-27 (9th Cir. 1980).

⁸⁰ *Ground Zero Ctr. For Non-Violent Action*, 383 F.3d at 1089-90 (citing *NoGWEN Alliance of Lane County*, 855 F.2d at 1385).

certainty or precision, but an *estimate* of anticipated (not unduly speculative) impacts.”⁸¹ The proper inquiry is not whether an effect is “theoretically possible,” but whether it is “reasonably probable that the situation will obtain.”⁸² The Staff “need not address every impact that could possibly result, but rather only those that are reasonably foreseeable or have some likelihood of occurring.”⁸³

4.6. An environmental review document “is not intended to be ‘a research document.’”⁸⁴ NEPA does not require the Staff to analyze “every conceivable aspect” of a proposed project.⁸⁵ “There is no NEPA requirement to use the best scientific methodology, and NEPA should be construed in the light of reason if it is not to demand virtually infinite study and resources.”⁸⁶ Although the Staff can always gather more data in a particular area, it “must have some discretion to draw the line and move forward with decisionmaking.”⁸⁷

4.7. Additional considerations apply where an EA, rather than an Environmental Impact Statement (EIS), is prepared. Unlike an EIS, which is subject to a number of specified regulatory requirements,⁸⁸ there is no “universal formula for what an EA must contain and

⁸¹ *Louisiana Energy Servs., L.P.* (National Enrichment Facility), CLI-05-20, 62 NRC 523, 536 (2005).

⁸² *Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Units 1 and 2), ALAB-455, 7 NRC 41, 49 (1978).

⁸³ *Southern Nuclear Operating Co.* (Early Site Permit for Vogtle ESP Site), LBP-09-07, 69 NRC 613, 631 (2009).

⁸⁴ *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)).

⁸⁵ *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-02-25, 56 NRC 340 (2002).

⁸⁶ *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC 287, 315 (2010) (citing *Hells Canyon Alliance v. United States Forest Serv.*, 227 F.3d 1170, 1185 (9th Cir. 2000); *Natural Resources Defense Council v. Hodel*, 865 F.2d 288, 294 (D.C. Cir. 1988)) (internal quotation omitted).

⁸⁷ *Pilgrim*, CLI-10-11, 71 NRC at 315.

⁸⁸ See, e.g., 10 C.F.R. §§ 51.70 and 51.71 (draft EIS), 10 C.F.R. §§ 51.90 and 51.91 (final EIS), 40 C.F.R. §§ 1502.15 and 1502.16 (all EISs).

consider.”⁸⁹ The NRC’s NEPA regulations state that an EA must “identify the proposed action” and include a “brief discussion” of the need for the proposed action, alternatives, the environmental impacts of the proposed action and alternatives, as appropriate, and a list of agencies and persons consulted and identification of sources used.⁹⁰

4.8. Our implementing regulations, like the Council on Environmental Quality (CEQ) NEPA regulations, define an EA as follows:⁹¹

An EA is a “concise public document” which serves to:

- (1) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.
- (2) Aid an agency's compliance with the Act when no environmental impact statement is necessary.
- (3) Facilitate preparation of a statement when one is necessary.

NRC regulations also require that after completing an EA, the Staff will determine whether to prepare an EIS or a FONSI on the proposed action.⁹²

4.9. Whether issuing an EA or an EIS, the agency's “hard look” must encompass “a thorough investigation into the environmental impacts of [the] agency's action and a candid acknowledgment of the risks that those impacts entail.”⁹³ Because of the variety of possible factual variations in NEPA cases, an agency's obligations under NEPA are case-specific. The

⁸⁹ *Friends of Congaree Swamp v. Fed. Highway Admin.*, 786 F. Supp. 2d 1054, 1062 (D.S.C. 2011).

⁹⁰ 10 C.F.R. § 51.30(a).

⁹¹ *Pacific Gas & Electric Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-26, 68 NRC 509, 514 and n.27 (2008); see also 10 C.F.R. § 51.14.

⁹² 10 C.F.R. § 51.31(a).

⁹³ *Nat'l Audubon Soc'y v. Dep't of Navy*, 422 F.3d 174, 185 (4th Cir.2005).

level of detail required “depends upon the nature and scope of the proposed action.”⁹⁴ An EA requires less depth of consideration and less detail than an EIS.⁹⁵

4.10. When reviewing an EIS or an EA for compliance with NEPA, a court must “take a holistic view of what the agency has done to assess environmental impact[s],” and must not “flyspeck” the agency’s environmental analysis.”⁹⁶ In the context of NRC proceedings, the Commission has specifically stated that NRC hearings are not intended to fine-tune, add details or nuances, or edit Staff NEPA documents to meet an intervenor’s preferred language or emphasis.⁹⁷ Furthermore, “in an NRC adjudication, it is Intervenor’s burden to show [the] significance and materiality” of a mistake in the Staff’s environmental review document.⁹⁸

4.11. A licensing board may look beyond the face of the Staff’s NEPA document and examine the entire administrative record to determine whether “the Staff’s underlying review was sufficiently detailed to qualify as ‘reasonable’ and a ‘hard look’ under NEPA — even if the Staff’s description of that review in the [NEPA document] was not.”⁹⁹ Thus, “even if an [environmental review document] prepared by the Staff is found to be inadequate in certain

⁹⁴ *California v. Block*, 690 F.2d 753, 761 (9th Cir.1982).

⁹⁵ See *Pa’ina Hawaii, L.L.C.*, CLI-10-18, 72 NRC 56, 75 (2010).

⁹⁶ See, e.g., *Fuel Safe Washington v. FERC*, 389 F.3d 1313, 1323 (10th Cir. 2004) (describing the inquiry as “deciding whether claimed deficiencies in a FEIS are merely flyspecks, or are significant enough to defeat the goals of informed decision making and informed public comment”) (quotation marks omitted); *Half Moon Bay Fishermans’ Mktg. Ass’n v. Carlucci*, 857 F.2d 505, 508 (9th Cir.1988) (“The reviewing court may not ‘flyspeck’ an EIS.”).

⁹⁷ *Exelon Generation Co., LLC* (Early Site Permit for Clinton ESP Site), CLI-05-29, 62 NRC 801, 811 (2005) (boards “do not sit to ‘flyspeck’ environmental documents or to add details or nuances.”); see also *System Energy Resources, Inc.* (Early Site Permit for Grand Gulf ESP Site), CLI-05-4, 61 NRC 10, 19 (2005) (internal citations omitted) (editing Staff NEPA documents to meet an intervenor’s preferred language or emphasis “is not a function of [the NRC] hearing process,” and “boards do not sit to parse and fine-tune” the staff’s NEPA documents).

⁹⁸ *Clinton ESP*, CLI-05-29, 62 NRC at 811.

⁹⁹ *Dominion Nuclear North Anna, LLC* (Early Site Permit for North Anna ESP Site), CLI-07-27, 66 NRC 215, 230 (2007).

respects, the Board's findings, as well as the adjudicatory record, 'become, in effect, part of the [environmental review document].'¹⁰⁰ This applies whether the document is an EIS or an EA, and regardless of the type of hearing procedures involved.¹⁰¹

4.12 Neither NEPA nor the Commission's regulations formally prescribe the circumstances under which an EA must be supplemented.¹⁰² However, 10 C.F.R. § 51.92(a) states that the Staff must supplement an EIS "if there are substantial changes in the proposed action that are relevant to environmental concerns" or if "[t]here are new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." Courts have applied the regulations and case law addressing supplementation of an EIS when considering if an EA should be supplemented.¹⁰³ Supplementation has not been required when an agency determines that the importance of new information has been exaggerated,¹⁰⁴ when a change in a project resulted in no "discernable" differences in environmental effects,¹⁰⁵ and when new information is not quantitatively or qualitatively significantly different than what was considered in the agency NEPA document.¹⁰⁶

¹⁰⁰ *Strata Energy, Inc.* (Ross In Situ Recovery Project), LBP-15-3, 81 NRC 65, 82 (2015) (citations omitted); see also *Pacific Gas and Electric Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-26, 68 NRC 509, 526 (2008) ("Consistent with longstanding NRC practice," an NRC adjudicatory decision "becomes part of the environmental record of decision along with the environmental assessment itself.").

¹⁰¹ *Pa'ina Hawaii, L.L.C.*, Initial Decision (Ruling on Concerned Citizens of Honolulu Amended Environmental Contentions #3, #4, and #5) at 16-18 (August 27, 2009) (unpublished), *aff'd in part and rev'd in part on other grounds*, *Pa'ina Hawaii, L.L.C.*, CLI-10-18, 72 NRC 56 (2010).

¹⁰² *Highway J Citizen Group v. Mineta*, 349 F.3d 938, 959 (7th Cir. 2003).

¹⁰³ *Id.* at 960; *Price Rd. Neighborhood Ass'n v. U.S. Dep't of Transp.*, 113 F.3d 1505, 1509-10 (9th Cir.1997).

¹⁰⁴ *Marsh v. Oregon Natural Res. Council*, 490 U.S. 360, 385 (1989).

¹⁰⁵ *Price Rd. Neighborhood Ass'n*, 113 F.3d at 1510.

¹⁰⁶ *Vine Street Concerned Citizens, Inc. v. Dole*, 630 F. Supp. 24, 29 (E.D.Pa.1985).

C. NHPA Requirements

4.13. Under Section 106 of the NHPA, an agency must consider the effects that a proposed action will have on any property that is listed in, or eligible to be listed in, the National Register of Historic Places. The Advisory Council on Historic Preservation (ACHP) is the agency charged with implementing the NHPA. Under the ACHP's regulations,¹⁰⁷ before entering into an "undertaking" a federal agency must make a reasonable and good faith effort to identify historic properties that may be affected by the undertaking.¹⁰⁸ The agency's "identification efforts may include activities such as background research, consultation, oral history interviews, sample field investigation, and field survey."¹⁰⁹ If the agency "finds that either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them," and the agency receives no objection from the SHPO or ACHP within 30 days, then "the agency official's responsibilities under section 106 are fulfilled."¹¹⁰ Similarly, if the agency finds that the undertaking will have no adverse effect on historic properties, then the agency has fulfilled its Section 106 responsibilities and consultation may be concluded.¹¹¹

4.14. The ACHP has published guidance further defining the "reasonable and good faith" standard.¹¹² Under this guidance, "a reasonable and good faith effort to identify historic

¹⁰⁷ 36 C.F.R. Part 800.

¹⁰⁸ 36 C.F.R. § 800.4(b)(1).

¹⁰⁹ *Id.*

¹¹⁰ 36 C.F.R. § 800.4(d)(1).

¹¹¹ 36 C.F.R. § 800.5(d)(1) ("Implementation of the undertaking in accordance with the finding as documented fulfills the agency official's responsibilities under section 106 and this part."); *cf.* 36 C.F.R. §800.5(d)(2) ("If an adverse effect is found, the agency official shall consult further to resolve the adverse effect pursuant to § 800.6.").

¹¹² *Meeting the "Reasonable and Good Faith" Identification Standard in Section 106 Review (ACHP)* (available at http://www.achp.gov/docs/reasonable_good_faith_identification.pdf) (last retrieved November 22, 2015).

properties [must] include some level of effort—at a minimum, a review of existing information on historic properties that are located or may be located within the [area of potential effects] (APE).”¹¹³ The ACHP explains that a reasonable and good faith effort “may consist of one or more methodologies and should be designed so that the federal agency can ensure that it produces enough information, in enough detail, to determine what the undertaking’s effects will likely be on historic properties.”¹¹⁴ In its guidance, the ACHP also explains:

[A] reasonable and good faith identification effort does *not* require:

- The ‘approval’ of a [State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO),] or other consulting party. The ACHP, SHPO/THPO and other consulting parties advise and assist the federal agency official in developing its identification efforts, but do not dictate its scope or intensity.
- Identification of every historic property within the APE. One of the reasons the ACHP’s regulations contain a post-review discovery provision (36 C.F.R. § 800.13) is that a reasonable and good faith effort to identify historic properties may well not be exhaustive and, therefore, some properties might be identified as the project is implemented.
- Investigations outside of, or below, a properly documented APE. The Section 106 process does not require that the agency search for all historic properties in a given area. Because the APE defines the geographic limits of federal agency responsibility for purposes of Section 106 review, identification efforts are carried out within its boundaries.
- Ground verification of the entire APE. In many cases, areas can be considered to have a certain probability of containing historic properties based on current knowledge. This or similar characterizations can be used to justify where within the APE most identification efforts will or should be targeted. Predictive models that have been tested and found to be reasonably efficient can also assist federal agencies to meet the ‘reasonable and good faith’ identification standard.¹¹⁵

¹¹³ *Id.* at 2 (citing 36 C.F.R. § 800.4(a)(2)).

¹¹⁴ *Id.*

¹¹⁵ *Id.* at 3 (emphasis in original).

4.15. With respect to consultation, the ACHP's regulations make clear that an agency provides tribes with a reasonable opportunity to identify their concerns when it takes the following steps. First, the agency must make a "reasonable and good-faith effort" to identify tribes that may potentially be affected by an undertaking.¹¹⁶ Second, the agency must provide a tribe:

a reasonable opportunity to identify its concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate its views on the undertaking's effects on such properties, and participate in the resolution of adverse effects.¹¹⁷

4.16. Further, the consulting agency may choose to coordinate its NHPA review with any NEPA review the agency is conducting. Under guidance published jointly by the ACHP and CEQ, this approach is permissible as long as the agency finalizes its NHPA review before issuing its Record of Decision for the proposed action.¹¹⁸

4.17. The NHPA further requires that consultation with Indian tribes "recognize the government-to-government relationship between the Federal Government and Indian tribes."¹¹⁹ As the ACHP has explained, however, "[w]hile the Section 106 regulations are fairly prescriptive in nature, they only direct agencies on what to do and at which stages of the process to engage in consultation," and do "not direct exactly how to carry out consultation."¹²⁰ Thus, agencies can and do develop policy statements or guidance documents to guide government-to-government

¹¹⁶ 36 C.F.R. § 800.2(c)(2)(ii)(A).

¹¹⁷ *Id.*

¹¹⁸ Ex. NRC-048 at 35.

¹¹⁹ 36 C.F.R. § 800.2(c)(2)(ii)(C).

¹²⁰ "Consultation with Indian Tribes in the Section 106 Review Process: A Handbook" (ACHP) (available at <http://www.achp.gov/regs-tribes2008.pdf>) (last retrieved November 22, 2015) at 8.

consultation with Tribes. The NRC's agency guidance appears in its Tribal Protocol Manual.¹²¹

That manual describes the NRC's obligation to consult on a government-to-government basis as follows:

The U.S. government recognizes Tribes as domestic sovereign nations, that is, the United States has acknowledged the inherent authority of Native American Tribes to govern themselves. . . . In establishing a government-to-government relationship with Federally recognized Tribal governments, the NRC acknowledges the status of Tribes as domestic dependent sovereign nations, as being distinct from the status of special interest groups, stakeholders, non-governmental organizations, or members of the general public.¹²²

4.18. The Tribal Protocol Manual also specifies that when initiating consultation with a Tribe, the "initial written contact announcing a licensing application and inviting the participation of an Indian Tribe in consultation should be made by an NRC Division Director or Deputy Director" and "the addressee should be the leader of the Tribal government," though a copy "may be sent to the Tribal Historic Preservation Officer (THPO)."¹²³ After the initial invitation to consultation, "[s]ubsequent interactions with Tribal governments can be conducted by the NRC staff that contact and establish relationships with Tribal representatives who hold similar levels of authority."¹²⁴ The Tribal Protocol Manual also states that "[w]hen representatives of the Federal government and Tribal governments interact on issues within the scope of their authority, the interaction may be considered 'government to government,'" and that "information-sharing meetings, presentation, preliminary discussions, introductory briefings, information-gathering sessions, teleconferences, written correspondence, and telephone conversations

¹²¹ Ex. NRC-047.

¹²² *Id.* at 9.

¹²³ *Id.* at 16.

¹²⁴ *Id.* at 17.

between staff-level employees” can all constitute government-to-government consultation.¹²⁵

The NRC’s understanding that “government-to-government” consultation is a process that may be initiated by higher-level agency officials and then sustained by employees more knowledgeable about the undertaking itself is consistent with the approach used by certain other federal agencies.¹²⁶

D. NRC Regulations and Guidance

4.19. The Staff conducted its safety review of CBR’s license renewal request in accordance with applicable standards in 10 C.F.R. Part 40, Appendix A, and consistent with NUREG-1569.¹²⁷ The Staff uses NUREG-1569 “to determine whether the proposed activities will be protective of public health and safety and the environment and to fulfill NRC responsibilities under the National Environmental Policy Act (NEPA).”¹²⁸ The Staff developed NUREG-1569 as an alternative to issuing safety regulations specifically addressing uranium recovery facilities.¹²⁹

¹²⁵ *Id.* at 14.

¹²⁶ E.g., “*Holding Regional Consultation Meetings with Tribal Leaders*” (U.S. Bureau of Reclamation) (available at http://www.usbr.gov/native/policy/RegionalMeetingswithTribalLeaders_2009.pdf) (last retrieved November 22, 2015) at 1 (“Government-to-government meetings . . . require the participation of leadership and staff who can ensure that meeting recommendations will be brought forward to final decision makers should such decision makers not be present at the meetings.”); “*American Indian and Alaska Native Policy and Department of Defense Instruction Number 4710.02: DoD Interactions with Federally-Recognized Tribes*” (U.S. Dep’t of Defense) (available at http://www.denix.osd.mil/na/upload/_American-Indian-and-Alaska-Native-Policy-Booklet-Version-2-for-Web-Posting.pdf) (last retrieved November 22, 2015) at 4 n.(h) (“Although communication with tribes on a government-to-government basis demands attention--at least initially--at a relatively senior level of command, the goal should be to develop mutually acceptable protocols or procedures that will allow most day-to-day liaison and work with interested tribes to be accomplished on a staff-to-staff basis. Senior commanders and tribal leaders should be kept apprised of this day-to-day interaction, but--once these protocols are in place--need act personally and directly only when requested to do so by the other party.”).

¹²⁷ NUREG-1569, Standard Review Plan for In Situ Leach Uranium Extraction License Applications (June 2003) (Ex. NRC-013).

¹²⁸ Ex. NRC-013 at 3.

¹²⁹ *Id.* at 5–6.

4.20. The Staff conducted its environmental review in accordance with the applicable standards in 10 C.F.R. Part 51 and NUREG-1748.¹³⁰ NUREG-1748 provides general procedures for the environmental review of licensing actions regulated by NMSS. Because certain areas of the environmental review, such as hydrology and hydrogeology, overlap with the safety review, the Staff incorporated information and findings from the safety review and SER into its environmental review as appropriate.

4.21. In formulating its conclusions regarding the environmental impacts of a proposed action, the Staff uses a standard scheme to categorize the impacts.¹³¹ This standard was created using the approach outlined in CEQ regulations indicating that agencies should consider both the context and intensity of impacts.¹³² This standard utilizes three possible levels of environmental impacts, which are defined as follows:

SMALL - Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

MODERATE - Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE - Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.¹³³

4.22. Although Staff guidance is not binding on a licensing board, it is entitled to special weight in a hearing.¹³⁴ The Commission recently reiterated that Staff guidance

¹³⁰ NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (August 2003) (Ex. NRC-014).

¹³¹ See, e.g., 10 C.F.R. Part 51, App. B, table. B-1 n.3.

¹³² See Ex. NRC-014 at 4-14.

¹³³ Ex. NRC-010 at viii.

¹³⁴ See *Yankee Atomic Elec. Co.* (Yankee Nuclear Power Station), CLI-05-15, 61 NRC 365, 375 n.26 (2005) ("We recognize, of course, that guidance documents do not have the force and effect of law. Nonetheless, guidance is at least implicitly endorsed by the Commission and therefore is entitled to correspondingly special weight."). See also *Nextera Energy Seabrook, LLC* (Seabrook Station, Unit 1), CLI-12-05, 75 NRC 301, 314 n.78 (2012) (explaining that a Staff-issued NUREG is entitled to special

documents do not have the force of law, but they are entitled to special weight and should not lightly be set aside in favor of a board's own determination without sufficient justification.¹³⁵

4.23. Although NUREG-1569 is a Staff guidance document, rather than an NRC rule, it is guidance that the Commission unanimously approved for publication in May 2003.¹³⁶ When the Commission voted to approve publication of NUREG-1569, it understood that the Staff intended to use NUREG-1569 to determine whether an applicant has met the safety requirements for receiving a license and whether the Staff has fulfilled its responsibilities under NEPA.¹³⁷ Because NUREG-1569 was explicitly endorsed by the Commission's vote in SECY-02-0204, it is to be given weight commensurate with its status as Commission-approved guidance.

4.24. Similarly, the Commission explicitly endorsed Appendix C of NUREG-1748 in its 2004 policy statement on environmental justice.¹³⁸ As such, while not binding on a licensing board, it should be accorded special weight commensurate with its status as Commission-endorsed guidance.¹³⁹

weight); *Private Fuel Storage LLC* (Independent Spent Fuel Storage Installation), CLI-01-22, 54 NRC 255, 264 (2001) (same).

¹³⁵ *Entergy Nuclear Operations, Inc.* (Indian Point, Units 2 and 3), CLI-15-6, 81 NRC 340, 358-59 and n.85 (2015). The Commission did note that a board has greater leeway to set aside Staff guidance in situation "[w]here the guidance is not directly applicable to the issue at hand." such as the application of guidance for licensing of nuclear power plants to a materials license proceeding. *Id.* at 358 n.86 (citing *Curators of the University of Missouri*, (Trump-S Project) CLI-95-1, 41 NRC 71, 150 (1995)).

¹³⁶ VR-SECY-02-0204, Update of Uranium Recovery Guidance Documents (May 7, 2003).

¹³⁷ *Id.* at 14.

¹³⁸ "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions," 69 Fed. Reg. 52040 (Aug. 24, 2004).

¹³⁹ *Nextera Energy Seabrook, LLC* (Seabrook Station, Unit 1), CLI-12-05, 75 NRC 301, 314 n.78 (2012); *Yankee Atomic Elec. Co.* (Yankee Nuclear Power Station), CLI-05-15, 61 NRC 365, 375 n.26 (2005); *Private Fuel Storage LLC* (Independent Spent Fuel Storage Installation), CLI-01-22, 54 NRC 255, 264 (2001).

4.25. In May 2009, the NRC issued NUREG-1910, a generic EIS for ISR facilities that assesses potential ISR facility construction/operation/decommissioning impacts in four specific Western United States regions, including the Nebraska-South Dakota-Wyoming region in which the CBR facility is located. Unlike the GEIS for power reactor license renewals, the ISR GEIS has not been incorporated into the NRC's regulations. Therefore, it can be challenged in an adjudicatory proceeding.¹⁴⁰ However, as with other Staff guidance, it is entitled to special weight in such a proceeding.¹⁴¹

E. Scope of License Renewal Review

4.26. The scope of the Staff's review of a license renewal application differs from that of an initial license application. NUREG-1569 states that all applicants are required to provide detailed information on the facilities, equipment, and procedures to be used, and an environmental report that discusses the effects of proposed operations on the health and safety of the public and on the environment.¹⁴² For license renewal applications, however, the licensee need only submit information containing changes from the current accepted license. The licensee need not resubmit a complete application covering all aspects of facility operation.¹⁴³

4.27. NUREG-1569 directs the Staff, in its review of a request for license renewal, to analyze the inspection history and operation of the site and review changes to operations from those currently found acceptable. If these changes are found to be acceptable, then the license

¹⁴⁰ *Strata Energy, Inc.* (Ross In Situ Recovery Uranium Project), LBP-12-3, 75 NRC 164, 207 (2012).

¹⁴¹ See *Yankee Atomic Elec. Co.* (Yankee Nuclear Power Station), CLI-05-15, 61 NRC 365, 375 n.26 (2005) ("We recognize, of course, that guidance documents do not have the force and effect of law. Nonetheless, guidance is at least implicitly endorsed by the Commission and therefore is entitled to correspondingly special weight.").

¹⁴² Ex. NRC-013 at xv.

¹⁴³ *Id.* at xvii.

is acceptable for renewal.¹⁴⁴ In accordance with this approach, the acceptance criteria for a license renewal application consist of “a summary of proposed changes, a record of amendments since the last license issuance, and documentation of inspection results.”¹⁴⁵

4.28. Appendix A to NUREG-1569 provides specific guidance regarding the Staff’s review of a licensee’s historical record of site operations and compliance in conjunction with a request for a license renewal. The areas of review include amendments and changes to operating practices and procedures; excursions and cleanup histories; and exceedances of any non-radiological contaminant exposure or release limits.¹⁴⁶ If, after reviewing the historical aspects of site operations, the Staff concludes “that the site has been operated so as to protect health and safety and the environment and that no unreviewed safety-related concerns have been identified,” then the Staff is only to review the changes proposed by the license renewal application using the appropriate sections of NUREG-1569.¹⁴⁷

F. Burden of Proof

4.29. Generally, an applicant has the burden of proof in a licensing proceeding.¹⁴⁸ In cases involving NEPA- and NHPA-based contentions, however, the burden is on the Staff, because the Staff, not the Applicant, has the statutory obligation of complying with NEPA.¹⁴⁹ According to the Commission, “NRC hearings on NEPA issues focus entirely on the adequacy

¹⁴⁴ *Id.* at xvii.

¹⁴⁵ *Id.* at 1-2.

¹⁴⁶ *Id.* at A-1.

¹⁴⁷ *Id.* (stating that “[a]spects of the facility and its operations that have not changed since the last license renewal or amendment should not be reexamined.”)

¹⁴⁸ 10 C.F.R. § 2.325.

¹⁴⁹ See, e.g., *Duke Power Co.* (Catawba Nuclear Station, Units 1 & 2), CLI-83-19, 17 NRC 1041, 1049 (1983).

of the Staff's work."¹⁵⁰ Contentions A, C, D, F, 1, 6, 9, 12, and 14 challenge the EA prepared by the Staff and question whether the NRC Staff has satisfied its responsibilities under NEPA.

Thus, the Staff bears the burden of proof for these contentions.¹⁵¹

4.30. However, because "the Staff, as a practical matter, relies heavily upon the Applicant's [LRA] in preparing the [environmental review document], should the Applicant become a proponent of a particular challenged position set forth in the [environmental review document], the Applicant, as such a proponent, also has the burden on that matter."¹⁵²

4.31. In challenging the Staff's EA, the CI and OST must identify, with some specificity, the alleged deficiencies in the Staff's NEPA analysis.¹⁵³ Moreover, "a party sponsoring a contention bears the burden of going forward with evidence sufficient to show that there is a material issue of fact or law, such that the applicant/proponent must meet its burden of proof."¹⁵⁴

As the Commission has stated:

The ultimate burden of proof on the question of whether the permit or license should be issued is . . . upon the applicant. But where . . . one of the other parties contends that, for a specific reason . . . the permit or license should be denied, that party has the burden of going forward with evidence to buttress that contention. Once he has introduced sufficient evidence to establish a prima facie case, the burden then shifts to the applicant who, as part of his overall burden of proof, must provide a sufficient rebuttal to satisfy the Board that it should reject the contention as a basis for denial of the permit or license.¹⁵⁵

¹⁵⁰ *Southern Nuclear Operating Co.* (Early Site Permit for Vogtle ESP Site), CLI-07-17, 65 NRC 392, 395 (2007); see also *Progress Energy Florida, Inc.* (Levy County Nuclear Power Plant, Units 1 and 2), CLI-10-2, 71 NRC 27, 34 (2010) (stating that "the ultimate burden with respect to NEPA lies with the NRC Staff").

¹⁵¹ See, e.g., *Levy County*, CLI-10-2, 71 NRC at 34.

¹⁵² *Strata Energy, Inc.* (Ross In Situ Recovery Uranium Project), LBP-15-3, 81 NRC 65, 85 (Jan. 23, 2015) (quoting *Louisiana Energy Servs., L.P.* (Claiborne Enrichment Center), LBP-96-25, 44 NRC 331, 339 (1996), *rev'd on other grounds*, *Louisiana Energy Servs., L.P.* (Claiborne Enrichment Center) CLI-97-15, 46 NRC 294 (1997)).

¹⁵³ See *Hydro Resources, Inc.*, CLI-99-22, 50 NRC at 13.

¹⁵⁴ Changes to Adjudicatory Process, 69 Fed. Reg. 2182, 2213 (final rule) (Jan. 14, 2004).

¹⁵⁵ *Amergen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-09-7, 69 NRC 235, 269 (2009), quoting *Consumers Power Co.* (Midland Plant, Units 1 and 2), ALAB-123, 6 AEC 331, 345 (1973).

4.32. The Staff's NEPA analysis is deemed adequate unless the Staff "has failed to take a 'hard look' at significant environmental questions – i.e., Staff has unduly ignored or minimized pertinent environmental effects."¹⁵⁶ In NRC adjudications, it is the Intervenors' burden to show the significance and materiality of mistakes in the Staff's environmental review document.¹⁵⁷ "Boards do not sit to 'flyspeck' environmental documents or to add details or nuances If the ER (or [environmental review document]) on its face comes to grips with all important considerations, nothing more need be done."¹⁵⁸

4.33. Finally, the standard of proof in this proceeding is preponderance of the evidence.¹⁵⁹ Because NEPA does not require certainty or precision or the use of best methodology, the Staff need not prove, and this Board need not find, that its results are the most accurate or were performed with the best methodology.¹⁶⁰

V. RULINGS ON LEGAL ISSUES

A. Scope of the Contested Proceeding and Ruling on Motions in Limine and Written Objections

¹⁵⁶ *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-03-17, 58 NRC 419, 431 (2003).

¹⁵⁷ *Clinton ESP*, CLI-05-29, 62 NRC at 811.

¹⁵⁸ *Id.* (quoting *System Energy Resources, Inc.* (early Site Permit for Grand Gulf Site), CLI-05-4, 61 NRC 10, 13 (2005)).

¹⁵⁹ See *Pacific Gas and Electric Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-26, 68 NRC 509, 521 (2008) (applying a preponderance of the evidence standard to resolution of an environmental contention).

¹⁶⁰ See *Louisiana Energy Services*, CLI-05-20, 62 NRC at 536 (stating that NEPA does not require certainty or precision); *Pilgrim*, CLI-10-11, 71 NRC at 315 (stating that NEPA does not require use of the best methodology).

5.1. NRC hearings are limited to the scope of the admitted contentions, and if intervenors proffer testimony or evidence outside the scope of the admitted contentions, it should not be considered.¹⁶¹

5.2. The scope of an admitted contention is limited to the issues of law and fact pled with particularity in the intervention petition, including its stated bases, unless the contention is satisfactorily amended in accordance with NRC's rules.¹⁶² The Board may not consider matters not in the evidentiary record.¹⁶³

5.3. On June 15, 2015, the Staff filed a Motion in Limine to exclude Exhibits INT-001, INT-002, INT-004, INT-005, INT-010, INT-012, INT-023, INT-024, INT-025, INT-027, INT-029, INT-030, and INT-051 in their entirety, as well as INT-028, INT-046, INT-047, INT-048, INT-049, INT-069, INT-070, and OST-001 in part. The Intervenor responded on June 25, 2015. At an August 18, 2015 pre-hearing teleconference with the parties, we granted the Staff's motion with respect to Exhibits INT-001, INT-010, INT-012, INT-030 and INT-051.¹⁶⁴ We deferred our ruling on the remainder of the Staff's motion until after the evidentiary hearing.¹⁶⁵ We now grant the pending portion of the Staff's motion for the reasons stated by the Staff, and, as a result, will not consider those exhibits or those portions of exhibits in formulating this decision.

5.4 In our order of September 10, 2015, we granted the parties an opportunity to file written objections to exhibits identified during the August hearing. On September 14, 2015, the

¹⁶¹ See *Southern Nuclear Operating Co.* (Early Site Permit for Vogtle ESP Site), CLI-10-5, 71 NRC 90, 100-01 (2010) (agreeing with the Staff that the licensing board properly excluded the intervenors' testimony and exhibits that were outside the scope of the admitted contention).

¹⁶² *Vogtle ESP*, CLI-10-5, 71 NRC at 100.

¹⁶³ See *Pacific Gas & Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 & 2), ALAB-580, 11 NRC 227, 230 (1980) (stating that "it is a statutory requirement that the adjudicatory decisions of this Commission stand or fall on the basis of the record on which they rest").

¹⁶⁴ Tr. at 931-32.

¹⁶⁵ *Id.* at 933.

Staff filed a written objection to the admission of Exhibits BRD-011 to BRD-029. After considering the bases set forth by the Staff, we sustain their objection for the reasons stated by the Staff, and, as a result, will not consider those exhibits in formulating this decision.

5.5 In our orders of October 13, 2015, we admitted Intervenors' Exhibits INT-082-R, INT-084, and INT-085 and provided an opportunity for the Staff and CBR to file written objections to those exhibits. On October 19, 2015, the Staff filed a written objection. After considering the bases set forth by the Staff, we sustain the Staff's objection for the reasons set forth by the Staff. Accordingly, we will not consider Exhibits INT-084 and INT-085, and the portions of Exhibit INT-082-R that rely on them, in formulating this decision.

B. Expert Witness Qualifications

5.6. An expert opinion is only admissible if the witness is competent to give an expert opinion and adequately states and explains the factual basis for the expert opinion.¹⁶⁶ An admissible expert opinion must be "based upon sufficient facts or data to be the product of reliable principles and methods that the witness applied to the facts of the case."¹⁶⁷

5.7. In addition, a party bears the burden of demonstrating that its witness is qualified to serve as an expert.¹⁶⁸ "A witness may qualify as an expert by knowledge, skill, experience, training, or education to testify [i]f scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue."¹⁶⁹

¹⁶⁶ *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-4, 61 NRC 71, 81 (2005).

¹⁶⁷ *Id.* at 80.

¹⁶⁸ *Duke Energy Corp.* (Catawba Nuclear Station, Units 1 and 2), CLI-04-21, 60 NRC 21, 27 (2004).

¹⁶⁹ *Id.* at 27-28.

5.8. In this proceeding, the qualifications of the expert witnesses have not been challenged. We find that the Staff, CBR, CI, and OST have demonstrated that each of their witnesses is qualified to serve as an expert.

VI. FINDINGS OF FACT

6.1. We find that the Staff prepared the Crow Butte license renewal EA consistent with the requirements of NEPA and the NHPA. For the reasons stated below, we resolve each of the Intervenor's admitted contentions in favor of the Staff and CBR.

A. Contention A

6.2. Contention A, as migrated to the Staff's EA in our March 2015 decision, LBP-15-11, reads as follows:

Contention A: There is no evidence based science for [the NRC Staff's] conclusion that ISL mining has "no non radiological health impacts," or that non radiological impacts for possible excursions or spills are "small."¹⁷⁰

6.3. Contention A was first proffered by the OST as a challenge to CBR's LRA and raised a wide variety of arguments grouped loosely around the theme of health impacts on the Pine Ridge Indian Reservation that may result from excursions at the CBR facility.¹⁷¹ As support for Contention A, the OST provided opinions by Dr. Richard Abitz and Intervenor's witness Dr. Hannan LaGarry, a 1989 letter to the NRC regarding the potential communication of

¹⁷⁰ LBP-15-11 at 451.

¹⁷¹ See OST 2008 Petition at 6-9. Specifically, the OST raised arguments relating to the likelihood of communication between the mined aquifer and the drinking water source for the Pine Ridge Indian Reservation; the adequacy of the spill contingency plans described in CBR's LRA; the location and monitoring frequency of the wells used to monitor for excursions at the Crow Butte site; the exclusion of uranium and "other heavy metals known to be toxic and linked to the development of cancer" from the parameters used to monitor for excursions; the accuracy and potential for bias in the testing of monitoring wells; the ecological impacts of the Crow Butte project on various listed ecosystems, animals, and humans; the absence in the LRA of a literature review regarding non-radiological impact of ISR mining on the public generally and the OST specifically; and the absence in the LRA of an outline of "the possible health hazards of ingesting drinking water that is contaminated with uranium." *Id.*

aquifers in the area, and studies relating to the effects of depleted uranium on mice and cancer prevalence in Native American populations.¹⁷²

6.4. We admitted Contention A in a November 21, 2008 memorandum and order ruling on the intervenors' hearing requests.¹⁷³ The Staff and CBR appealed this decision admitting Contention A, among other contentions, and the Commission responded to their appeal in an order dated May 18, 2009.¹⁷⁴

6.5. In reviewing our ruling on Contention A, the Commission recognized that the OST "made many assertions in its proposed contention," but found that "the Board limited the admitted contention to the following claim:"¹⁷⁵

The Tribe has raised a genuine dispute with the License Renewal Application by raising sufficient questions whether Crow Butte's spill contingency plan adequately addresses non-radiological contaminants. Specifically in this regard, the Tribe challenges the monitoring frequency for contaminants, and the Tribe's expert, Dr. Abitz, opines that certain portions of the License Renewal Application are deficient.¹⁷⁶

The Commission also referred to the OST's citation of Dr. Abitz's report and his opinion that there is "no valid scientific reason" to exclude uranium as an excursion indicator, and the OST's argument that a biweekly testing plan was too infrequent to detect possible excursions.¹⁷⁷

Finally, the Commission noted that in admitting Contention A, we "relied primarily on the expert opinion of Dr. Abitz, rather than on the testimony of Dr. LaGarry."¹⁷⁸

¹⁷² See *id.* at 5-12.

¹⁷³ LBP-08-24 at 718.

¹⁷⁴ CLI-09-9 at 331.

¹⁷⁵ *Id.* at 346.

¹⁷⁶ *Id.* at 347.

¹⁷⁷ *Id.*

¹⁷⁸ *Id.*

6.6. Regarding the admitted portion of Contention A, the OST claimed that leaks could occur and go undetected if the biweekly schedule for testing of monitoring wells does not coincide with a leak.¹⁷⁹ In support of this claim, the OST referred to Section 5.8.1.3 of the LRA.¹⁸⁰ This section of the LRA describes the operating procedures that CBR has in place to handle potential surface and subsurface releases of radioactive materials through spills and leaks, including surface leaks, transportation accidents, and subsurface releases.¹⁸¹ The OST also claimed that CBR's ground water monitoring plan – alluded to in Section 5.8.1.3 but more fully described in Section 5.8.8.2 of the LRA – does not indicate that monitoring wells are tested for uranium and that “[t]here is no scientific basis for excluding uranium from the monitor well testing.”¹⁸²

6.7. In their submission dated January 5, 2015, the OST filed several new contentions in response to the issuance of the Staff's EA for the CBR license renewal.¹⁸³ They did not seek to amend, or otherwise address, their previous arguments concerning Contention A with this filing. In our memorandum and order ruling on the intervenors' proposed new contentions related to the EA, the Board migrated Contention A, as admitted, from a challenge to CBR's LRA to a challenge to the Staff's EA.¹⁸⁴

6.8. The Staff describes the potential ground water impacts from renewal of the Crow Butte project in Section 4.6.2 of the EA. The sections most relevant to the OST's admitted

¹⁷⁹ OST 2008 Petition at 7.

¹⁸⁰ *Id.* While the location, screening and sampling frequency of CBR's monitoring well network is briefly described in Section 5.8.1.3 of the LRA, it is more fully discussed in Section 5.8.8.2. See Ex. CBR-011 at 5-103.

¹⁸¹ Ex. NRC-001-R at 5.

¹⁸² OST 2008 Petition at 7.

¹⁸³ See *generally* OST New Contentions.

¹⁸⁴ LBP-15-11 at 410.

claims in Contention A are the Staff's discussions of ground water impacts from spills and leaks during operations, which is contained in Section 4.6.2.2.2 of the EA,¹⁸⁵ and ground water impacts from excursions during operations, which is contained in Section 4.6.2.2.4 of the EA.¹⁸⁶ The EA also describes in Section 4.6.2.2.6 the potential environmental impacts that could occur to ground water outside of the Crow Butte facility as a result of excursions.¹⁸⁷

6.9. While the two matters admitted for hearing in this contention relate to the frequency of monitoring well sampling and the use of uranium as an excursion indicator, the Intervenor cited as support for those issues a portion of the LRA that discusses CBR's operating procedures as they pertain to spills and leaks at the facility. In its testimony, the Staff explained that it did not make a determination regarding the adequacy of CBR's operating procedures covering spills and leaks in the course of its safety review of the license renewal application.¹⁸⁸ The Staff explained that it did not reevaluate the adequacy of these procedures because the NRC previously concluded that Crow Butte's spill contingency plans were acceptable, and the Staff did not find anything during its current licensing review to invalidate its previous findings.¹⁸⁹ The Staff stated that this approach is consistent with NUREG-1569 (Ex. NRC-013), which does not require the Staff to reconsider the adequacy of CBR's spill contingency plans unless the inspection history of the site, or operational changes made to the site, warrants such consideration.¹⁹⁰

¹⁸⁵ Ex. NRC-010 at 75-77.

¹⁸⁶ *Id.* at 78-80.

¹⁸⁷ *Id.* at 81.

¹⁸⁸ Ex. NRC-001-R at 5.

¹⁸⁹ *Id.* at 6; Ex. NRC-009 at 65.

¹⁹⁰ Ex. NRC-001-R at 6; see Ex. NRC-013 at A-1.

6.10. The Staff argues that in light of the fact that (1) these plans were not reviewed as part of the Staff's license renewal review and (2) the contention as admitted is narrowly focused on specific elements of CBR's excursion monitoring program, rather than spills and leaks covered under these plans, any claims based on these plans fall outside the scope of the admitted contention. We agree. While the contention as originally pled may have contemplated the broader issues encompassed by these plans, the contention as admitted is directed exclusively to issues relating to the efficacy of CBR's excursion monitoring program as a means of detecting excursions.¹⁹¹ Therefore, we address in turn each of the Intervenors' admitted claims.

1. Biweekly Sampling of Monitoring Wells

6.11. As part of their challenge to the Staff's assessment of hydrological impacts in the EA, the Intervenors asserted that leaks could occur and go undetected if the biweekly schedule for testing of monitoring wells does not coincide with a leak.¹⁹²

6.12. The Staff and CBR testified that CBR is required by Condition 11.5 of CBR's license to sample and test all perimeter and aquifer monitoring wells no more than 14 days apart.¹⁹³ CBR added that when a well goes on excursion status, CBR must increase the sampling frequency to weekly until the well goes off excursion status – meaning three consecutive weekly samples below the upper control limits (UCLs) for excursion parameters – and has demonstrated compliance for an additional three weeks.¹⁹⁴ The Staff stated that the biweekly sampling requirement has been in place since CBR's initial license was granted in 1989 and was described in the EA for that licensing action, as well as in the NRC's EA for

¹⁹¹ See CLI-09-9 at 347.

¹⁹² OST 2008 Petition at 7.

¹⁹³ Ex. NRC-001-R at 10; Tr. at 1597; see *also* Ex. NRC-012 at 12.

¹⁹⁴ Tr. at 1597 (Teahon); see *also* Ex. NRC-012 at 12.

CBR's 1998 license renewal.¹⁹⁵ The Staff also stated that the biweekly standard is consistent with NUREG-1569, which states that "an acceptable excursion monitoring program should indicate that all monitor wells will be sampled for excursion indicators at least every 2 weeks during *in situ* leach operations."¹⁹⁶ Finally, the Staff explained that the adequacy of the biweekly sampling standard has been borne out by historical experience at the site; in the EA, the Staff described the excursion events that have occurred and been detected at the site and states that there has been no measurable impact to ground water beyond the licensed area from CBR's operations.¹⁹⁷

6.13. The Intervenor's have not provided an adequate evidentiary basis for us to conclude that their concerns regarding the sampling frequency for monitoring wells is well-founded. The Intervenor's submitted no testimony or other evidence regarding this particular concern. Therefore, after reviewing the evidentiary record associated with excursions during ISR operations, and mindful of the NRC's guidance in NUREG-1569 regarding the adequacy of biweekly sampling, we find that the preponderance of the evidence supports the conclusion that the biweekly monitoring well sampling frequency in place at Crow Butte is sufficient to ensure the detection of excursions during ISR operations.

2. Uranium as an Excursion Indicator

6.14. The Intervenor's also challenged the adequacy of the parameters used at the Crow Butte site to detect excursions. Through the opinion of Dr. Abitz, submitted as expert evidence in conjunction with their initial intervention petition, the Intervenor's claimed that there is no valid scientific reason to exclude uranium from the list of excursion monitoring parameters for three reasons: (1) uranium is highly mobile as a carbonate complex in lixiviant and is an

¹⁹⁵ Ex. NRC-001-R at 10.

¹⁹⁶ *Id.* at 10; *see also* Ex. NRC-013 at 5-43.

¹⁹⁷ Ex. NRC-001-R at 10; *see also* Ex. NRC-010 at 81.

excellent indicator of excursions; (2) its concentration in baseline wells is generally two or three orders of magnitude lower than the lixiviant; and (3) because the uranium ratio is approximately 100 times greater than it is for other parameters listed in the tables, it will perform “about 100 times better” as an excursion indicator.¹⁹⁸ The Intervenors also asserted that the indicator parameters currently in use at the CBR facility do not tell a complete story about any potential geochemical changes in the ground water as a result of excursions.¹⁹⁹

6.15. The Staff explained in its testimony that CBR’s excursion monitoring program requires monitoring three indicator parameters – chloride, conductivity, and total alkalinity.²⁰⁰ The requirement to monitor these three parameters is documented in License Condition 11.4 of CBR’s license.²⁰¹ The Staff noted that between 1995 and 2010 CBR reported 13 perimeter monitoring wells had been placed on excursion status, and CBR identified 16 excursion events in 12 monitoring wells in the overlying aquifer.²⁰² These excursions were detected and corrected without the use of uranium as an excursion parameter. The Staff described this record of excursion events in Section 4.6.2.2.4 of the EA and Section 5.7.9.3.2 of the SER.²⁰³

6.16. Finally, although uranium is not used as an excursion indicator at the CBR facility, the Staff noted that CBR is currently subject to a limited requirement to sample for natural uranium in two mine units. In Section 4.6.2.2.4 of the EA, the Staff explained that Brule wells in Mine Unit 6 and 8 experienced several excursion events that were attributed to natural

¹⁹⁸ Ex. INT-002 at PDF 6.

¹⁹⁹ Tr. at 1602 (Wireman).

²⁰⁰ Ex. NRC-001-R at 10-11. CBR was also required to sample for sodium and sulfate until those parameters were removed from the license condition in 2003. Ex. NRC-010 at 78 n.7; Tr. at 1600 (Teahon).

²⁰¹ Ex. NRC-012 at 11; *see also* Ex. NRC-001-R at 11.

²⁰² Ex. NRC-010 at 79.

²⁰³ *Id.* at 78; Ex. NRC-009 at 124.

fluctuations in water quality.²⁰⁴ License Condition 11.12, which requires wells in Mine Units 6 and 8 that are on excursion status for more than 60 days to be tested for uranium in addition to the three excursion parameters, was imposed to allow the Staff to verify whether the excursions are a consequence of natural fluctuations, as proposed by CBR, or related to a release or migration of ISR production fluids.²⁰⁵

6.17. The Staff testified that it disagreed with the Intervenors' characterization of uranium as an excellent excursion indicator.²⁰⁶ According to the Staff, the choice of indicator parameters is predicated on their usefulness as conservative, leading-edge parameters that will enable the detection of an excursion most quickly.²⁰⁷ To that end, indicator parameters must be highly mobile.²⁰⁸ The Staff explained that uranium is disfavored as an indicator parameter because it is not as mobile as the three parameters in use at the CBR facility – chloride, conductivity, and total alkalinity.²⁰⁹

6.18. In response to the Intervenors' claim that uranium is highly mobile as a carbonate complex in lixiviant, the Staff testified that

Although the presence of carbonate ions in the lixiviant enhances the mobility of uranium, uranium will remain mobile only as long as the geochemical conditions are favorable. Once the lixiviant moves away from the wellfield, the geochemistry of the ground water and mineralogy of the sandstone is different, potentially affecting the mobility of the uranium.²¹⁰

²⁰⁴ Ex. NRC-010 at 78.

²⁰⁵ Ex. NRC-010 at 78; Tr. at 1632 (Striz). The Staff noted during the hearing that testing is limited to natural uranium, not uranium and radium-226 as stated in the EA. Tr. at 1638 (Striz).

²⁰⁶ Ex. NRC-001-R at 11-13.

²⁰⁷ *Id.* at 13-14.

²⁰⁸ *Id.*

²⁰⁹ *Id.* at 11-12, 13-14.

²¹⁰ *Id.* at 11.

The Staff explained that the degree of mobility and the extent of adsorption of uranium depends on variables such as the concentrations of carbonate and uranium and the pH of the ground water.²¹¹

As the levels of these variables change, particularly as the concentrations of carbonate decrease as an excursion moves away from the production area, the extent of uranium complexed with carbonate would decrease, and therefore the adsorption of uranium on iron hydroxides and clay minerals would increase. In addition, as uranium is transported outside of the production area, which has not been impacted by lixiviant, the presence of organic carbon and reduced minerals will retard the mobility of uranium. As soon as adsorption or other mechanisms cause uranium retardation to occur, the movement of uranium will slow down relative to the speed of the ground water.²¹²

For these reasons, the Staff stated, uranium does not display the conservative behavior expected of a useable leading-edge indicator parameter for excursions outside of the production zone.²¹³

6.19. The Staff also disagreed with the Intervenors' claim that uranium is a key indicator of lixiviant because the uranium ratio is approximately 100 times greater than it is for other parameters.²¹⁴ Although the Staff agreed that the ratio of uranium in lixiviant to natural uranium is higher than for the indicator parameters for which CBR is currently required to monitor, the Staff averred that the concentration ratios are not as important as the mobility of the excursion parameter, reiterating that mobility of the parameter is the defining characteristic of a good excursion indicator.²¹⁵

²¹¹ *Id.*

²¹² *Id.* at 11-12.

²¹³ *Id.* at 12.

²¹⁴ *Id.* at 13.

²¹⁵ *Id.* at 12.

6.20. At the hearing, the Intervenors testified in response to these claims by the Staff concerning the effectiveness of uranium as an excursion indicator that uranium would not be used on its own, but would be added to the other indicators.²¹⁶ The Intervenors agreed that uranium absorbs readily, but asserted in that this characteristic of uranium caused it to be useful in the detection of excursions because the presence of uranium in a monitoring well despite these characteristics indicates the existence of an issue.²¹⁷ The Staff responded that monitoring uranium in addition to the other indicator parameters does not provide any additional benefit, because even under conditions in which uranium travels at a relatively rapid rate, the other excursion indicators would be expected to travel along with the uranium and be detected at the same time.²¹⁸ The Staff added that the NRC only calls upon the licensee to provide what is necessary to meet the regulatory requirements, and that in this case, the existing excursion indicator parameters are sufficient for these purposes.²¹⁹

6.21. Having reviewed the evidence and testimony presented, we find that a preponderance of the evidence supports the Staff's conclusion that uranium is not as effective a tool for the purposes of early excursion detection at the Crow Butte site as chloride, conductivity, and total alkalinity. We find that the Staff's position is further supported by NUREG/CR-3709, which states that uranium is a poor excursion indicator because it does not travel as rapidly as water,²²⁰ and NUREG-1569, which states that uranium is not a good

²¹⁶ Tr. at 1603 (Wireman).

²¹⁷ *Id.* at 1603-04 (Wireman).

²¹⁸ Tr. at 1607 (Fuhrmann).

²¹⁹ Tr. at 1607-08 (Striz); *see also* Tr. at 1634 (Striz) ("The excursion indicators are still adequate for detecting excursions from the production zone."); Tr. at 1636 (Striz) ("I do not see that we would add uranium as an excursion indicator. They've functioned very well over more than 20 years of operations."); Tr. at 1640 (Striz) ("We think that the monitoring network is sufficient to detect excursions using the three indicators.").

²²⁰ Ex. NRC-018 at 5.

excursion indicator because its mobility may be affected by conditions in the aquifer.²²¹ We also find support in CBR's established record of detecting and resolving excursions using excursion parameters other than uranium.²²² For these reasons, we resolve this contention in favor of the Staff and CBR.

B. Contention C

6.22 Contention C, as admitted and migrated to the EA, states as follows:

[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.

6.23 In Contention C, the Intervenors asserted that the Staff failed to address the White River as a potential pathway for contamination to reach the Pine Ridge Reservation. The basis for this contention is Dr. LaGarry's statement that the White River alluvium can receive contaminants from surface spills at the CBR facility, from waters transmitted through the Basal Chadron Sandstone where it is exposed at the land surface, and through faults.²²³ When we originally admitted this contention, we found a genuine factual dispute as to "whether these aquifers are interconnected and so could be the potential pathway for contaminant migration to surface waters."²²⁴

²²¹ Ex. NRC-013 at 5-41. We note that another licensing board recently took up the question of whether uranium is as effective an excursion indicator as other possible indicators – such as chloride, conductivity and alkalinity – those in use at the CBR site. See *Strata Energy, Inc.*, LBP-15-3, 81 NRC at 148-52. That licensing board determined that uranium was not as effective an excursion indicator as other parameters in use, but noted that there may be site-specific evidence that for a particular facility the aquifer geochemistry may make uranium equal to or better than other parameters for the purposes of detecting excursions. *Id.* at 150; see also Tr. at 1607 (Lancaster, Fuhrmann) (explaining that uranium is not necessarily retarded in all geologic strata and under all conditions). In this case, we do not find that evidence has been presented to indicate that there are site-specific reasons to justify the addition of uranium to the list of excursion indicator parameters currently employed at the CBR site.

²²² See Ex. NRC-001-R at 13; Tr. at 1636 (Striz).

²²³ OST 2008 Petition at 16; Ex. INT-003 at 3.

²²⁴ LBP-08-24, 68 NRC at 724.

6.24. Now that this contention has migrated to the EA, the primary issue for our consideration is whether the Staff has met its obligation under NEPA to take a “hard look” at potential impacts to surface waters, and particularly the White River, as part of its environmental review.

1. Evaluation of Surface Water Impacts

6.25. The Staff described surface water features in and near the CBR facility in Section 3.5.1 of the EA. As described in that section and shown in Figure 2.2-3 of the LRA, the White River flows northeast through Crawford and Dawes County into South Dakota.²²⁵ The CBR facility lies within the watersheds of White Clay Creek, Squaw Creek, and English Creek, which are small southern tributaries to the White River.²²⁶ Squaw Creek and English Creek flow from southeast to northwest within the CBR License Area, and White Clay Creek, on the west side of the CBR facility, is located primarily outside of the License Area.²²⁷ All three streams converge north of the License Area and enter the White River approximately three miles north of the License Area and two miles northeast of and downstream from the city of Crawford.²²⁸

6.26. The Staff also states in Section 3.5.1 of the EA that there are eight surface water impoundments in or near the License Area.²²⁹ According to the LRA, these impoundments are

²²⁵ Ex. NRC-010 at 32; Ex. CBR-011 at 2-25.

²²⁶ Ex. NRC-010 at 32; Ex. CBR-011 at 2-25.

²²⁷ Ex. CBR-011 at 2-25.

²²⁸ *Id.*

²²⁹ Ex. NRC-010 at 32.

generally used for livestock watering.²³⁰ The four impoundments within the License Area are on Squaw and English Creeks.²³¹

6.27. Sections 4.6.1.2 and 4.6.2.2.2 of the EA discuss the impacts of surface spills and leaks on surface waters and the surficial aquifer (Brule).²³² CBR has implemented extensive controls and procedures for investigating and responding to spills and leaks, including a Spill Prevention, Control and Countermeasure (SPCC) plan, and has appropriately addressed spills that have occurred and mitigated their impacts satisfactorily.²³³ CBR has installed dikes and berms in wellfields and secondary containment in process buildings to prevent spills or leaks from entering surface waters.²³⁴

6.28. In Section 4.6.2.2.2 of the EA and Section 3.1.3.4 of the SER, the Staff discussed potential spills or leaks from pipes.²³⁵ The Staff testified that CBR maintains continuous real-time monitoring and control of flow rates and trunk line pressures, and has alarms, sensors and other instrumentation in place to monitor the status of the injection system and alert operators to leaks or spills.²³⁶ The Staff also testified that, to reduce the likelihood of pipe breaks or ruptures, all pipelines are pressure tested at operating pressures prior to use.²³⁷

²³⁰ Ex. CBR-011 at 2-163.

²³¹ *Id.* at 2-159, 2-163.

²³² Ex. NRC-010 at 69-72, 75-77.

²³³ Ex. NRC-001-R at 17; *see also* Ex. NRC-010 at 70.

²³⁴ Ex. NRC-010 at 70.

²³⁵ *Id.* at 69-72.

²³⁶ Ex. NRC-001-R at 17; Ex. NRC-010 at 75; Ex. NRC-009 at 38.

²³⁷ Ex. NRC-001-R at 18.

Also, as required by License Condition 10.14, flow rates and pressures are monitored daily, and injection pressures at wellheads are limited.²³⁸

6.29. In Section 4.6.2.2.2 of the EA, the Staff discusses potential spills from well failures. To minimize such spills, CBR is required under License Condition 10.5 to conduct mechanical integrity testing (MIT) of wells initially and every 5 years thereafter, as well as when a well is serviced.²³⁹ The Staff testified that MIT ensures that all wells are constructed properly and are capable of maintaining pressure without leakage.²⁴⁰ Also, if a leak is detected during MIT, the well is repaired and a new mechanical integrity test is performed.²⁴¹ If the well cannot be repaired or fails MIT after repair, it is plugged and abandoned.²⁴² Well integrity is also subject to oversight under CBR's Nebraska Department of Environmental Quality (NDEQ) Class III injection well permit.²⁴³

6.30. As discussed in Section 4.6.2.2.2 of the EA, to minimize potential leaks and spills from evaporation ponds, the ponds were designed to meet criteria in NRC Regulatory Guide 3.11.²⁴⁴ The commercial evaporation ponds have primary and secondary impermeable liners with leak detection systems installed between the liners.²⁴⁵ The ponds are also subject to regular inspections, including daily pond liner and berm inspections, and monitoring wells are

²³⁸ *Id.*; Ex. NRC-012 at 9.

²³⁹ Ex. NRC-010 at 75; Ex. NRC-012 at 8.

²⁴⁰ Ex. NRC-001-R at 18.

²⁴¹ *Id.*

²⁴² Ex. NRC-010 at 75.

²⁴³ *Id.*

²⁴⁴ Ex. NRC-010 at 72; Ex. NRC-020.

²⁴⁵ *Id.* at 9, 77.

installed around the ponds to assess impacts in the event of leaks.²⁴⁶ Leaks that have occurred to date have had no impacts on shallow ground water.²⁴⁷ To prevent overflow, ponds are required by License Condition 10.16 to have sufficient freeboard to prevent overflow resulting from rain events.²⁴⁸ Pond levels are monitored daily, and dikes and berms have been installed to divert runoff away from ponds.²⁴⁹

6.31. Section 4.6.2.2.4 of the EA and Section 5.7.9.3.2 of the SER discuss vertical excursions.²⁵⁰ In Section 4.6.2.2.4 of the EA, the Staff reported that Brule wells in Mine Unit 6 and 8 experienced several excursion events that were attributed to natural fluctuations in water quality.²⁵¹ The Staff agreed with CBR that it was unlikely that these events are a consequence of migration of lixiviant from the production aquifer.²⁵² The Staff explained that these excursion events do not have the signature of production fluid movement and appear to be related to changes in water levels associated with precipitation events.²⁵³ CBR also testified that the chloride values seen in these events are far below what would be seen in a true excursion.²⁵⁴ CBR explained that the wells are close to English Creek and in wet years the parameters go up and then go back down when things dry out.²⁵⁵

²⁴⁶ *Id.* at 77.

²⁴⁷ *Id.*

²⁴⁸ Ex. NRC-012 at 9.

²⁴⁹ Ex. NRC-010 at 78.

²⁵⁰ *Id.* at 77-79, Ex. NRC-009 at 124-127.

²⁵¹ NRC-010 at 78.

²⁵² *Id.*

²⁵³ Tr. at 1618 (Striz).

²⁵⁴ *Id.* at 1629 (Teahon); *see also, e.g.*, Ex. BRD-010B at 2.

²⁵⁵ Tr. at 1629 (Teahon).

6.32. License Condition 11.12 requires that wells in Mine Units 6 and 8 that are on excursion for more than 60 days must be tested for uranium in addition to the three excursion parameters.²⁵⁶ The purpose of this additional testing is to allow the Staff to evaluate whether the excursions are a consequence of natural fluctuations, as proposed by CBR, or related to a release or migration of ISR production fluids.²⁵⁷ The Staff explained that it does not disagree with CBR's assessment, but wants further verification of the source of the excursion events.²⁵⁸ Thus, the Staff is using the uranium testing requirement as a characterization tool to ensure that the events are not due to spills or production fluids.²⁵⁹

6.33. The Staff testified that although the reason for the excursion events in Mine Units 6 and 8 has not been conclusively verified, the Staff has appropriately concluded that long-term impacts to ground water quality from excursions would be SMALL.²⁶⁰ The Staff has determined, based on the history of these events to date, that impacts have been small, and in the event of an actual excursion of production fluids, CBR is required to take corrective action and restore to baseline conditions under License Condition 11.5.²⁶¹

6.34. In Sections 4.6.1.2 and 4.6.2.2.6 of the EA, and Section 5.7.9.3.3 of the SER, the Staff discusses CBR's monitoring of surface waters (English and Squaw Creeks) and offsite private wells as part of its effluent and environmental monitoring program.²⁶² CBR conducts quarterly surface water sampling for natural uranium and radium at upstream and downstream

²⁵⁶ Ex. NRC-012 at 14.

²⁵⁷ Ex. NRC-009 at 126.

²⁵⁸ Tr. at 1632 (Striz).

²⁵⁹ *Id.*

²⁶⁰ *Id.* at 1640-41 (Striz).

²⁶¹ *Id.*; Ex. NRC-012 at 12.

²⁶² Ex. NRC-010 at 70-72, Ex. NRC-009 at 129-131.

locations on English Creek and Squaw Creek, and at surface impoundments on those streams.²⁶³ The data show that, from 1990 to 2010, radionuclide concentrations for these water bodies remained at or below preoperational levels.²⁶⁴ CBR also conducts annual sediment sampling for natural uranium, radium, and lead-210 in English and Squaw Creeks upstream and downstream of the CBR facility.²⁶⁵ The results show no clear trends at the downstream sample locations (E-5 and S-5) since the last license renewal that could indicate contamination from surface spills or leaks.²⁶⁶ The Staff testified that, although spills and leaks have occurred, there is no evidence from over 20 years of surface water and sediment sampling on English and Squaw Creeks that contaminants have been transported downstream of the wellfields and outside of the CBR license area.²⁶⁷ Similarly, all vertical excursions into the overlying Brule aquifer that have occurred between 1995 and 2010 were corrected without long term impacts occurring, and monitoring data from private wells in the overlying Brule aquifer indicate the water quality has remained consistent with radiological background levels.²⁶⁸

6.35. The Staff concluded that operational impacts to surface water would be SMALL.²⁶⁹ The Staff based this conclusion on several considerations: the controls in place to prevent spills and leaks and to protect surface water, the results of 20 years of quarterly surface water monitoring that have remained at or below preoperational levels, results of annual sediment testing for English and Squaw Creeks that showed no significant trends, and the

²⁶³ Ex. NRC-010 at 70; Ex. CBR-011 at 5-78.

²⁶⁴ Ex. NRC-010 at 70.

²⁶⁵ *Id.* at 69-70.

²⁶⁶ *Id.* at 71-72; Ex. CBR-011 at 5-129 to 5-130.

²⁶⁷ Ex. NRC-001-R at 19.

²⁶⁸ *Id.* at 20.

²⁶⁹ Ex. NRC-010 at 72, 77.

Staff's review of historical spills and leaks at the facility and the effectiveness of CBR's response to them.²⁷⁰

6.36. At the evidentiary hearing, CBR provided additional details on measures taken to prevent spills and leaks or minimize and mitigate their effects. These include descriptions of pipe construction, protection of stream crossings, evaporation pond leak detection, mechanical integrity testing of wells, use of berms around wellfields and adjacent to streams, and procedures for addressing spills.²⁷¹ CBR also clarified the criteria for reporting spills to the NDEQ and the NRC.²⁷²

6.37. The Staff stated in the EA that CBR maintains a list of spills and leaks that have occurred onsite.²⁷³ CBR testified that there have been 358 spills at the CBR facility since operations began, ranging in size from 1 to 40,000 gallons.²⁷⁴ Intervenors' witnesses, Mr. Michael Wireman and Dr. David Kreamer, asserted that in 1996, a 300,000 gallon leak from an injection well escaped into the Brule aquifer, and only 100,000 gallons were recovered.²⁷⁵ According to CBR, this event involved a joint failure in the well that resulted in the potential for 300,000 gallons going down the well.²⁷⁶ In response to a question from the public, NDEQ discussed this event in Attachment C to its Order granting CBR's aquifer exemption petition for the North Trend Expansion Area (NTEA).²⁷⁷ According to NDEQ, "most of the fluid would have

²⁷⁰ *Id.* at 69-70; Ex. NRC-001-R at A.C.10.

²⁷¹ Tr. at 1529-32, 1533-50, 1560-62, 1639-40 (Teahon, Pavlick).

²⁷² *Id.* at 1555-60, 1563-66 (Teahon).

²⁷³ Ex. NRC-010 at 69.

²⁷⁴ Tr. at 1558 (Teahon).

²⁷⁵ *Id.* at 1563-64 (Teahon).

²⁷⁶ *Id.* at 1565 (Teahon).

²⁷⁷ Ex. CBR-019 at PDF 33-34.

taken the most conductive path, which is down the well and into the intended injection zone” and “the lateral extent of the affected area was less than 100 feet from the well.”²⁷⁸

Approximately 100,000 gallons were pumped out of those wells over three years to restore the area to baseline conditions.²⁷⁹

6.38. The Intervenors have not provided any evidence that contaminants from surface spills and leaks have reached the White River or its alluvium, either through surface waters or by migration through the Brule aquifer. The Intervenors provided as exhibits two lists of purported spills and leaks (Exs. INT-007 and INT-042), but did not provide further discussion of the listed events or any description or explanation of resulting impacts to the White River near the CBR facility or downstream at the Pine Ridge Reservation. The Staff testified that monitoring by the South Dakota Department of Environment and Natural Resources (SD DENR) on the White River at Oglala, South Dakota, shows that the White River has been unaffected by over 20 years of CBR operations.²⁸⁰ SD DENR has been monitoring water quality specifically for uranium and other constituents associated with ISR activities, and has found no evidence of impacts from ISR operations.²⁸¹

6.39. Dr. Kreamer asserted that during flood events, sediment in creek beds could be mobilized and flow downstream.²⁸² He states that these sediments “can potentially sorb and retain pollutants” which could be a possible means of spreading contamination from spills or leaks.²⁸³ At the supplemental hearing, he stated that because flood events are short, this

²⁷⁸ *Id.* at PDF 33.

²⁷⁹ *Id.*

²⁸⁰ Ex. NRC-001-R at 23.

²⁸¹ Ex. NRC-022 at 143.

²⁸² Ex. INT-069 at 2.

²⁸³ *Id.*

“facilitated particle transport” would not be reflected in the monitoring of the White River by South Dakota, and, in his opinion, “there is a possibility of surface transport off the property in the lack of monitoring of these flood events.”²⁸⁴

6.40. Dr. Kreamer agreed, however, that in an oxidizing environment like the river, there would be more dissolution immediately and uranium would be present in both dissolved and particle phases.²⁸⁵ He stated that sediment is typically mobilized from stream beds, which are not always in an oxidized state, so uranium transport could occur if there were particles in a reduced phase in the stream bed.²⁸⁶

6.41. We acknowledge the potential for facilitated particle transport under the right conditions, but find insufficient evidence in the record to conclude that this is a plausible contamination pathway at the CBR site. The Intervenors have offered no evidence that the streams in question are in a reduced state that would favor uranium transport, or that there are significant amounts of uranium in the stream beds to be mobilized. In contrast, the record shows extensive measures are taken to prevent and minimize spills at the CBR facility. With regard to surface runoff in particular, CBR has installed earthen berms (2-3 feet high and covered with grass) along Squaw and English Creeks, as well as secondary and tertiary berms around the wellfields.²⁸⁷ The berms along the creeks are inspected twice a year.²⁸⁸ Although spills and leaks have occurred, water and sediment sampling in English and Squaw Creeks do not show any clear trends indicating that the spills are contaminating these water bodies.²⁸⁹

²⁸⁴ Tr. at 2608 (Kreamer).

²⁸⁵ *Id.* at 2637-38 (Kreamer)

²⁸⁶ *Id.* at 2637 (Kreamer).

²⁸⁷ *Id.* at 1560-61 (Teahon).

²⁸⁸ *Id.* at 1561 (Teahon).

²⁸⁹ Ex. NRC-001-R at 19; Ex. NRC-010 at 71-72.

6.42. Dr. Kreamer also asserts that CBR's pipeline monitoring would not be able to detect small, chronic leaks, which could be sizable in the long term.²⁹⁰ CBR testified that they have not found any slow leaks to date, and a slow leak would be noticed within a year because of absence of frost on the ground in winter.²⁹¹

2. Evidence of Pathways for Contaminants to Reach the White River

6.43. Intervenors' witness Dr. LaGarry asserted that contaminants can reach the White River through three potential pathways: surface spills and leaks, the Basal Chadron Sandstone where it is exposed at the land surface, and faults.²⁹² We address the first two pathways here, but leave the issue of confinement and whether faults provide pathways for movement of water upward from the Basal Chadron Sandstone to the shallow Brule aquifer or surface waters to our discussion of Contention D (Section VI.C *infra*).

6.44. Dr. LaGarry asserted that contaminants could reach the White River through surface spills and leaks. The Staff acknowledged in its testimony that transport through surface waters or migration over a distance of two miles through the shallow Brule aquifer are potential pathways for uncontained spills and leaks to reach the White River alluvium.²⁹³ The Staff, CBR, and Intervenors agree that the ground water flow in the Brule is to the northwest, towards the White River.²⁹⁴

6.45. We find it highly unlikely, however, that CBR's operations will result in spills or leaks that would reach the White River through this pathway. This finding is based on the

²⁹⁰ Ex. INT-069 at 8.

²⁹¹ Tr. at 1532-33 (Teahon).

²⁹² Ex. INT-003 at 3.

²⁹³ Ex. NRC-001-R at 17.

²⁹⁴ Tr. at 2465-67 (Beins, Back, Wireman).

comprehensive engineering and administrative controls discussed in the EA and further explained by CBR at the hearing, as well as the monitoring results from surface waters and sediments on site, and Brule wells offsite, which have shown no significant trends or evidence of contamination.

6.46. Dr. LaGarry also asserted that contaminants could reach the White River through the Basal Chadron Sandstone aquifer where it is exposed at the surface.²⁹⁵ In this scenario, ISR production fluids would migrate away from the CBR site through the Basal Chadron Sandstone to areas where it outcrops near the White River or White River alluvium.

6.47. CBR is required by License Condition 10.7 to maintain an inward hydraulic gradient in the wellfields until restoration is complete.²⁹⁶ This gradient creates a cone of depression that draws ground water toward the interior of the License Area, thus preventing fluid migration offsite through the Basal Chadron Sandstone.²⁹⁷ This means that in the northwest portion of the License Area, flow within the Basal Chadron Sandstone is southeast, away from the White River.²⁹⁸ CBR is also required by License Condition 11.5 to monitor a ring of perimeter wells screened in the Basal Chadron Sandstone aquifer to detect horizontal excursions, and if excursions are detected, CBR adjusts the extraction and injection rates in the wellfield to draw fluids back in.²⁹⁹ The Staff testified that this process has been used successfully to correct excursions during the period that the CBR facility has operated.³⁰⁰ The Intervenors have provided no evidence to the contrary.

²⁹⁵ Ex. INT-003 at 3

²⁹⁶ Ex. NRC-012 at 8.

²⁹⁷ Ex. NRC-010 at 75, Ex. NRC-001-R at 21.

²⁹⁸ Tr. at 1086 (Beins).

²⁹⁹ Ex. NRC-012 at 7, 12.

³⁰⁰ Ex. NRC-001-R at 20.

6.48. Dr. LaGarry's proposed pathway also requires that the Basal Chadron Sandstone aquifer be exposed at the land surface near the White River or in direct hydraulic communication with the White River alluvium. In the vicinity of the CBR License Area, and on the southeast boundary of the NTEA where it underlies the White River, the Basal Chadron Sandstone is hundreds of feet deep.³⁰¹ The Staff testified that the only outcrops of the Basal Chadron Sandstone it is aware of are located approximately 12 miles northwest of Crawford and far north of the White River alluvium.³⁰² At the hearing, Dr. LaGarry testified that he has mapped the Basal Chadron Sandstone near Horn, Nebraska, approximately 12 miles north of Crawford.³⁰³ A map in Exhibit BRD-005, a 1998 paper by Terry, shows the location of Horn, Nebraska to be 10-15 miles northwest of Crawford.³⁰⁴

6.49. According to Figure 2.2-3 in the LRA, the White River flows northeast from Crawford.³⁰⁵ The outcrops of the Basal Chadron Sandstone identified by the Staff and Intervenors are more than 10 miles north and northwest of Crawford – a considerable distance from the White River and its alluvium.

6.50. Based on the facts adduced above, we find that the Intervenors have not demonstrated a reasonable likelihood of a hydraulic connection between the Basal Chadron Sandstone and the White River or its alluvium through this proposed pathway. Therefore, we find it implausible that contaminants from the CBR facility would reach the White River through this pathway. This finding is based on the requirements to maintain an inward hydraulic gradient and to monitor for and correct excursions, CBR's demonstrated ability to correct

³⁰¹ Ex. NRC-001-R at 20; Ex. CBR-011 at 2-111.

³⁰² Ex. NRC-001-R at 20-21.

³⁰³ Tr. at 1076 (LaGarry).

³⁰⁴ Ex. BRD-005 at 21.

³⁰⁵ Ex. CBR-011 at 2-25.

excursions, and the lack of evidence of outcrops of the Basal Chadron Sandstone near the White River in the vicinity of the CBR site.

6.51. Dr. LaGarry also claimed that artesian flow could transmit contaminated water to the land surface and into the White River alluvium. At the hearing, CBR testified, based on cross-sections in the LRA that show potentiometric surfaces, that there is no artesian flow in the CBR License Area.³⁰⁶ Dr. LaGarry did not take issue with the location of the potentiometric surfaces on the cross-sections.³⁰⁷ The lack of artesian flow is also supported by the fact that the potentiometric surface of the Brule is significantly higher than that of the Basal Chadron Sandstone throughout the CBR License Area.³⁰⁸ This results in a downward hydraulic gradient that precludes upward flow from the Basal Chadron Sandstone to the Brule, should a pathway exist.³⁰⁹ For these reasons, we find artesian flow is not a credible pathway for potential contaminants from the License Area to reach surface waters.

3. Conclusion

6.52. Having reviewed the evidence and testimony presented by the parties, we find by a preponderance of the evidence that the Staff took a hard look at potential impacts to surface waters over the license renewal period and correctly determined they would be SMALL. The Staff addressed potential spills or leaks from pipes, wells, evaporation ponds, and vertical excursions in its review and identified protective measures that are in place to prevent spills and leaks or minimize their impacts. The Staff also reviewed historical records of spills and leaks, and how they were resolved, as well as monitoring results that demonstrate no impacts to surface waters from CBR's operations. The Intervenors have asserted that facilitated transport

³⁰⁶ Tr. at 1047-48 (Beins).

³⁰⁷ Tr. at 2049 (LaGarry).

³⁰⁸ Ex. CBR-062.

³⁰⁹ Tr. at 1435-36 (Beins); Tr. at 2477 (Wireman).

or small, chronic pipe leaks could be problematic, but have not provided evidence that such events are likely to occur or will have significant impacts. We also find that the Intervenors did not demonstrate specific, credible pathways by which contaminants could reach or have been reaching the White River alluvium or the Pine Ridge Reservation, nor did they present credible evidence of surface water contamination as a result of CBR's operations. For these reasons, we resolve Contention C in favor of the Staff and CBR.

C. Contention D

6.53. Contention D reads as follows:

[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.

6.54. As originally admitted, OST Contention D asserted that the Basal Chadron Sandstone aquifer (the mined aquifer at the CBR facility) communicates with the aquifer that provides drinking water to the Pine Ridge Reservation.³¹⁰ The OST claimed that faults – and the White River Fault, in particular – could transmit contaminants from Crawford to Pine Ridge, South Dakota.³¹¹ As support for their original contention, the OST submitted the 2008 Opinion of Dr. Hannan LaGarry (Ex. INT-003) and a 2007 letter from the NDEQ (Ex. INT-011).³¹²

6.55. In our decision admitting new contentions based on the Staff's EA (LBP-15-11), we migrated Contention D to the EA and merged portions of the Intervenors' new Contentions 3,

³¹⁰ OST 2008 Petition at 18.

³¹¹ *Id.* at 20.

³¹² CLI-09-9 at 353.

5 and 10 into Contention D.³¹³ Specifically, we modified Contention D to include the Intervenors' claim in EA Contention 5 questioning the use of data from the North Trend Expansion Area in the Staff's modeling of the White River feature and the accuracy of the Staff's determination that the White River feature is a fold.³¹⁴ We also modified Contention D to include the issue of whether the Staff's analysis of environmental justice (EJ), including its analysis of cumulative effects, should be expanded to consider potential impacts on the aquifer that provides drinking water to the Pine Ridge Reservation.³¹⁵

6.56. Contention D thus involves two overarching issues: first, whether the Staff took a "hard look" at impacts to ground water quality—specifically, whether there is communication among aquifers that would lead to significant impacts from CBR operations to the drinking water aquifer on the Pine Ridge Reservation; and second, whether the Staff properly considered such impacts in its EJ analysis.

6.57. We first address the issue of communication among aquifers by examining the evidence supporting vertical confinement of the Basal Chadron Sandstone aquifer from overlying aquifers. We then consider pathways for contaminant migration, including through faults and through aquifers, and finally, we consider the Staff's evaluation of the White River structural feature.

1. Confinement of the Basal Chadron Sandstone Aquifer

6.58. The Staff testified that it assessed confinement of the Basal Chadron Sandstone aquifer in both its safety and environmental reviews. In those reviews, the Staff considered information in the LRA, operational monitoring reports, relevant portions of CBR's applications

³¹³ LBP-15-11 at 406.

³¹⁴ *Id.* at 422.

³¹⁵ *Id.* at 417. We found EA Contention 10 on cumulative impacts partially admissible, stating that because the Pine Ridge Reservation lies within 50 miles of all of the proposed CBR expansion areas, "[a]dditional analysis on the cumulative impacts with respect to EJ may be necessary." *Id.* at 433, 451.

for an NRC license amendment and NDEQ permits associated with the NTEA, and geological literature.³¹⁶ The Staff testified that there were several lines of evidence supporting the conclusion of adequate confinement, including the thickness of upper confining units, results of aquifer pumping tests, differences in potentiometric surface, and differences in geochemistry.³¹⁷

6.59. Section 3.4.1.3 of the EA discusses the stratigraphy of the White River Group, which consists of the Basal Chadron Sandstone, Middle Chadron, Upper Chadron, and Brule.³¹⁸ The Pierre Shale is the lower confining unit under the Basal Chadron Sandstone.³¹⁹ Cross-sections in the LRA show that the Arikaree Formation overlies the Brule at the far southeast corner of the License Area.³²⁰ According to Table 3-8 in Section 3.5.2.2. of the EA, the lower members of the Brule Formation and the Upper and Middle Chadron Formations form the upper confining layers at the CBR facility.³²¹

6.60. Section 3.5.2.3.2 of the EA and Section 2.4.3.2.2 of the SER describe several bases for concluding that the Basal Chadron Sandstone aquifer is vertically confined at the CBR facility, including the thickness and composition of the upper confining units, the results of aquifer pumping tests, differences in potentiometric surface between the overlying Brule aquifer and the Basal Chadron Sandstone aquifer, and differences in geochemistry of water in the two aquifers.³²²

a. Characteristics of Upper Confinement

³¹⁶ Ex. NRC-001-R at 27.

³¹⁷ *Id.* at 27-28.

³¹⁸ Ex. NRC-010 at 26.

³¹⁹ *Id.*

³²⁰ Ex. CBR-011 at 2-111 to 2-125.

³²¹ Ex. NRC-010 at 36.

³²² *Id.* at 37-38; Ex. NRC-009 at 21-23.

6.61. The EA states that the confining units at the site consists of clays and fine-grained mudstones (upper and middle Chadron) and interbedded siltstone, mudstone and claystone (lower Brule).³²³ According to the LRA, the upper confining unit ranges in thickness from 200 to 500 feet in the wellfield area.³²⁴ The upper confining units contain significant amounts of montmorillonite and other clays, and have very low vertical hydraulic conductivities.³²⁵ The Staff testified that cross sections based on geophysical log data presented in the LRA demonstrate that the upper confining units are continuous across the site.³²⁶

6.62. CBR likewise testified that lithologic analyses of drill cuttings and geophysical logs for over 10,000 boreholes demonstrate the upper confinement is continuous across the whole License Area.³²⁷ These drill cuttings and logs also confirm that the 25-foot thick red clay layer that overlies the mined aquifer is laterally continuous across the License Area.³²⁸

b. Aquifer Pumping Tests

6.63. As discussed in Section 3.5.2.3.1 of the EA, CBR performed aquifer pumping tests in 1982, 1987 1996, and 2002 to demonstrate the integrity of the upper confining layers and the hydraulic isolation of the Basal Chadron Sandstone from the overlying Brule aquifer.³²⁹ The Staff testified that these four aquifer pumping tests were long-term tests (51 to 72 hrs) with high pumping rates (23.8-51.2 gpm) that significantly stressed the Basal Chadron Sandstone

³²³ Ex. NRC-010 at 26.

³²⁴ Ex. CBR-011 at 2-136 to 2-137.

³²⁵ Ex. NRC-010 at 37-38; Ex. CBR-011 at 2-127.

³²⁶ Ex. NRC-001-R at 29, Ex. CBR-011 at 2-111 to 2-125.

³²⁷ Tr. at 1052-53, 1058 (Beins).

³²⁸ *Id.* 1112-13 (Beins).

³²⁹ Ex. NRC-010 at 37.

aquifer over large radii of influence (4,000-5,700 ft).³³⁰ During these tests, the water level responses in the Basal Chadron Sandstone aquifer and the overlying Brule aquifer were assessed using observation wells.³³¹ The aquifer pumping tests were designed, operated, and analyzed followed widely accepted practices that are incorporated into ASTM standards, such as those listed in Ex. NRC-080.³³² In all four of the aquifer pumping tests, there was no response in the observations wells in the overlying Brule aquifer, demonstrating the impermeable behavior of the upper confinement.³³³

6.64. At the hearing, CBR provided details on the design of the pumping test, including well diameters, numbers of wells, locations of wells, and test duration.³³⁴ CBR also indicated that pump tests were reviewed and approved by NDEQ and were conducted consistent with industry standard techniques.³³⁵ Dr. Kreamer acknowledged that pumping tests are a good first step and it is standard to start with these tests.³³⁶ Dr. Kreamer acknowledged that there is no evidence NDEQ standards were not met, although he believes the tests were not optimal.³³⁷

6.65. Dr. Kreamer and Mr. Wireman both criticized the number of wells used in the tests, particularly the use of one response well in the Brule and (with the exception of Test 2) no wells in the upper confinement.³³⁸ The Staff testified that the number and locations of wells in

³³⁰ Ex. NRC-076-R2 at 37.

³³¹ *Id.* at 35-36.

³³² *Id.*, (citing Ex. NRC-080).

³³³ *Id.* at 37.

³³⁴ Tr. at 1266-72 (Beins).

³³⁵ *Id.* at 1275 (Beins).

³³⁶ *Id.* at 1298 (Kreamer).

³³⁷ *Id.* at 1275 (Kreamer).

³³⁸ Ex. INT-069 at 4, Ex. INT-070 at 1, Ex. INT-081 at 1.

these tests were consistent with standard practice, and that NRC has based many licensing decisions on similar configurations.³³⁹ CBR added that the upper confinement “does not contain recoverable quantities of water”— meaning that, although there may be water in those units, recovery would be so slow it would not be responsive in an aquifer pumping test.³⁴⁰ The Staff noted that the piezometer placed in the overlying confining unit during Test 2 showed no response, confirming that the overlying confinement behaved as an impermeable unit.³⁴¹

6.66. Dr. Kreamer and Mr. Wireman also criticized the use of laboratory testing on cores to determine hydraulic conductivity.³⁴² CBR responded that, for the same reasons discussed above, it is not possible to obtain hydraulic properties in the upper confinement from a pumping test.³⁴³

6.67. Dr. Kreamer asserted that the methods used to analyze the pumping test data were inappropriate because those methods assume homogeneous, isotropic behavior and uniform thickness, which are not present at the CBR site.³⁴⁴ However, at the evidentiary hearing, he acknowledged that the methods used by CBR are common industry accepted tests for evaluating results of pumping tests.³⁴⁵ The Staff testified that the various data analysis methods used in the aquifer pumping tests (e.g., Theis, Cooper/Jacob, Hantush) are widely used and accepted standard methods taught in hydrogeology and hydrology courses and incorporated into American Society of Testing and Materials (ASTM) standards related to

³³⁹ Tr. at 1283 (Striz).

³⁴⁰ Ex. CBR-045 at 31; Tr. at 1142-43.

³⁴¹ Ex. NRC-076-R2 at 36-37.

³⁴² Ex. INT-047 at 4; Ex. INT-079 at 5.

³⁴³ Ex. CBR-045 at 31-32.

³⁴⁴ Ex. INT-046 at 2; *see also* Ex. INT-069 at 3; Ex. INT-079 at 8.

³⁴⁵ Tr. at 1299 (Kreamer).

aquifer testing, such as those listed in Exhibit NRC-080.³⁴⁶ The Staff also testified at the hearing that the tests are set up assuming homogeneous and isotropic responses, and the results would show whether there were deviations from the assumed conditions.³⁴⁷ In this case, the Staff testified that “all the pumping tests came very close to demonstrating homogeneous isotropic behavior except for Test 1 and Test 2 that showed very small amounts of anisotropy.”³⁴⁸

6.68. Dr. Kreamer also asserted that several of the aquifer test results were incorrectly analyzed or interpreted, and in his opinion showed evidence of recharge boundaries and potential leakage. He asserted that a Cooper-Jacob drawdown curve in Test 4 (Figure 7 of Ex. CBR-012) showed evidence of a recharge boundary.³⁴⁹ The Staff replied that the curve did not behave like a classic recharge boundary, which would have continued to curve upward with time, and Dr. Kreamer agreed with the Staff’s description.³⁵⁰ The Staff explained further that instead of showing classic behavior, the curve shows that the drawdown starts to go back to the straight line, which is more indicative of a well system going on or off nearby.³⁵¹ CBR explained that a nearby well being shut off was a likely explanation.³⁵²

6.69. Dr. Kreamer also asserted that CBR incorrectly omitted early time data in plots for Tests 1 and 2, and that if the early time data is considered, there is evidence of recharge

³⁴⁶ Ex. NRC-076-R2 at 33-34.

³⁴⁷ Tr. at 1284-85 (Striz).

³⁴⁸ *Id.* at 1285 (Striz).

³⁴⁹ Ex. INT-079 at 1-2; Tr. at 1301-03 (Kreamer).

³⁵⁰ Tr. at 1303-04 (Back), 1308 (Kreamer).

³⁵¹ *Id.* at 1303-05 (Back).

³⁵² *Id.* at 1306 (Lewis).

boundaries.³⁵³ Both the Staff and CBR testified that early time data should be omitted, citing a text that explains why such data should be given less weight in all curve fitting methods.³⁵⁴ With regard to Test 2, CBR determined that time data less than 37 minutes should be discarded by applying a constraint that is recommended by the authors of the method and used in commercial software packages used for this type of analysis.³⁵⁵ In addition, CBR testified that wellbore storage causes deviations in early time data, and for the well size and depths at the CBR site, those effects can last for over 20 minutes.³⁵⁶

6.70. Mr. Wireman claimed that aquifer pumping tests were inadequate to characterize the overlying confinement and that minor leakage in tests indicates the possibility of inter-formation flow.³⁵⁷ With regard to characterizing the overlying confinement, both the Staff and CBR testified that the primary purpose of the aquifer pumping tests was to demonstrate confinement, not to characterize aquifer properties.³⁵⁸ With regard to leakage, the Staff testified that a small amount of recharge (leakage) was reported for the first two aquifer pumping tests, but this recharge was the result of the extensive stress applied to the confining unit during the aquifer pumping tests.³⁵⁹ CBR testified that the volume of leakage in Test 1 was less than 1000 gallons over a radius of influence greater than 50 million square feet.³⁶⁰ The Staff explained

³⁵³ Ex. INT-079 at 3, 7.

³⁵⁴ Ex. NRC-103 at 16-17; Ex. CBR-074 at 11.

³⁵⁵ Tr. at 2539 (Lewis).

³⁵⁶ Tr. at 2539-40 (Lewis).

³⁵⁷ Ex. INT-047 at 4-5.

³⁵⁸ Tr. at 1144 (Beins); *id.* at 1152, 1282-83 (Back).

³⁵⁹ Ex. NRC-076-R2 at 38.

³⁶⁰ Tr. at 2519 (Lewis).

that the leakage came from water being squeezed out of the very low permeability clay layer that overlies the Basal Chadron Sandstone aquifer.³⁶¹

6.71. Although the Intervenor have raised a number of criticisms regarding CBR's aquifer pumping tests, we find that their design, implementation, and analysis were adequate to demonstrate confinement of the mined aquifer. These tests employed widely-used and accepted, standard methods, and CBR gave reasonable explanations for its decisions, such as the location of wells, the use of laboratory test data for hydraulic characteristics of the upper confining unit, and the exclusion of early time data from the analysis of test results. While the Intervenor may have a different view of how to design and interpret these tests, and suggest that more "up to date" methods could have been used,³⁶² we note that NEPA "does not call for certainty or precision"³⁶³ or use of the best scientific methodology.³⁶⁴

c Differences in Potentiometric Surfaces

6.72. The Staff testified that there has been very little change in the potentiometric surface elevations in the Brule aquifer since the initiation of ISR activities, but during the same time period, the potentiometric surface of the Basal Chadron Sandstone aquifer decreased approximately 14 meters (47 feet).³⁶⁵ The Staff explained that if the aquifers were connected (i.e., there was not adequate confinement), the potentiometric surface of the Brule aquifer would have experienced declines in concert with those observed in the Basal Chadron Sandstone aquifer.³⁶⁶

³⁶¹ *Id.* at 2512-14 (Back).

³⁶² Ex. INT-079 at 5, 11.

³⁶³ *Louisiana Energy Servs., L.P.* (National Enrichment Facility), CLI-05-20, 62 NRC 523, 536 (2005).

³⁶⁴ *Pilgrim*, CLI-10-11, 71 NRC at 315 (citations omitted).

³⁶⁵ Ex. NRC-001-R at 30.

³⁶⁶ *Id.*

6.73. Dr. Kreamer asserted that there had been significant changes in water level in the Brule aquifer between preoperational readings in 1982 and readings taken in 2008-2009.³⁶⁷ In Exhibits BRD-008A and BRD-008B (annotated versions of the Figures 2.7-3a and 2.7-3b from the LRA), he identified an area near Well 11 where the Brule apparently dropped 40 feet during that time period.³⁶⁸ The Staff testified, based on data in Table 2.7-5 of the LRA, that the value for Well 11 in those figures was a transcription error, and the true value (as shown in the table) should be between 3830 and 3834 feet.³⁶⁹ Mr. Wireman agreed that this was a reasonable explanation.³⁷⁰ We agree.

6.74. Dr. Kreamer asserted that “numerous well points showed drawdown in Brule from 1982 to 2008,” not just a single location.³⁷¹ He later identified other wells showing discrepancies as Wells 17, 21 or 26, 24, 64, 19 and 129.³⁷² Because Dr. Kreamer did not tabulate the asserted discrepancies in these wells, we examined Exhibits BRD-008A and BRD-008B and found that, of the wells Dr. Kreamer identified, only Wells 17, 24 and 64 had measured values in 1982-83. The contours in Ex. BRD-008B do not extend far enough to estimate the 2008 water levels for those wells without extrapolating. Therefore, we find that these assertions of additional discrepancies are not credible.

6.75. Dr. Kreamer also asserted that without water level data in the Brule from 1991 to 1999, it is not possible to determine whether initial drawdown occurred in the Brule when

³⁶⁷ Ex. INT-079 at 10.

³⁶⁸ Tr. at 1793-94 (Kreamer).

³⁶⁹ Tr. at 2424 (Back).

³⁷⁰ Tr. at 2437-38 (Wireman).

³⁷¹ Ex. INT-079 at 10.

³⁷² Tr. at 2555 (Kreamer).

operations began, because by 1999 a near-steady state could have been reached.³⁷³ The Staff responded that under leaky conditions, a steady state drawdown would be reached but there would still be a noticeable impact because there would not be enough water coming in.³⁷⁴ The Staff also identified two wells (PM-6 and PM-7) that were installed in Mine Unit 1 for the first aquifer pumping test which had 1982-83 water levels comparable to the 1994-2003 levels in well SM1-2 (also in Mine Unit 1).³⁷⁵ CBR testified that each time a mine unit has started up, the hydrographs from the shallow monitoring wells in that mine unit do not show long-term declines in the Brule.³⁷⁶ We note that the hydrographs of wells SM7-17 and SM7-22 in Mine Unit 7 have remained relatively constant from 1999, when operations began in that mine unit, until present.³⁷⁷

d. Differences in Geochemistry

6.76. Section 4.13.6.2 of the EA states that distinct geochemical differences in the water in the Basal Chadron Sandstone and Brule aquifers have remained during ISR operations.³⁷⁸ At the hearing, Intervenors' witness Mr. Wireman asserted that differences in chemistry do not automatically mean there is no connection between aquifers, because Brule chemistry could be affected by upward flow from the Basal Chadron Sandstone.³⁷⁹ However, Mr. Wireman later agreed that the downward gradient at the site would preclude such upward

³⁷³ Ex. INT-079 at 10-11.

³⁷⁴ Tr. at 2444 (Back).

³⁷⁵ Tr. at 2443 (Back), 2562 (Striz).

³⁷⁶ Tr. at 2560-61 (Beins).

³⁷⁷ Exs. CBR-063-R, CBR-063-R.

³⁷⁸ Ex. NRC-001-R at 31; Ex. NRC-010 at 115; see *also* Ex. CBR-011 at 2-28.

³⁷⁹ Tr. at 1186 (Wireman).

flow.³⁸⁰ The Staff testified that if migration did occur, there would be mixed water without clear distinctions rather than distinct geochemical signatures.³⁸¹

2. Potential Pathways for Communication Among Aquifers

6.77. Dr. LaGarry has generally asserted that contaminants can be transmitted to the White River alluvium through spills and leaks, migration of contaminants through the Basal Chadron Sandstone to surface exposures, and through faults.³⁸² He did not describe a specific subsurface pathway from the CBR facility to the Pine Ridge Reservation. Likewise, Intervenor's witness Ms. Charmaine White Face claimed that contamination was traveling from the CBR facility to wells in the Arikaree, but did not describe a specific pathway.³⁸³

6.78. We addressed the viability of pathways to the White River and its alluvium via spills and leaks and via migration through the Basal Chadron Sandstone in our discussion of Contention C. We found, for the reasons discussed in Section VI.B, *supra*, that those pathways are not viable. Here, we discuss whether contaminants can travel through faults to the White River or its alluvium, and whether contaminants can migrate through ground water (i.e., aquifers) or faults to the drinking water aquifers on the reservation.

a. Potential Migration Through Faults

6.79. The Intervenor's asserted that faults are potential pathways for contaminants to reach the Pine Ridge Reservation. Dr. LaGarry claimed that faults and joints are "ubiquitous" in the region.³⁸⁴ The Staff agreed, in general, that faults and joints exist in northwestern Nebraska, but explained that it has not seen any site-specific data indicating the presence of significant

³⁸⁰ *Id.* at 2477 (Wireman).

³⁸¹ *Id.* at 1193 (Back).

³⁸² Ex. INT-003 at 3.

³⁸³ Ex. OST-001 at 3-4.

³⁸⁴ Ex. INT-013 at 3.

faults, fractures or joints connecting the confining layers in the License Area.³⁸⁵ The Staff testified that “the same evidence demonstrating confinement of the Basal Chadron Sandstone aquifer shows that the Basal Chadron Sandstone and Brule aquifers are not hydraulically connected by fault, fractures, or joints through the geologic confining units within or near the [License Area].”³⁸⁶ The Staff also stated, based on the 200 to 500 foot thickness of the confinement over wellfield area and the high clay content of the confining units, that “if any faults or joints do exist, it is highly improbable that they create continuous permeable pathways vertically or horizontally in any of the overlying confining units.”³⁸⁷

6.80. The Staff identified regional structural features in Section 3.4.2 of the EA, and specifically discussed the White River feature in Section 3.5.2.3.3.³⁸⁸ The White River structural feature “follows the White River north of Crawford and passes along the southeast permit boundary of the proposed North Trend expansion area, approximately 3.2 km (2 mi) from the northern boundary of the CBR facility.”³⁸⁹ The Staff testified that the White River structural feature is the only field-documented structural feature near the CBR facility.³⁹⁰

6.81. Intervenors’ witness Dr. LaGarry asserted that faults or fractures in and near the CBR License Area are potential pathways for contamination from CBR’s operations to reach the Pine Ridge Reservation.³⁹¹ In support of this claim, Dr. LaGarry cited work by Diffendal, who

³⁸⁵ Ex. NRC-001-R at 34

³⁸⁶ *Id.*

³⁸⁷ *Id.* at 35.

³⁸⁸ Ex. NRC-010 at 27, 38-39.

³⁸⁹ Ex. NRC-010 at 38.

³⁹⁰ Ex. NRC-001-R at 35.

³⁹¹ Ex. INT-003 at 3.

identified lineaments³⁹² throughout northwestern Nebraska, including the CBR License Area.³⁹³ Dr. LaGarry acknowledged that these lineaments “may or may not represent faults or joints,” and that “[s]uch a determination would require extensive fieldwork to check each lineament.”³⁹⁴ He also agreed that Diffendal did not “ground truth” the lineaments he identified.³⁹⁵ The Staff testified that a claim that a lineament represents a subsurface geologic fault, fracture, or joint is speculative until “ground truthing” is performed with extensive hard data obtained in the field (e.g., test drill holes).³⁹⁶ Also, according to the Staff, subsurface exploration is essential to determine not only the existence of faults, fractures, and joints, but also their extent and possible impacts on confinement.³⁹⁷ Dr. LaGarry agreed that the ultimate transmissivity of a fault, not just its presence, is the important consideration.³⁹⁸

6.82. Dr. LaGarry also cited recent work by Balmat (Ex. INT-056) and a poster presentation by Maher and Schuster (Ex. INT-060) to support the claim that faults exist at the CBR facility.³⁹⁹ According to Dr. LaGarry, Balmat concluded that “lineaments visible from Earth’s orbit do, in fact, represent faults and joints identifiable on the ground.”⁴⁰⁰ The Staff testified that Balmat’s field verification was limited to a small area southeast of Chadron, Nebraska, more than 20 miles northeast of the CBR facility, and that Balmat did not provide a

³⁹² According to Dr. LaGarry, lineaments are “unexplained features based on remote sensing imagery.” Ex. INT-043 at 2.

³⁹³ Ex. INT-043 at 2 (citing Ex. INT-055); Tr. at 1177 (LaGarry).

³⁹⁴ Ex. INT-043 at 2.

³⁹⁵ Tr. at 1180-81 (LaGarry).

³⁹⁶ Ex. NRC-076-R2 at 23.

³⁹⁷ *Id.*

³⁹⁸ Tr. at 1180 (LaGarry).

³⁹⁹ Ex. INT-043 at 3-4; Tr. at 1176-77, 1181 (LaGarry).

⁴⁰⁰ Ex. INT-043 at 2-3.

map or any other information indicating that any of the lineaments she identified are on or near the CBR site.⁴⁰¹ Dr. LaGarry confirmed that Balmat's field work was confined to the Chadron area.⁴⁰² Dr. LaGarry described the work of Maher and Schuster as an effort to define regional structure in northwestern Nebraska and southwestern South Dakota.⁴⁰³ The Staff pointed out, however, that the fieldwork in this study was also limited to locations distant from the CBR facility, and, therefore, does not demonstrate the existence of faults at the CBR site.⁴⁰⁴

6.83. Finally, Dr. LaGarry asserted that the presence of faults at the CBR site is supported by a 1989 letter to the NRC (Ex. INT-009) that claimed uranium being recovered by CBR occurs within faults at the CBR site, not in a roll-front deposit, and that removing uranium from faults is opening up pathways for contaminants to migrate through.⁴⁰⁵ Neither Dr. LaGarry nor the exhibit he cited provided evidence of specific faults at the site. The Staff testified, based on information in Exhibit NRC-030, that "the CBR uranium trend has been unequivocally described as a roll-front deposit."⁴⁰⁶ CBR also provided detailed testimony concerning evidence of a roll-front deposit based on geophysical logs and drill cuttings.⁴⁰⁷ Dr. LaGarry conceded that, with respect to the CBR License Area, he had no evidence to counter the Staff's statement and no reason to dispute the evidence provided.⁴⁰⁸

⁴⁰¹ Ex. NRC-076-R2 at 24.

⁴⁰² Tr. at 1176-77 (LaGarry).

⁴⁰³ Ex. INT-043 at 3.

⁴⁰⁴ Ex. NRC-076-R2 at 24, 25-26.

⁴⁰⁵ Ex. INT-003 at 4 (citing Ex. INT-009).

⁴⁰⁶ Ex. NRC-001-R at 42 (citing Ex. NRC-030 at 280-281).

⁴⁰⁷ Ex. CBR-045 at 9-11.

⁴⁰⁸ Tr. at 1060-61 (LaGarry).

6.84. We find that, other than the White River structural feature, there is no evidence of specific, field-verified faults in the vicinity of the CBR License Area. We agree with the Intervenor that faults are common in the region, and we do not rule out the presence of isolated small faults or fractures in the lower Brule and Upper and Middle Chadron formations at the CBR site. Nonetheless, based on the evidence of confinement of the Basal Chadron Sandstone aquifer discussed in paragraphs 6.58 to 6.76, we find it highly unlikely that a pathway for contaminant migration consisting of a single fault or a connected pathway of faults exists in the upper confining layers at the CBR facility.

b. Modeling of the White River Feature

6.85. Section 3.5.2.3.3 of the EA describes ground-water modeling and maximum likelihood analysis that the Staff performed to further validate the conclusion that the White River feature was a non-transmissive fold, and thus would not affect the confinement of the Basal Chadron Sandstone aquifer in that vicinity. The Staff testified that the model input included geological layers developed using borehole data from CBR's NTEA license amendment application because the White River feature is located along the southern boundary of the proposed NTEA.⁴⁰⁹ Additional inputs to the model, including well boring log data, hydraulic properties of the geologic units, well water level data, and boundary conditions were all based on field data obtained from the NTEA license amendment application.⁴¹⁰

6.86. The Intervenor asserted that the Staff inappropriately failed to use data from the License Area in the modeling, but instead relied solely on data from the NTEA. The Staff testified that data for the main CBR facility were not used in the model because they did not cover the area of the White River feature, which is two miles from the northern boundary of the

⁴⁰⁹ Ex. NRC-001-R at 46.

⁴¹⁰ *Id.* (citing NRC-009 at 25).

main facility.⁴¹¹ The Staff used data from the NTEA because the southeastern part of the NTEA abuts the White River feature.⁴¹² The Intervenors have not provided testimony or evidence refuting the Staff's statements.

6.87. The Staff concluded that its modeling results supported the conclusion that the White River feature is a non-transmissive fold and thus does not affect the confinement of the Basal Chadron Sandstone.⁴¹³ However, the Staff testified that, given the other lines of evidence supporting hydraulic isolation, the modeling is simply one more line of evidence and is not essential to the Staff's conclusions about the White River feature or its conclusions regarding environmental impacts.⁴¹⁴

6.88. At our direction, after the August 2015 hearing the Staff prepared and submitted as an exhibit a report addressing questions proposed by the Intervenors concerning the Staff's modeling of the White River structural feature.⁴¹⁵ Staff witness Dr. Striz, who was not involved in the modeling effort, testified that the Staff was unable to defend some of the assumptions made by the original modeler, who is no longer with the agency.⁴¹⁶ Therefore, the Staff proposed that we give the model no weight.⁴¹⁷ We agree, and will accordingly give no weight to the Staff's

⁴¹¹ *Id.*

⁴¹² *Id.*; Ex. NRC-010 at 38.

⁴¹³ Ex. NRC-010 at 39.

⁴¹⁴ Ex. NRC-001-R at 28, 47.

⁴¹⁵ Ex. NRC-093. At the evidentiary hearing, the Staff stated that the ground water modeling files were not provided as an exhibit and no summary of the inputs to the model had been prepared. Tr. at 1338-40 (Striz). Because those files were not listed in the Staff's disclosures, the Staff provided them to all parties during the hearing. We subsequently directed the Intervenors to provide a list to Staff of questions regarding modeling inputs and assumptions, and Staff to prepare and submit as an exhibit a report responding to those questions. That report is Ex. NRC-093.

⁴¹⁶ Ex. NRC-095 at 20-22.

⁴¹⁷ Tr. at 2588 (Striz).

modeling as an indicator of whether the White River structural feature is a transmissive fault or a non-transmissive fold.

c. Evaluation of the White River Feature

6.89. The Staff testified that even if its modeling is not considered, the Staff's conclusions regarding the nature of the White River structural feature are unaffected because the modeling was only one of a number of bases for concluding that the White River feature is not a transmissive fault.⁴¹⁸

6.90. Some of these bases are discussed in the EA and SER. For instance, the EA states that CBR is required to operate under an inward hydraulic gradient, which prevents flow within the Basal Chadron Sandstone toward the White River.⁴¹⁹ The EA also states that the White River structural feature is two miles from the northwest boundary of the License Area.⁴²⁰ The Staff testified that if water could flow in that direction, against the inward gradient, it would take 500 years for water to flow over that distance,⁴²¹ and during this travel time, advection, dispersion, sorption, and geochemical processes would reduce the concentration of any contaminants of concern.⁴²² The Intervenors did not provide any evidence that shows ground water contaminants are migrating from the License Area to the White River structural feature.

6.91. The Staff testified that "the White River structural feature has no significance with respect to determining whether there is adequate confinement of the Basal Chadron Sandstone

⁴¹⁸ Ex. NRC-095 at 22.

⁴¹⁹ Ex. NRC-010 at 75; Ex. NRC-095 at 22.

⁴²⁰ Ex. NRC-010 at 38.

⁴²¹ Tr. at 1192. The EA also reports the estimated flow velocity in the Basal Chadron Sandstone of 20 feet per year. Ex. NRC-010 at 118. Converting 2 miles to feet and dividing by the reported flow velocity gives a travel time of approximately 500 years.

⁴²² Ex. NRC-095 at 22-23.

aquifer at the CBR facility” because of its distance (2 miles) from the License Area.⁴²³ The Staff also testified that, in the vicinity of the White River structural feature, there would be no effect on hydraulic confinement of the Basal Chadron Sandstone aquifer based on the continuity of the Chadron Formation-Pierre Shale contact and overlying units across the structural feature, based on 130 geophysical logs, the vertical gradient and potentiometric ground water surfaces of the Basal Chadron Sandstone aquifer and the Brule aquifer over the area of the structural feature, aquifer tests in the area that demonstrate the integrity of the overlying confining unit, and distinct geochemical variations among aquifers.⁴²⁴

6.92. The Staff’s testimony on confinement in the vicinity of the White River structural feature is based on information in CBR’s Class III Underground Injection Control (UIC) permit application to NDEQ (Ex. NRC-028), which is cited and listed as a reference in the SER.⁴²⁵ As described in Exhibit NRC-028, the 2006 pumping test demonstrated confinement over the majority of the NTEA, CBR’s 3D geologic modeling (Figures 3.3a-3.3d on PDF pages 2-5) results show a lack of obvious linear features on the top surface of the Pierre Shale and Basal Chadron Sandstone that are typically associated with discrete fault displacement and that two important marker beds (Pierre Shale and Basal Chadron Sandstone) have not been offset due to faulting; differences in hydraulic head of 80-90 feet between the BCS and overlying aquifers have been observed, as have distinct geochemical characteristics of ground water between the BCS and overlying aquifer.⁴²⁶ Section 2.3.3.2 of the SER discusses Staff’s agreement with CBR’s conclusions based on close spaced drilling that there is not a fault that cuts through and

⁴²³ Ex. NRC-001-R at 45.

⁴²⁴ *Id.* at 39.

⁴²⁵ Ex. NRC-009 at 18.

⁴²⁶ Ex. NRC-028 at PDF 2-10.

displaces the White River Group, and the EA discusses how a conductive fault would affect potentiometric levels and geochemistry.⁴²⁷

6.93. The Staff also testified that NDEQ independently evaluated the White River structural feature during its review of CBR's aquifer exemption petition for the NTEA.⁴²⁸ NDEQ's review, which included review by an independent panel of expert geologists, concluded that CBR's interpretation of this feature as a fold was plausible and that there is no evidence of faults or contaminant pathways between the Basal Chadron Sandstone aquifer and the Brule aquifer within the NTEA.⁴²⁹ NDEQ based its conclusion on the 3D geologic modeling, drill hole data showing no evidence of faults or contamination pathways, flowing artesian conditions in the proposed NTEA, CBR's 2006 aquifer pumping test for the NTEA, and review by independent experts concluding CBR's interpretation was plausible.⁴³⁰

6.94. Dr. LaGarry generally asserted that the White River structural feature is a fault, but his statements address faults generally or on a regional level, and identify the White River structural feature as a fault without further explanation.⁴³¹ Mr. Wireman also asserted that the nature of the White River feature is "very uncertain," but provided no basis for this assertion.⁴³² We therefore find that the Intervenors have not provided any specific evidence to refute the Staff's testimony stated above, nor have they provided evidence demonstrating that the White River structural feature is a conductive fault or that it has transported contaminants to and impacted the water quality of the White River.

⁴²⁷ Ex. NRC-009 at 16; Ex. NRC-010 at 39.

⁴²⁸ Ex. NRC-001-R at 37, 39.

⁴²⁹ *Id.* at 37-38; Ex. CBR-019 at PDF 16-17.

⁴³⁰ Ex. NRC-001-R at 37.

⁴³¹ Ex. INT-003 at 3; Ex. INT-013 at 3.

⁴³² Ex. INT-047 at 3.

d. Potential Migration Through Aquifers

6.95. The Staff testified that there is no continuous pathway between the Basal Chadron Sandstone aquifer at the CBR facility and the drinking water aquifers at the Pine Ridge Reservation.⁴³³ The Staff explained that CBR is required by license condition to operate under an inward hydraulic gradient that causes ground water in the mined aquifer to flow toward the interior of the facility, and that even if contaminants could flow against the inward gradient, the Basal Chadron Sandstone pinches out a few miles northeast of Crawford and there are 25 miles of aquitard between the pinch out and the southwestern boundary of the reservation.⁴³⁴ Also, the Pierre Shale and Niobrara Shale outcrop between the CBR facility and the Pine Ridge Reservation, effectively preventing any connection of the Basal Chadron Sandstone aquifer at the CBR facility to the drinking water aquifers on the Pine Ridge Reservation.⁴³⁵ At the hearing, Dr. LaGarry agreed that there is no evidence of a pathway between the License Area and the reservation through the Basal Chadron Sandstone.⁴³⁶

6.96. The Staff also testified that there is no path for water to travel from the CBR facility to the reservation through the Arikaree aquifer. The Staff testified that the confinement of the Basal Chadron Sandstone would preclude upward migration through the Brule to the Arikaree, and that the Arikaree is dry where it exists on the site because it is on a hill.⁴³⁷ The Staff also testified that there is not a viable pathway through the Arikaree formation at the southeast portion of the License Area to the Pine Ridge Reservation, because such a pathway would require water to travel cross-gradient for 60 miles and over a ground water mound just to

⁴³³ Ex. NRC-001-R at 31-33.

⁴³⁴ Ex. NRC-095 at 16-17.

⁴³⁵ *Id.* at 17.

⁴³⁶ Tr. at 2576 (LaGarry).

⁴³⁷ Ex. NRC-076-R2 at 27; Tr. at 1170 (Beins); *id.* at 2620 (Lancaster).

reach the South Dakota-Nebraska border.⁴³⁸ In the supplemental hearing, Dr. LaGarry agreed with Staff's assessment, stating that "it is very unlikely that there's a direct lateral route from the license area to the Reservation."⁴³⁹

6.97. Based on the facts adduced above, we find there is no credible underground pathway from the Basal Chadron Sandstone aquifer to the drinking water aquifers on the Pine Ridge Reservation.

3. Impacts to Drinking Water on the Pine Ridge Reservation

6.98. Finally, we examine whether CBR's ISR operations have had an impact on the drinking water aquifer at the Pine Ridge Reservation. The Staff testified that according to two USGS reports, the Arikaree and Ogalalla aquifers are the primary drinking water aquifers at the Pine Ridge reservation.⁴⁴⁰ The Staff also testified that it does not believe that the Chamberlain Pass Formation on the reservation is used as a drinking water source, because neither of the USGS reports identify the Chamberlain Pass Formation as a source of drinking water.⁴⁴¹ The Intervenors have not provided any testimony indicating the locations of specific wells in the Chamberlain Pass Formation. Two of the Intervenors' exhibits state generally that the Chamberlain Pass formation is used for drinking water on the Pine Ridge Reservation, but give no information about specific locations.⁴⁴²

6.99. Ms. White Face testified that test results from five wells drilled in the Arikaree aquifer on the Pine Ridge Reservation show elevated levels of uranium that she attributes to

⁴³⁸ Ex. NRC-095 at 27-28, Tr. at 2621-22 (Lancaster).

⁴³⁹ Tr. at 2622 (LaGarry).

⁴⁴⁰ Ex. NRC-001-R at 33 (citing Ex. NRC-025 and Ex. BRD-003).

⁴⁴¹ Ex. NRC-095 at 15-16.

⁴⁴² Exs. INT-072, INT-074.

CBR's operations.⁴⁴³ Ms. White Face testified that the well samples showed ratios of U-234/U-238 of approximately 2 to 1, and that this ratio would have been much lower based on natural percentages of U-234 and U-238.⁴⁴⁴ The five wells are located in the towns of Oglala, Pine Ridge, Kyle, Manderson, and Porcupine, South Dakota.⁴⁴⁵ The Staff testified that each of the wells tested in OST-001 is at least 49 miles from the nearest boundary of the CBR facility.⁴⁴⁶ Ms. White Face agreed that Oglala, the closest town to the CBR facility, is 49 miles away, and stated that the other towns are between 20 to 60 miles east or north of Oglala.⁴⁴⁷

6.100. The Staff testified that Ms. White Face had incorrectly compared the activity ratios of U-234/U-238 to the natural abundance ratios of those isotopes, which is inappropriate because the two isotopes have different specific activities.⁴⁴⁸ Exhibit NRC-082 shows that the specific activity of U-234 is over four orders of magnitude greater than that of U-238.⁴⁴⁹

6.101. The Staff also testified the natural activity ratio of U-234/U-238 in ground water typically ranges between 1 and 3, putting the measured U-234/U-238 activity ratios in the Arikaree well test results within the range for natural ground water.⁴⁵⁰ The activity ratios reported by Ms. White Face are also consistent with U-234/U-238 activity ratios calculated from

⁴⁴³ Ex. OST-001 at 3-5, 7-8.

⁴⁴⁴ *Id.* at 5-8.

⁴⁴⁵ Tr. at 1515-17 (White Face).

⁴⁴⁶ Ex. NRC-076-R2 at 47.

⁴⁴⁷ Tr. at 1515-17 (White Face).

⁴⁴⁸ Ex. NRC-076-R2 at 49. We take official notice under 10 C.F.R. § 2.337(f) that these ratios are based on different physical properties. Activity is based on measurements of radioactivity, while natural abundance is based on mass.

⁴⁴⁹ Ex. NRC-082 at PDF 2.

⁴⁵⁰ Ex. NRC-076-R2 at 49 (citing Ex. NRC-082 at PDF 2, 3).

data in Ex. NRC-025 obtained from wells in Manderson and Porcupine in 1995, and data in Exhibit INT-006, a 1982 baseline water quality study for northwestern Nebraska.⁴⁵¹

6.102. Intervenors' exhibits INT-072 and INT-074 discuss studies related to uranium contamination on the Pine Ridge Reservation. Exhibit INT-072 states that "naturally elevated uranium levels" in the Chamberlain Pass Formation on the reservation are "due to devitrified volcanic glass within the aquifer." Exhibit INT-074 states that outcrops and subcrops of the Chamberlain Pass Formation are likely sources of natural uranium contamination of soils, sediments, surface waters, and ground water in several communities on the Pine Ridge Reservation, including Manderson, Porcupine, and Kyle, South Dakota. The Staff provided an additional exhibit, NRC-098, which states that "[v]olcanic ash within the aquifers is the primary source of elevated uranium levels in the region's groundwater."

6.103. Based on the Staff's testimony on activity ratios, the distance from the CBR facility to the five Arikaree wells, and the three exhibits discussed above, we find that the elevated uranium levels in the five Arikaree wells are most likely caused by naturally occurring uranium on the Reservation and are not the result of CBR's operations. This finding is also supported by our earlier finding that there is no viable pathway for contaminants to reach the Pine Ridge Reservation from the CBR facility. We also find that, if the Chamberlain Pass Formation is used as a drinking water source on the reservation, elevated levels of uranium in wells completed in that formation are most likely caused by naturally occurring uranium, not CBR's operations. We base this finding on the evidence in Exhibits INT-072 and INT-074, as well as the lack of a viable pathway through the Basal Chadron Sandstone to the Chamberlain Pass Formation on the Reservation discussed previously.

⁴⁵¹ *Id.* (citing Ex. NRC-025 at 60-61); Tr. at 1678 (Fuhrmann).

4. Conclusion – Communication Among Aquifers

6.104. Having reviewed the evidence and testimony, we find by a preponderance of the evidence that the Staff's analysis of environmental impacts on water quality included a detailed assessment of vertical confinement and horizontal containment of the Basal Chadron Sandstone aquifer at the CBR site. We find that CBR demonstrated that the Basal Chadron Sandstone aquifer is vertically confined based on several lines of evidence, including the characteristics of the upper confining layers, the results of aquifer pumping tests, and differences in potentiometric surfaces and geochemistry between the Basal Chadron Sandstone and Brule aquifers.

6.105. We also find that, in analyzing environmental impacts, the Staff addressed the various pathways that the Intervenor proposed for contaminants to escape the CBR License Area and reach the Pine Ridge Indian Reservation. The Staff considered whether faults at or near the CBR facility could contribute to potential contaminant migration, and gave specific consideration to the role of the White River structural feature as a potential pathway among aquifers. Even giving no weight to the Staff's modeling of the feature, we find that the Staff considered several lines of evidence that support the conclusion that the interpretation of the feature as a fold is plausible, and that the Intervenor has not provided any evidence to refute that finding. Finally, based on a thorough review of potential impacts to ground water quality from CBR's operations, as documented in Section 4.6.2.2 of the EA, the Staff concluded that impacts would be SMALL.

6.106. For the above reasons, we find that the Staff satisfied the "hard look" requirement of NEPA in analyzing the potential ground water quality impacts of renewing CBR's license, and we therefore resolve this portion of Contention D in favor of the Staff and CBR.

5. Environmental Justice

6.107. In EA Contention 3, the intervenors asserted that the Staff's environmental justice (EJ) analysis was inadequate because the Staff limited its review area to a radius of four

miles around the CBR facility, did not identify any minority or low-income populations, and found no need to perform a more detailed analysis.⁴⁵² The intervenors supported their claim by citing Dr. LaGarry's claims that contaminants from CBR's operations have the potential to impact water at the Pine Ridge Reservation.⁴⁵³

6.108. In partially admitting this contention and merging it with OST Contention D, we identified the issue as follows: "whether the Staff's analysis of EJ, including its analysis of cumulative effects, should be expanded to consider potential impacts on the aquifer that provides drinking water to the Pine Ridge Reservation."⁴⁵⁴

6.109. In its initial testimony, the Staff explained the basis for choosing a 4-mile radius for the EJ review area and the reasons why the Staff did not expand its EJ analysis to include potential impacts to drinking water on the Pine Ridge Reservation.⁴⁵⁵ The Staff explained that, based on its determination that impacts to surface and ground water would be SMALL, there would be no significant impacts and thus no EJ impacts.⁴⁵⁶

6.110. When considering EJ as part of its NEPA process, the NRC "makes an effort to become aware of the demographic and economic circumstances of local communities where nuclear facilities are to be sited, and take care to mitigate or avoid special impacts attributable to the special character of the community."⁴⁵⁷ In NRC practice, "[t]he essence of an [EJ] claim . . .

⁴⁵² OST New Contentions at 47.

⁴⁵³ *Id.* at 45-46.

⁴⁵⁴ LBP-15-11 at 451.

⁴⁵⁵ Ex. NRC-001-R at 49-52.

⁴⁵⁶ *Id.* at 51-52.

⁴⁵⁷ *Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), CLI-02-20, 54 NRC 147, 156 (2002)

is disparate environmental harm.”⁴⁵⁸ Moreover, the NRC considers EJ implications “only when disparate environmental effects are ‘high and adverse.’”⁴⁵⁹

6.111. The Staff followed the guidance in NUREG-1748, Appendix C, in conducting its EJ analysis.⁴⁶⁰ That guidance states that for materials facilities located in rural areas, a radius of four miles should be used.⁴⁶¹ The Staff concluded that there was no basis to deviate from the 4-mile guideline for this license renewal action, based on the Staff’s knowledge gained from regulatory oversight of the CBR facility over its 24-year operating history, as well as its environmental review of the LRA.⁴⁶² With respect to potential surface or ground water impacts in particular, the Staff cited the semiannual effluent and environmental monitoring reports it receives from CBR that provide data on surface and ground water quality.⁴⁶³

6.112. The Staff also explained that its EJ guidance allows the Staff to proceed with an EJ review if the Staff believes a minority or low-income population would be adversely affected by a project.⁴⁶⁴ In this case, the Staff was aware of the OST at the Pine Ridge Reservation, but determined based on the distance from the facility to the reservation that members of the OST at the reservation would not be adversely affected.⁴⁶⁵

⁴⁵⁸ *Id.* at 156.

⁴⁵⁹ *Id.* at 154; *see also Indian Point*, CLI-15-6, 81 NRC at 380 (agencies are to examine “disproportionately high and adverse” impacts to EJ populations).

⁴⁶⁰ Ex. NRC-010 at 91, citing Ex. NRC-014 at Appendix C. As noted in the Staff’s testimony, the guidance in NUREG-1748 was explicitly endorsed by the Commission in its 2004 policy statement on environmental justice. Ex. NRC-001-R at 49.

⁴⁶¹ Ex. NRC-014 at C-4.

⁴⁶² Ex. NRC-001-R at 50.

⁴⁶³ *Id.*

⁴⁶⁴ *Id.* at 51.

⁴⁶⁵ *Id.*

6.113. The Staff's guidance states that even if a minority or low-income population is identified within an area of review, an EJ analysis proceeds only if impacts are determined to be significant.⁴⁶⁶ Thus, any further EJ analysis respect to potential impacts on drinking water at the Pine Ridge reservation would have required the Staff to determine that there would be significant impacts to surface or ground water quality from the relicensing of the CBR facility. Under the guidance in NUREG-1748, if impacts are not significant, there can be no disproportionately high and adverse impacts on an EJ population.⁴⁶⁷

6.114. As discussed in Section 4.6.2.2 of the EA, as well as the Staff's testimony on Contentions C and D, the Staff concluded that impacts to surface and ground water would be SMALL and thus insignificant.⁴⁶⁸ Because the Staff concluded based on its analysis that impacts would be small, and hence not significant, there was no basis to expand the EJ review area based on potential impacts to surface or ground water at the Pine Ridge Reservation.⁴⁶⁹

6.115. The OST, through Ms. White Face, asserted that CBR operations impact water quality in wells at the Pine Ridge Reservation.⁴⁷⁰ Ms. White Face asserts that uranium pumped into the Basal Chadron Sandstone during ISR operations at the CBR facility is being transported to the Arikaree aquifer at the Pine Ridge Reservation and raising uranium levels in wells on the reservation that are completed in that aquifer.⁴⁷¹ As evidence, Ms. White Face presented results from well tests on the reservation that purportedly showed contamination from CBR's operations.

⁴⁶⁶ *Id.* (citing Ex. NRC-014 at C-6).

⁴⁶⁷ *See Indian Point*, CLI-15-6, 81 NRC at 380.

⁴⁶⁸ Ex. NRC-010 at 74-81.

⁴⁶⁹ Ex. NRC-001-R at 52.

⁴⁷⁰ OST Supplemental Position Statement at 4 (citing Ex. OST-001).

⁴⁷¹ Ex. OST-001 at 3-4.

6.116. We addressed Ms. White Face's test results in paragraphs 6.99 through 6.101 above, and found that Ms. White Face's test data do not support the assertion that the uranium in the five Arikaree wells she tested is coming from the CBR facility. We also find, therefore, that Ms. White Face's testimony does not provide information that would have required the Staff to revise its choice of a 4-mile radius for the EJ review area or its conclusion that there are no EJ impacts to residents of the Pine Ridge Reservation. The Intervenors provided no other written testimony or exhibits to support the claim that the Staff should have expanded its EJ analysis to assess potential effects on the drinking water aquifer at Pine Ridge Reservation.

6.117. In Section 4.13 of the EA, the Staff identified three potential CBR expansion areas (North Trend, Marsland, and Three Crow) as reasonably foreseeable future actions for the purposes of cumulative impacts analysis.⁴⁷² In Section 4.13.9 of the EA, the Staff explained its approach to cumulative impacts related to EJ. The Staff explained that, applying the same 4-mile review area, demographic analyses for the three proposed CBR expansion areas would yield similar results as the demographic analysis for the license renewal, and no further EJ analysis would be needed.⁴⁷³

6.118. The Staff testified that it has not yet determined whether those expansion areas would result in significant impacts. But based on the regulatory requirements of 10 CFR Part 40 and the acceptance criteria in NUREG-1569 that would have to be met, as well as the Staff's considerable knowledge of operating experience at the CBR facility and other ISR facilities, the Staff concluded, for the purposes of its cumulative impact analysis, that there was no reason to expect significant impacts to surface or ground water outside of the proposed expansion areas,

⁴⁷² Ex. NRC-010 at 105.

⁴⁷³ *Id.* at 124-25.

and no reason to expect disproportionately high and adverse impacts to the residents of the Pine Ridge Reservation.⁴⁷⁴

6.119. Based on the record before us, we find that the Staff appropriately selected the EJ review area consistent with Commission-endorsed guidance, and had no basis to deviate from the recommended 4-mile review area in their EJ analysis for the CBR license renewal or for the cumulative impacts analysis. We also find that the Staff had an adequate basis for concluding that there would be no significant impacts to water quality, and, therefore, that the Staff appropriately concluded there were no “disproportionately high and adverse” impacts to address in the context of EJ. We therefore find that the Staff has satisfied the requirements of NEPA for this issue, and resolve this portion of Contention D in favor of the Staff and CBR.

6.120. With regard to a claim that cumulative impacts from EJ would be significant, the Intervenor did not provide any testimony or exhibits to support such a claim, nor did they refute the Staff’s testimony on this topic. For this reason, we find that the Intervenor has failed to meet the burden of going forward with evidence to support this claim.⁴⁷⁵ But in any event, we find the Staff’s explanation of its approach to the cumulative impacts analysis for EJ, and its determinations regarding the size of the review area and the lack of disproportionately high and adverse impacts to the residents of the Pine Ridge Reservation, to be reasonable. We therefore find that the Staff has satisfied the requirements of NEPA with respect to this issue, and resolve this portion of Contention D in favor of the Staff and CBR.

D. Contention F

6.121. In Contention F, Intervenor argued that the Staff failed to include recent geological research in its analysis of environmental impacts.

⁴⁷⁴ Ex. NRC-001-R at 53.

⁴⁷⁵ *Oyster Creek*, CLI-09-7, 69 NRC at 269.

6.122. Specifically, this contention claimed that CBR had ignored more recent research on geology and hydrology of the area. As support, the Intervenor provided the 2008 opinion of Dr. Lagarry (Ex. INT-003) and a 2007 letter from NDEQ to CBR commenting on CBR's NTEA aquifer exemption petition (Ex. INT-011).

6.123. The Intervenor, through Dr. LaGarry, first asserted that the Staff improperly applied the "layer cake concept" which overestimates thickness and areal extent of stratigraphic units.⁴⁷⁶ At the hearing, Dr. LaGarry explained his view of the layer cake concept: from 1930s to 1960s geologists assumed rock layers were uniform thickness, uniform lithology, and spread out in all directions, but after the advent of plate tectonics and recognizing uplifts locally, geologists came to recognize that rocks are not uniform layers but are discontinuous and pinch out.⁴⁷⁷

6.124. The Staff discussed regional and site stratigraphy and hydrostratigraphy in Sections 3.4.1 and 3.5.2 of the EA and Sections 2.3.3.1 and 2.3.3.2 of the SER. In both the SER and the EA, the Staff described a range in thicknesses in stratigraphic units.⁴⁷⁸ And in Section 3.5.2.3 of the EA, the Staff explained that the Basal Chadron sandstone pinches out northeast of Crawford.⁴⁷⁹ The Staff provided further explanation of this "pinch out" based on the depositional history of the area in its testimony.⁴⁸⁰

6.125. The Staff testified that it examined site-specific stratigraphic cross-sections provided in the LRA to assess the hydrostratigraphy at and near the CBR facility.⁴⁸¹ These

⁴⁷⁶ Ex. INT-003 at 3.

⁴⁷⁷ Tr. at 1069 (LaGarry).

⁴⁷⁸ Ex. NRC-010 at 26, 38; Ex. NRC-009 at 16.

⁴⁷⁹ Ex. NRC-010 at 37.

⁴⁸⁰ Ex. NRC-001-R at 32 (citing Ex. NRC-023 at 3).

⁴⁸¹ *Id.* at 56 (citing Ex. CBR-011 at 2-111 to 2-125).

cross sections were obtained from geophysical logs and demonstrate the extent and thickness of the hydrostratigraphic units at the site.⁴⁸² As shown in Figure 2.6-3 of the LRA, these cross sections cover the entire site in both longitudinal and transverse directions.⁴⁸³ The Staff stated in its testimony that, from a hydrostratigraphic point of view, the data support a “layer cake model” of the subsurface.⁴⁸⁴ The Intervenors did not provide any testimony or evidence contradicting this statement.

6.126. We find that the cross-sections provided in the LRA, and reviewed by the Staff, clearly show the variation in thickness and areal extent of the various subsurface strata over the entire CBR site. The Staff based its discussion of stratigraphy and hydrostratigraphy in the EA on this information. We find, therefore, that the Staff did not assume a “layer cake concept” of site stratigraphy as understood by Dr. LaGarry.

6.127. The Intervenors also asserted that the Staff ignored recent interpretations of the stratigraphic formations at and near the CBR facility and continued to use “outdated nomenclature” in referring to the stratigraphic units. Specifically, Dr. LaGarry objects to the Staff’s use of “Basal Chadron Sandstone” to refer to the mined aquifer at the CBR site, asserting that this formation should properly be referred to as the “Chamberlain Pass Formation.” Dr. LaGarry cites several studies by himself and others that document the reinterpretation of the White River Group in South Dakota and northwestern Nebraska. One of these studies, a 1998 paper by Terry, is an exhibit (Ex. BRD-005) in this proceeding.

6.128. The Staff testified that it reviewed regional and site geology as part of the safety review for the CBR license renewal.⁴⁸⁵ During that review, the Staff was aware of the proposed

⁴⁸² *Id.*

⁴⁸³ Ex. CBR-011 at 2-109.

⁴⁸⁴ Ex. NRC-001-R at 56.

⁴⁸⁵ *Id.* at 54.

lithostratigraphic revisions that Dr. LaGarry cited, as well as the nomenclature issues raised in the April 2007 NDEQ letter, and specifically considered the issue.⁴⁸⁶ The Staff discussed its findings in Section 2.3.3.2 of the SER.⁴⁸⁷

6.129. In the SER, the Staff explained that it retained the current naming convention (i.e., Basal Chadron sandstone) because the United States Geological Survey (USGS) did not identify the Chamberlain Pass Formation in Nebraska, and because the Nebraska Department of Environmental Quality (NDEQ) used the traditional stratigraphic terms.⁴⁸⁸ The Staff reiterated these points in its testimony, and added it defers to the USGS as the federal authority on geological nomenclature.⁴⁸⁹ The Staff also noted that when NDEQ granted CBR's aquifer exemption petition for the North Trend Expansion Area (NTEA) in 2011, NDEQ retained the original nomenclature, and allowed CBR to continue to use the name "Basal Chadron" for consistency with historical permitting and to prevent confusion.⁴⁹⁰

6.130. In the SER, the Staff also explained that "[s]tratigraphic nomenclature aside, nothing in the naming conventions for the geologic units . . . changes the interpretation of the physical and hydraulic features of the rock units."⁴⁹¹ In its testimony, the Staff reiterated that the choice of nomenclature has no bearing on the evaluation of hydrogeology or environmental impacts on surface and ground water.⁴⁹²

⁴⁸⁶ *Id.* at 57-58.

⁴⁸⁷ Ex. NRC-009 at 15.

⁴⁸⁸ *Id.*

⁴⁸⁹ Ex. NRC-001-R at 57.

⁴⁹⁰ *Id.* (citing Ex. CBR-019 at PDF 1, PDF 13).

⁴⁹¹ Ex. NRC-009 at 15.

⁴⁹² Ex. NRC-001-R at 58.

6.131. At the hearing, Dr. Lagarry claimed that this is not a nomenclature issue but a conceptual issue.⁴⁹³ He stated that nomenclature labels a “basket” and what is known about a rock unit is in the basket.⁴⁹⁴ In response, the Staff testified that in terms of the properties most important to performance of the CBR facility, it is immaterial what the unit is called – the field investigative work defines the actual properties.⁴⁹⁵

6.132. Dr. LaGarry also testified that the primary reason for the name change was that the Basal Chadron sandstone was considered a separate rock stratum from the stratum underneath it (overbank mudstone facies), while the Chamberlain Pass Formation includes both of those units.⁴⁹⁶ CBR testified that the primary reason for changing the name related to assumptions regarding ore body thickness as influenced by depositional history, and that fact does not change the physical characteristics of the Basal Chadron sandstone.⁴⁹⁷

6.133. After considering the record before us, we find nothing in Dr. LaGarry’s statements to refute the overarching argument that the nomenclature of the mined aquifer has no bearing on the physical characteristics that are material to assessing hydrogeological or environmental impacts. We also find that the Staff considered the proposed nomenclature revision based on recent studies and provided a reasonable basis for retaining the original “Basal Chadron” nomenclature in its review documents.

⁴⁹³ Tr. at 1055 (LaGarry).

⁴⁹⁴ *Id.*

⁴⁹⁵ *Id.* (Back).

⁴⁹⁶ *Id.* at 1057-58 (LaGarry).

⁴⁹⁷ *Id.* at 1056-57 (Beins).

6.134. Finally, when we admitted this contention we cited, as another example of a potential failure to use recent research,⁴⁹⁸ a statement by Dr. Paul Robinson of the Southwest Research and Information Center that criticized the LRA for referring to two outdated Environmental Protection Agency documents.⁴⁹⁹ The Staff testified that a search of the LRA revealed that these documents are mentioned only once, in a list of references to Section 2.9 of the LRA, and that the documents were referenced in the LRA for historical context.⁵⁰⁰

6.135. The Intervenors did not dispute the Staff's testimony, nor did they provide any testimony or evidence regarding Dr. Robinson's statement, the relevance or importance of the cited EPA documents, or the fact that they appeared to be outdated. We therefore find that the Intervenors did not meet the burden of going forward with evidence to support this claim. We also find that these documents were cited for historical context and are not material to the Staff's environmental review for this license renewal.

6.136. In summary, we find that the Staff did not assume a "layer cake model" as understood by Dr. LaGarry. We also find that the Staff specifically considered the nomenclature revisions proposed by Dr. LaGarry and had a sound basis for declining to adopt them. Finally, we find that the outdated EPA documents were cited in the LRA only for historical context. Because the Staff has met its burden, we resolve Contention F in favor of the Staff and CBR.

E. Contention 1

6.137. In admitting Contention 1, we limited the Intervenors' challenge to the following issues: (1) whether the NRC Staff meaningfully consulted with the OST under the NHPA, and (2) whether the NRC Staff's incorporation of the cultural resources surveys performed for the

⁴⁹⁸ Dr. Robinson's review was attached to the Consolidated Intervenors' Petition but was not cited in support of Technical Contention F, either in the original petition or the reply. Dr. Robinson was not a witness in this proceeding.

⁴⁹⁹ LBP-08-24 at 739 (citing Ex. INT-005 at 4).

⁵⁰⁰ Ex. NRC-001-R at 59; Tr. at 1651-52 (Back).

license renewal area was consistent with its obligation to take a hard look at the impacts to cultural resources surveys under NEPA.⁵⁰¹ We address each in turn.

1. The Staff Satisfied its Consultation Obligations Under the NHPA

6.138. The NRC's consultation obligations under the NHPA require that the NRC offer consulting Tribes a reasonable opportunity to identify their concerns about historic properties, advise on the identification and evaluation of those properties, and explain their views on the undertaking's effects on those properties.⁵⁰² Additionally, the NRC is obligated to consult on a "government-to-government" basis in a manner respectful of each Tribe's status as a dependent domestic sovereign nation. We find that the Staff's consultation efforts satisfied both requirements.

6.139. While the "NRC's goal [is] to begin meaningful interactions with Tribal governments at the earliest stage possible on . . . proposed projects with Tribal implications,"⁵⁰³ here the NRC Staff initiated contact with potentially affected Tribes well after CBR submitted its license renewal application. Nonetheless, the Staff did ultimately engage in a lengthy and meaningful consultation process that provided Tribes the opportunity to offer their advice and views on the potential for cultural resources in and around the license area.

6.140. The Staff's testimony demonstrates that it made a reasonable and good-faith effort to identify Tribes that may be affected by the renewal of CBR's license. The Staff reviewed ISR projects with ongoing consultation efforts in the general vicinity of the Crow Butte facility, consulted a contract cultural resources specialist and the NRC's Federal, State, and

⁵⁰¹ LBP-15-11 at 415, 451.

⁵⁰² 36 CFR § 800.2(c)(2)(ii)(A).

⁵⁰³ Ex. NRC-047 at 13.

Tribal Liaison Branch, and followed up with consulting Tribes in order to identify potentially-affected Tribes.⁵⁰⁴

6.141. Consistent with its Tribal Protocol Manual and the NHPA obligation to conduct government-to-government consultation in a manner respectful of Tribal sovereignty, the NRC's initiation of formal consultation on January 13, 2011, took the form of a letter from the NRC Division Director responsible for the undertaking to OST President Theresa Two Bulls, with copy to the OST THPO.⁵⁰⁵

6.142. Throughout the consultation process, the NRC employed multiple avenues of communication with the Tribes in an effort to solicit their input on the undertaking's potential impacts on cultural resources. The Staff communicated with OST on a regular basis and dozens of occasions via letters, phone calls, teleconferences, and face-to-face meetings,⁵⁰⁶ all methods consistent with the NHPA, as well as all applicable ACHP and NRC guidance. Letters typically took the form of a certified mailing to the Tribal President with copy to the THPO, with additional copy to the THPO via e-mail.⁵⁰⁷ As evidence of the Staff's effort to make consultation a collaborative process, the Staff incorporated comments and suggestions from the Tribes into its consultation process. For example, the Staff agreed to Tribal requests for face-to-face meetings, including a meeting at the Pine Ridge Reservation, an open-site approach to the Traditional Cultural Properties (TCP) survey, and multiple site visits to the CBR facility.⁵⁰⁸

6.143. While the Intervenor's argue that the Staff did not fully engage the OST in consultation, it is apparent that the OST itself did not fully engage in the process. For example,

⁵⁰⁴ Ex. NRC-001-R at 60.

⁵⁰⁵ Ex. NRC-039.

⁵⁰⁶ See Ex. NRC-038.

⁵⁰⁷ *Id.*

⁵⁰⁸ Ex. NRC-001-R at 63-64.

the OST “almost never responded to a formal consultation letter where comments were solicited.”⁵⁰⁹ The OST did not participate in the 2012 open-site TCP survey of the license renewal and expansion areas, nor did it provide comments on the survey report when comments were requested. When the Staff agreed to an additional Tribal Leaders meeting in May 2013 to resolve disagreements over the government-to-government nature of previous consultation efforts, the OST President, after accepting the Staff’s invitation,⁵¹⁰ did not attend the meeting. Mr. Catches-Enemy and Intervenor’s witness Mr. Dennis Yellow Thunder were unable to provide an explanation for the lack of attendance.⁵¹¹

6.144. The Intervenor’s object to certain aspects of the Staff’s consultation efforts. First, the Intervenor’s claim that the NRC inappropriately outsourced its consultation responsibility to CBR and its contractor, the SRI Foundation.⁵¹² Intervenor’s witness Mr. Michael Catches-Enemy testified that the concern was that “the development of any type of survey to be conducted with the tribes was going to be led by the Applicant and the consultant and not the tribes.”⁵¹³ The Staff testified that SRI Foundation “had no role in the Staff’s decision,” and instead served as an advisor to CBR.⁵¹⁴ 6.145. Importantly, the ACHP encourages applicants to “assume[] an active and informed role in the process.”⁵¹⁵ And at any rate, the agreed-upon approach for the TCP survey was an open-site approach led by participating Tribes, allowing them maximum control over the design and conduct of the survey. In sum, we

⁵⁰⁹ *Id.*

⁵¹⁰ Ex. NRC-044.

⁵¹¹ Tr. at 2323 (Catches-Enemy, Yellow Thunder).

⁵¹² Joint Position Statement at 78.

⁵¹³ Tr. at 2102 (Catches-Enemy).

⁵¹⁴ Ex. NRC-076-R2 at 52.

⁵¹⁵ “Section 106 Applicant Toolkit” (ACHP) (available at <http://www.achp.gov/apptoolkit.html>) (last retrieved November 22, 2015).

are not persuaded that the SRI Foundation inappropriately assumed control over the development of the survey.

6.146. The Intervenor also argue that the NRC failed to uphold its trust responsibility to the OST.⁵¹⁶ But as an independent regulatory agency that does not hold Tribal assets or manage Tribal lands, the NRC fulfills its trust responsibility by ensuring that Tribal members receive the same protections under implementing regulations that are available to other persons.⁵¹⁷ The Intervenor do not show that the NRC treated OST or its members less favorably than other entities or persons.

6.147. Finally, the Intervenor object to the nature of certain consultation communications or meetings, in which the CBR license renewal, CBR expansion areas, and Dewey-Burdock licensing were all discussed.⁵¹⁸ We are unpersuaded that the inclusion of other facilities for discussion rendered the Staff's consultation efforts deficient for three reasons. First, the Staff's practice of consolidating topics for discussion was not only to the convenience and financial benefit to all involved parties, but it is also consistent with the practice of other federal agencies.⁵¹⁹ Second, we find no prohibition of such a practice in the NHPA or in ACHP

⁵¹⁶ *E.g.*, Joint Position Statement at 78.

⁵¹⁷ See *Skokomish v. FERC*, 121 F.3d 1303, 1308-09 (9th Cir. 1997) (holding that FERC did not need to provide a Tribe greater rights beyond what they would otherwise have under the Federal Power Act, when FERC is assigning preliminary power licenses).

⁵¹⁸ Joint Position Statement at 79; Tr. at 2042.

⁵¹⁹ See *"Best Management Practices from the REAT Guidance Manual"* (U.S. Bureau of Land Management), C-A3: Cultural and Historic Resources at I-A-20 ("BLM Field Offices should consider combining consultations on multiple projects or inviting tribes to meetings where multiple projects may be discussed and coordinated"); *"EPA Region 5 Implementation Procedures for EPA Policy on Consultation and Coordination with Indian Tribes"* (U.S. Environmental Protection Agency) (available at <http://www3.epa.gov/region5/tribes/pdfs/r5-consultation-procedures-20110726.pdf>) (last retrieved November 22, 2015) at 12 ("EPA Region 5 may choose to combine consultation on multiple topics and for different purposes.").

regulations or guidance. Finally, during the consultation process, the Staff did separate the CBR relicensing discussion from the other projects.⁵²⁰

6.148. After reviewing the consultation efforts of the Staff and OST, we are persuaded that the Staff did meaningfully consult with the OST on a government-to-government basis as required by the NHPA and in accordance with ACHP and NRC guidance. We therefore resolve this portion of Contention 1 in favor of the Staff and CBR.

2. The Cultural Resources Surveys Relied on in the EA Support the Staff's Hard Look at Impacts to Cultural Resources

6.149. Under NEPA, the NRC Staff is required to take a "hard look" at potential impacts to cultural resources from the proposed action. Here, the Staff informed its analysis of such impacts through a number of information-gathering mechanisms, beginning with a review of the cultural resources field identifications conducted in 1982 and 1987 to support initial licensing.⁵²¹ This review was conducted "to verify the extent and intensity of the original field inventories in relation [to] the current operating conditions."⁵²² The 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."⁵²³ Furthermore, the Staff found 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."⁵²⁴

⁵²⁰ Tr. at 2176 (Goodman).

⁵²¹ Ex. NRC-001-R at 67; *see also* Ex. CBR-027; Ex. CBR-028.

⁵²² Ex. NRC-001-R at 67, 72.

⁵²³ *Id.* at 72.

⁵²⁴ *Id.* at 72-73.

6.150. The Staff also conducted a literature review to identify potential cultural resources absent from the 1982 and 1987 inventories, and made contact with “local experts, societies, neighboring Federal and State agency offices, and regional archives.”⁵²⁵ During the consultation process, the Staff conducted field trips to the CBR facility and surrounding area with tribal representatives, as well as independent visits by the Staff’s cultural resources contractor.⁵²⁶

6.151. Finally, the Staff supported an open-site TCP survey of the license renewal and expansion areas, to be conducted by Tribes willing to participate. All consulting Tribes were invited to participate, and two—the Santee Sioux Nation and the Crow Nation—accepted. Five persons from each Tribe conducted field inventories of the areas between November 14 and December 1, 2012, with decisions about which lands to cover on foot in the hands of the Tribes.⁵²⁷ Representatives of the Crow Nation, after observing the license renewal area, concluded that the area was so disturbed by past agricultural and other historic land uses that there was no need for a pedestrian inventory of the area. Representatives of the Santee Sioux Nation concurred with this assessment.⁵²⁸ In such a case, where previous or partial surveys “and all other evidence, indicate that a complete survey would be fruitless,” the NHPA does not require a complete survey of the project area is not required.⁵²⁹ The results of the TCP survey

⁵²⁵ *Id.* at 67-68, 69.

⁵²⁶ *Id.* at 68; *see also* Ex. NRC-050.

⁵²⁷ *Id.* at 74.

⁵²⁸ *Id.*

⁵²⁹ *Wilson v. Block*, 708 F.2d 735, 754-55 (D.C. Cir. 1983) (noting that ACHP’s “regulations do not expressly require agencies in all cases completely to survey impact areas, and in fact recognize that the need for surveys will vary from case to case”); *see also* 36 C.F.R. § 800.4(b)(1) (“a reasonable and good faith effort to carry out appropriate identification efforts . . . *may include* . . . sample field investigation, and field survey) (emphasis added).

were prepared by the Santee Sioux Nation in a written report,⁵³⁰ which was distributed to all consulting Tribes for comment.

6.152. In its EA, the NRC Staff considered all of the above information.⁵³¹ The Staff also considered Administrative Condition 9.8 of CBR's license, which requires that CBR avoid any known or newly-discovered cultural resources in the license area.⁵³² In the event that the Staff concluded that overall impacts to historic and cultural resources from the relicensing of the CBR facility would be SMALL.⁵³³

6.153. The Intervenor's argue that the Staff has not taken a hard look at impacts to cultural resources, in violation of NEPA. In particular, the Intervenor's rely on two letters written by Intervenor's witness Dr. Louis Redmond, written in January 2013⁵³⁴ and May 2015.⁵³⁵ It is plain from the January 2013 letter, however, that its criticisms are leveled specifically at CBR's Environmental Report for the Marsland expansion area, not at the cultural resources review for the license renewal area at issue in this proceeding.⁵³⁶ Dr. Redmond confirmed as much in his testimony at the evidentiary hearing.⁵³⁷ We therefore do not consider that letter further here.

6.154. Dr. Redmond's May 2015 letter argues that the cultural resources surveys relied on by the Staff were not conducted by qualified personnel.⁵³⁸ Dr. Redmond clarified at the

⁵³⁰ Ex. NRC-052.

⁵³¹ Ex. NRC-010 at 46-57, 86-88.

⁵³² Ex. NRC-012 at 6.

⁵³³ Ex. NRC-010 at 88.

⁵³⁴ Ex. INT-054.

⁵³⁵ Ex. INT-022.

⁵³⁶ Ex. INT-054 at 1 ("As per your recent request, I have reviewed the CBR (Crow Butte Resources, Inc.) environmental report for the Marsland Expansion Area dated May 2012.").

⁵³⁷ Tr. at 973-978 (Redmond).

⁵³⁸ Ex. INT-022 at 1-2.

evidentiary hearing that he was not challenging the qualifications of the archeologists involved in the 1982 and 1987 surveys, but rather the 2012 TCP survey.⁵³⁹ He cites the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation as containing qualification requirements for persons conducting TCP surveys. But while the standards cited by Dr. Redmond pertain to Class III inventories, they do not govern TCP surveys.⁵⁴⁰ Furthermore, by their own terms, those standards "are not regulatory and do not set or interpret regulatory policy," but only "provide technical advice about archeological and historic preservation activities and methods."⁵⁴¹ We will not find deficient the Tribal-led TCP survey at issue here because it does not meet professional criteria that do not apply to it.

6.155. The Intervenor also argue that the Staff's reliance on the 1982 and 1987 field inventories is inappropriate, given the age of those surveys. But it is clear that the Staff did not simply adopt those inventories without critical review or supplementation. The Staff reviewed the 1982 and 1987 field inventories, determining that land conditions were largely unchanged, and supplemented their findings with a literature review, contacts with local experts, and site visits. The Staff further supported a TCP survey to be conducted by participating Tribes in the method of their choice. Therefore, we are not persuaded by the Intervenor's objection to the 1982 and 1987 field inventories.

6.156. While OST did not participate in the open-site TCP survey and did not provide comments on the survey report to the NRC, the Intervenor do object to the adequacy of the survey. Specifically, the Intervenor state that "it was improper for the NRC Staff to rely upon the Santee Sioux TCP Survey to the detriment of the OST," as "OST has never been involved in

⁵³⁹ Tr. at 982-83, 988 (Redmond).

⁵⁴⁰ 48 Fed. Reg. 44716 (Sept. 29, 1983); *see also* Ex. NRC-076-R2 at 58.

⁵⁴¹ 48 Fed. Reg. at 44716.

a TCP Survey conducted by Crow Butte.”⁵⁴² First, however, the Intervenor fail to explain how the Staff’s reliance on the TCP survey was “to the detriment” of the OST. The OST was invited to participate in the survey but did not. Nor did the OST provide comments to the NRC on the survey report.

6.157. Given the substantial information obtained and reviewed by the NRC Staff, we are persuaded that the Staff took the requisite hard look at potential impacts to cultural resources from renewing CBR’s license. We therefore resolve this remaining portion of Contention 1 in favor of the Staff and CBR.

F. Contention 6

6.158. The Intervenor’s Contention 6 challenged the EA’s analysis and conclusion regarding impacts to ground water quantity from consumptive ground water use during aquifer restoration. In admitting Contention 6, we narrowed the contention to the specific claim that the EA’s conclusion that short-term water quantity impacts from consumptive use during restoration are no greater than MODERATE violates NEPA.⁵⁴³ In essence, the Intervenor’s challenge, as admitted, amounts to the assertion that the EA fails to explain why short-term water quantity impacts from consumptive use during restoration will not be LARGE.

6.159. The EA defines a MODERATE impact as one in which the “environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.”⁵⁴⁴ The EA defines a LARGE impact as one in which the “environmental effects are clearly

⁵⁴² Joint Position Statement at 74.

⁵⁴³ LBP-15-11 at 426, 451.

⁵⁴⁴ Ex. NRC-010 at 64.

noticeable and are sufficient to destabilize important attributes of the resource.”⁵⁴⁵ These definitions mirror those in NUREG-1748.⁵⁴⁶

1. The Staff’s Analysis

6.160. Section 4.6.2.3 of the EA contains the NRC Staff’s discussion of aquifer restoration impacts on ground water.⁵⁴⁷ There, the EA describes the steps of the restoration process and notes that consumptive use during restoration will generally be greater than consumptive use during operations.⁵⁴⁸ The EA also lists each mine unit’s restoration status or schedule.⁵⁴⁹ Ultimately, the EA concludes that while “greater than expected consumptive use rates could significantly increase the drawdown in the potentiometric surface of the Basal Chadron aquifer, . . . it should still remain saturated” and that the short-term impact from consumptive ground water use during aquifer restoration may therefore be MODERATE.⁵⁵⁰

6.161. The NRC Staff testified that destabilizing the Basal Chadron would not occur unless CBR “were to drop the head below the top of the confining unit in the Basal Chadron and start[] pumping that aquifer at a rate . . . beyond its sustainable yield and essentially be mining the water.”⁵⁵¹ The Intervenors did not submit contrary evidence that would convince us otherwise. We proceed, then, on the understanding that a LARGE ground water quantity impact would require, at minimum, such a drop in head.

⁵⁴⁵ *Id.*

⁵⁴⁶ Ex. NRC-014 at 4-14.

⁵⁴⁷ Ex. NRC-010 at 81-83.

⁵⁴⁸ *Id.* at 82.

⁵⁴⁹ *Id.* at 83.

⁵⁵⁰ *Id.*

⁵⁵¹ Tr. at 1409 (Back).

6.162. The Staff testified that to determine consumptive water use rates during mine unit restoration, it performed a water balance analysis of the CBR facility, as described in the EA⁵⁵² and SER.⁵⁵³ This analysis found a historical average consumptive use rate of approximately 105 gallons per minute (gpm), with the Staff predicting 210 gpm of consumptive use going forward. The Staff then compared the pre-mining potentiometric surface of the Basal Chadron Sandstone aquifer to the measured potentiometric surface in 2009 in order to determine drawdown levels.⁵⁵⁴ The Staff determined that even in the portion of the license area with the smallest amount of available head, consumptive use rates would have to approach 495 gpm to decrease the potentiometric surface below the top of the Basal Chadron⁵⁵⁵—a necessary, but not sufficient, condition for a LARGE ground water quantity impact.

6.163. Based on the historical and projected pumping rates before us, we do not consider consumptive use rates of 495 gpm during restoration to be realistic. Furthermore, we recognize that CBR has a strong operational incentive not to lower the potentiometric surface below the top of the Basal Chadron Sandstone aquifer. As the Staff testified, lowering the surface below the top of the Basal Chadron Sandstone aquifer would require CBR to have to pump significantly more water to maintain the radius of influence, affecting the entire operation of the CBR facility.⁵⁵⁶ This incentive was not disputed by any party at the evidentiary hearing, and was in fact acknowledged by Intervenors' witness Mr. Wireman.⁵⁵⁷

⁵⁵² Ex. NRC-010 at 83.

⁵⁵³ Ex. NRC-009 at 41.

⁵⁵⁴ Ex. NRC-001-R at 87-88.

⁵⁵⁵ Ex. NRC-095 at 7-8.

⁵⁵⁶ Tr. at 1407-08 (Back).

⁵⁵⁷ See Tr. at 1451-1452 (Wireman) (agreeing with the Staff's statement that it is in CBR's best operational interest not to drop the water level below the top of the Basal Chadron Sandstone aquifer).

2. Intervenors' Criticisms

6.164. The Intervenors level several criticisms at the EA's conclusion. First, the Intervenors take issue with the EA's reasoning that because "water levels would eventually recover after aquifer restoration is complete," the overall long-term impact to ground water quantity from consumptive use during restoration will be SMALL.⁵⁵⁸ Dr. Kreamer, for instance, testified that the EA fails "to substantiate that consumptive use of ground water by CBR will not impact the surrounding regions long-term," and that the EA "does not adequately address the complete long-term picture and impact on surrounding communities and ecosystems."⁵⁵⁹ Dr. Kreamer further testified that the NRC Staff's consumptive use and drawdown calculations presented at hearing "are geared toward short time-frame analysis of aquifer response," not an "[a]nalysis of long-term effects."⁵⁶⁰

6.165. Intervenors' complaints regarding the EA's conclusion that *long-term* impacts to ground water quantity from consumptive use during restoration will be SMALL are plainly outside the scope of this contention, which we specifically limited to the EA's conclusion "that the *short-term* impacts . . . are MODERATE."⁵⁶¹ We therefore decline to address these concerns further.

6.166. The Intervenors next argue that there is no "verifiable basis for NRC Staff's conclusions about aquifer recharge and at what point the aquifer might be unable to recharge."⁵⁶² Mr. Wireman testified that "[t]here is no discussion of recharge and discharge to

⁵⁵⁸ Ex. NRC-010 at 83.

⁵⁵⁹ Ex. INT-069 at 8.

⁵⁶⁰ Ex. INT-082-R at 4.

⁵⁶¹ LBP-15-11 at 451 (emphasis added).

⁵⁶² Joint Position Statement at 109.

the [Basal Chadron].”⁵⁶³ The NRC Staff counter that they estimated drawdown and recovery rates, and ultimately the short-term ground water quantity impacts, assuming no recharge.⁵⁶⁴

6.167. As the NRC Staff explains, assuming no recharge to the Basal Chadron is a conservative approach to calculating drawdown, as recharge “would only reduce the estimates of drawdown and accelerate recovery rates.”⁵⁶⁵ Therefore, we are persuaded that the EA’s lack of discussion of recharge does not represent a deficiency in the NRC Staff’s conclusion that short-term water quantity impacts from consumptive use during restoration will be no greater than MODERATE.

6.168. The Intervenor further argue that water quantity impacts from restoration might extend beyond the Basal Chadron itself. For example, Mr. Wireman testified that drawdowns “can cause significant reductions in springs that discharge from the Basal Chadron / Chamberlain Pass aquifer.”⁵⁶⁶ First, however, the Staff testified that over decades of operation, “we’ve never seen any indication that . . . the mine operations have any impact on spring flow to the surface,”⁵⁶⁷ and the Intervenor present no contrary evidence beyond conjecture. Second, the Intervenor have not explained why reductions in springs would constitute destabilization of a resource, as opposed to simply a noticeable alteration.

6.169. The Intervenor also take issue with the NRC Staff’s “uncritical acceptance of CBR’s estimate of 11 pore volumes for restoration activities at the mine units [2-11].”⁵⁶⁸ But as the Staff has explained, the consumptive use rate, not the total number of pore volumes

⁵⁶³ Ex. INT-047 at 6.

⁵⁶⁴ Ex. NRC-001 at 92; Ex. NRC-076-R2 at 65.

⁵⁶⁵ Ex. NRC-076-R2 at 65.

⁵⁶⁶ Ex. INT-083 at 3.

⁵⁶⁷ Tr. at 2504 (Back).

⁵⁶⁸ Joint Position Statement at 109 (citing Ex. NRC-010 at 83); see *also* Ex. INT-047 at 7.

required to restore a mine unit, is the more important factor in determining water quantity impacts.⁵⁶⁹ This consumptive use rate expected during CBR's restoration activities was projected based on historical consumptive use rates and is practically limited by an important factor: under the terms of its state permit, CBR may have no more than five mine units in restoration at one time.⁵⁷⁰

6.170. Finally, the Intervenor's argue that the equations used to develop Staff's drawdown analysis were inappropriate. Dr. Kreamer testified that "the basic equations used to describe the impacts and drawdown of water tables and piezometric surfaces in the mining area are inappropriate for the indicated heterogeneous, anisotropic conditions," and that therefore water quantity "impacts are not reasonably projected."⁵⁷¹ The Staff counters that the "basic equations" Dr. Kreamer refers to "have been used in numerous ASTM standards . . . to determine aquifer hydraulic properties including application to heterogeneous anisotropic aquifers."⁵⁷² The Staff further points out that the use of these "basic equations" have actually overestimated actual drawdowns at CBR, and so provide another conservative means to estimate drawdowns going forward.⁵⁷³

3. Conclusion

6.171. Ultimately, after considering all of the in-scope evidence presented on Contention 6, we are satisfied that the Staff, consistent with its NEPA obligations, took a hard look at the short-term ground water quantity impacts from consumptive use during aquifer restoration. We

⁵⁶⁹ Tr. at 1404 (Back) ("the number of pore volumes really doesn't come into play since those pumping rates would be sustainable indefinitely It's really a function of the pumping rate rather than the number of pore volumes with respect to the consumptive use impacts.").

⁵⁷⁰ Ex. NRC-009 at 140.

⁵⁷¹ Ex. INT-046 at 6.

⁵⁷² Ex. NRC-076-R2 at 66; *see also* Ex. NRC-080.

⁵⁷³ Ex. NRC-076-R2 at 67.

are further satisfied that the Staff's conclusion that such impacts will not be greater than MODERATE is appropriate. Therefore, we resolve Contention 6 in favor of the Staff and CBR.

G. Contention 9

6.172. As admitted, Contention 9 states that the EA "fail[s] to include the required discussion of ground water restoration mitigation measures."⁵⁷⁴ The essential question is whether the EA adequately discusses how CBR's restoration efforts will mitigate the impacts to ground water quality from renewing CBR's license.

6.173. At the outset, we address the Intervenor's argument that the EA fails to state that CBR's restoration efforts have, in the past, "utterly and completely failed to restore the aquifer to baseline characteristics."⁵⁷⁵ Mr. Wireman testifies that "restoration conducted by CBR pursuant to NRC, EPA and NDEQ regulations has been inadequate to date," as "CBR failed to achieve the restoration standards for seven parameters at MU 1" and "[a]s of May 2011 uranium concentration at mine units 2-5 were still well above the restoration standard."⁵⁷⁶ We clarify here that the effectiveness of a completed, approved restoration of a mine unit during the previous license term (i.e., Mine Unit 1) is outside the scope of this contention and hearing. What is relevant is whether the Staff took a hard look at the expected effectiveness of restoration efforts resulting from the renewed license (i.e., Mine Units 2-11).

1. CBR Must Restore Ground Water Quality to Standards in 10 CFR Part 40, Appendix A, Criterion 5B(5)

6.174. In Section 4.6.2.3 of the EA, the Staff describe aquifer restoration impacts on ground water. The EA explains that:

The purpose of aquifer restoration is to return the ground water quality in the production zone to compliance with the ground water

⁵⁷⁴ LBP-15-11 at 451.

⁵⁷⁵ Consolidated Intervenor's Combined Reply to NRC Staff and Applicant's Responses to Newly Filed EA Contentions at 4 (Feb. 6, 2015).

⁵⁷⁶ Ex. INT-047 at 7.

protection standards in 10 CFR Part 40, Appendix A, Criterion 5B(5). These standards require that the concentration of a hazardous constituent must not exceed (1) the Commission-approved background concentration of that constituent in ground water, (2) the respective value 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 (3) an alternate concentration limit the Commission establishes.⁵⁷⁷

6.175. The EA's explanation accurately describes the standards in Criterion 5B(5).

Furthermore, while CBR's restoration of Mine Unit 1 under the terms of the previous license was allowed to rely on Nebraska Class of Use standards, the NRC has since made clear in Regulatory Issue Summary 2009-05 that the Criterion 5B(5) standards, not state class-of-use standards, are to be applied to ground water restoration:

The staff recognizes that NUREG-1569, "Standard Review Plan for In Situ Leach Uranium Extraction License Applications," provides guidance that is not consistent with the requirements in Criterion 5B of Appendix A [of 10 C.F.R. Part 40]. In particular, the NUREG-1569 discussion of groundwater restoration to "pre-operational class of use" as being a secondary standard is not accurate, and is not an appropriate standard to use in evaluating license applications. Criterion 5B contains the appropriate standards that will be applied to groundwater restoration at ISR facilities.⁵⁷⁸

Furthermore, Condition 10.6 of CBR's license makes clear that restoration of Mine Units 2-11 will be held to the Criterion 5B(5) standards.⁵⁷⁹

2. Intervenors' Criticisms

6.176. The Intervenors argue that the NRC inappropriately relies on state restoration standards. Mr. Wireman testified that "[f]or numerous parameters, the values for the Nebraska Class of Use standards are much higher than baseline values determined by CBR. . . . As such

⁵⁷⁷ Ex. NRC-010 at 82.

⁵⁷⁸ Ex. NRC-061 at 3.

⁵⁷⁹ Ex. NRC-012 at 8 ("Hazardous constituents in the ground water shall be restored to the numerical ground water protection standards as required by 10 CFR Part 40, Appendix A, Criterion 5B(5).")

the Class of Use standards are inappropriate.”⁵⁸⁰ But the NRC has made clear that it no longer applies Nebraska’s Class of Use standards, and that CBR will be required to meet the standards in 10 CFR Part 40, Appendix A, Criterion 5B(5) for mine units 2-11.⁵⁸¹ The EA’s discussion of restoration goals is based not on state standards, but on NRC regulations, which are in turn explicitly referenced in CBR’s license.⁵⁸²

6.177. The Intervenor also take issue with the potential for ACLs at CBR, claiming:

The EA is deliberately deceptive in its discussion of aquifer restoration. There will be no restoration of uranium levels to 'Commission approved background conditions.' There will not be compliance with 'the table in paragraph 5C.' Uranium levels will only, ever, be restored to ACLs. Discussion in the EA of any other restoration outcome is misleading and can only be interpreted as being included to intentionally confuse the public.⁵⁸³

Mr. Wireman testified that “ACLs have been approved for too many parameters.”⁵⁸⁴ But the NRC has never approved an ACL for the CBR facility.⁵⁸⁵ And more importantly, the Intervenor fail to explain why approving an ACL would pose a significant environmental hazard. Any ACL would have to meet the standards in 10 CFR Part 40 Appendix A, Criterion 5B(6), which require that an ACL “present no significant hazard” and represent limits that “are as low as reasonably achievable.” Therefore, to the extent that Intervenor dispute that restoration to ACLs would effectively mitigate ground water quality impacts, they impermissibly attack NRC regulations. As we have made clear, “NRC regulations explicitly allow the use of ACLs”; therefore, “[t]o the

⁵⁸⁰ Ex. INT-047 at 7.

⁵⁸¹ Exs. NRC-061 at 3; NRC-012 at 8.

⁵⁸² Ex. NRC-012 at 8.

⁵⁸³ Joint Position Statement at 114.

⁵⁸⁴ Ex. INT-070 at 3.

⁵⁸⁵ Tr at 1849-50 (Striz).

extent Intervenor challenge the use of an ACL, this is an impermissible challenge to an NRC regulation."⁵⁸⁶

6.178. Mr. Wireman further testified that “the potential conflict between the State of Nebraska and NRC restoration standards will provide CBR with support for establishment of [ACLs].”⁵⁸⁷ But the Intervenor offer no support for this claim, and given the requirements of Criterion 5B(6), we do not see how differing state standards would have any relevance to the approval of an ACL. We have no reason to believe that the Staff would not faithfully apply those criteria in the event that CBR applies for an ACL.

6.179. The Intervenor also argue that the EA does not consider that restored water quality may be reversed over time. Dr. Kreamer testified that “addition of reductant to sequester pollutants can be reversed with time and the continual, natural flow of more groundwater through the site.”⁵⁸⁸ But in accordance with Condition 10.6 of the renewed license, CBR cannot receive final approval for restoration of a mine unit until stability monitoring demonstrates four consecutive quarters without an increasing trend in the measured constituents.⁵⁸⁹ The Intervenor do not explain why this license requirement would not protect against the risk of ground water quality reversal.

6.180. Finally, the Intervenor argue that CBR’s Model-Based Restoration Plan (MBRP) is potentially deficient. Dr. Kreamer proposes a lengthy list of elements of the MBRP that he believes deserve additional scrutiny.⁵⁹⁰ But this list is accompanied by scant explanation as to

⁵⁸⁶ LBP-15-11 at 434 (citing 10 CFR § 2.335(a) (“No rule or regulation of the Commission . . . is subject to attack . . . in any adjudicatory proceeding subject to this part.”)).

⁵⁸⁷ Ex. INT-047 at 8.

⁵⁸⁸ Ex. INT-046 at 5.

⁵⁸⁹ Ex. NRC-012 at 8.

⁵⁹⁰ Ex. INT-069 at 7.

why these elements of the plan are suspect, or why the MBRP is unlikely to guide successful restoration. More importantly, however, the Intervenor's ignore that regardless of the MBRP's effectiveness, CBR will ultimately be required to restore ground water in accordance with 10 CFR Part 40, Appendix A, Criterion 5B(5). We are therefore not persuaded that any claimed deficiencies in the MBRP render the EA deficient.

3. Conclusion

6.181. It is clear that CBR's restoration of mine units 2-11 will be held to the requirements of 10 CFR Part 40, Appendix A, Criterion 5B(5). It is further clear that the standards in Criterion 5B(5) represent concentrations with no significant hazards. The EA explains the 5B(5) standards in Section 4.6.2.3.⁵⁹¹ Because the Intervenor's challenges are out of scope, impermissible attacks on the Commission's regulations, or unpersuasive, we resolve Contention 9 in favor of the Staff and CBR.

H. Contention 12

6.182. The Board's order regarding the admission of Contention 12 as an EA-related contention set forth that issue statement as follows:

EA Contention 12: The Final 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.⁵⁹²

6.183. Contention 12 was proffered by the CI and the OST as a challenge to the adequacy of the Staff's EA.⁵⁹³ As originally pled, the contention alleged that the EA lacked "current and confirmed information on air emissions and their impacts on various 'receptors' in

⁵⁹¹ Ex. NRC-010 at 82.

⁵⁹² LBP-15-11 at 451.

⁵⁹³ CI New Contentions at 94-97; OST New Contentions at 107-109.

the region.”⁵⁹⁴ The Intervenors asserted that the EA fails to analyze “liquid 11e2 byproduct via evaporation” and “the foreseeable impact of major wind storm events, including tornadoes, on the facility.”⁵⁹⁵ The Intervenors also argued that the EA failed to “properly account” for the environmental impacts, in particular those to wildlife, from the “land application of ISL wastes” such as irrigation from a center pivot.⁵⁹⁶

6.184. We found Contention 12 admissible in part.⁵⁹⁷ We found that the Intervenors pled an admissible contention of inadequacy and omission concerning land application of ISR wastewater and selenium contamination, and accordingly found that the Intervenors provided alleged facts sufficient to admit this portion of Contention 12.⁵⁹⁸ This support, filed by the CI as exhibits with their submission on the EA, consisted of a letter and report by the U.S. Fish and Wildlife Service (FWS) on the topic of selenium contamination related to the land application of ISR mining wastewater.⁵⁹⁹ The Intervenors also relied on the testimony of Dr. Linsey McLean to support their claims regarding the potential impacts of selenium from land application of ISR wastewater.⁶⁰⁰

6.185. We also found that the Intervenors pled an admissible contention of omission regarding the lack of a specific discussion relating to tornadoes in the EA.⁶⁰¹ Neither the CI nor

⁵⁹⁴ CI New Contentions at 95; OST New Contentions at 108. According to Intervenors, “receptors” include people, plants, animals, water bodies, soil, and parks. CI New Contentions at 95; OST New Contentions at 108.

⁵⁹⁵ CI New Contentions at 96; OST New Contentions at 108.

⁵⁹⁶ LBP-15-11 at 435 (quoting CI New Contentions at 67, 96; OST New Contentions at 81, 108).

⁵⁹⁷ *Id.* at 437.

⁵⁹⁸ *Id.* at 438, 441-42.

⁵⁹⁹ See Exs. INT-018 and INT-019.

⁶⁰⁰ Joint Position Statement at 122.

⁶⁰¹ LBP-15-11 at 437.

the OST provided alleged facts or expert opinion in support of their claim regarding tornadoes; however, as an argument of omission, we found that alleged facts or expert opinion to support this claim was not required.⁶⁰²

6.186. The EA does not contain a discussion related to tornadoes. However, in admitting this aspect of Contention 12 in part, we found that “[i]n light of the fact that the agency has found wind events worthy of discussion in the EA (as they have a potential for adverse impacts), we would expect that any associated discussion would only be ‘reasonably complete . . . [were it to] properly evaluate the severity of the adverse effects.’”⁶⁰³ The EA discusses wind events and their potential impacts in sections 3.3.4, 4.3.2, and 4.4.⁶⁰⁴

6.187. Section 3.3.4 of the EA describes the wind characteristics of the CBR site. This section describes the locations of the weather stations that are the source of the information for the wind analysis in the EA, the predominant direction of wind at these weather stations, and precipitation, evaporation, and temperature information-recording methodologies.⁶⁰⁵ As Chapter 3 of the EA consists of a description of the affected environment, this section of the EA is not concerned with the potential environmental impacts of wind events at or upon the CBR facility; the potential environmental impacts of wind events are discussed in Chapter 4 of the EA.

6.188. In Section 4.3.2 of the EA, the Staff states that soil erosion due to wind at the CBR facility has the potential for adverse impacts, but notes that the potential effects are greatest at the construction stage, which has already been completed for this facility.⁶⁰⁶ The

⁶⁰² See *id.*

⁶⁰³ *Id.* (quoting *Methow Valley Citizens Council*, 490 U.S. at 352) (internal references omitted). We specifically cited EA sections 3.3.4 (discussing wind monitoring on the site), 4.3.2 (noting that “[s]oil erosion due to wind at the CBR facility has the potential for adverse impacts”), and 4.4 (discussing air quality impacts from wind erosion).

⁶⁰⁴ *Id.* (quoting Ex. NRC-010 at 23, 65-66, 66-68).

⁶⁰⁵ Ex. NRC-010 at 23.

⁶⁰⁶ *Id.* at 65; see also Ex. NRC-001-R at 97.

Staff describes the methods by which CBR will seek to mitigate the potential impacts on soil resources from wind, including continuing to monitor wind erosion and minimizing the clearing of land, road grading, and removal of vegetation at the site.⁶⁰⁷ In Section 4.4 of the EA, the Staff states that impacts on air quality could result from existing fugitive dust caused by wind erosion, but notes that the application of water to unpaved roads reduces the amount of fugitive dust to levels equal to or less than the existing condition.⁶⁰⁸ Finally, in Section 2.3.2 of the EA, which describes land reclamation in the context of site restoration, reclamation, and decommissioning, the Staff discusses the measures that will be used to limit surface erosion by wind, among other factors.⁶⁰⁹

6.189. The Staff describes the land application of treated process wastewater in 2.2.2 and 2.4.1 of the EA. In Sections 2.2.2, the Staff describes the three permitted wastewater disposal options available to the CBR facility: evaporation in solar evaporation ponds, deep well injection, and land application.⁶¹⁰ In Section 2.4.1, the Staff describes disposal options for ISR wastewater from evaporation ponds after restoration, including evaporation. The Staff states that evaporation of water may be enhanced through the use of sprinkler systems for land application. The Staff then explains that CBR is not allowed to use land application after wet weather events under the terms of its current National Pollutant Discharge Elimination System (NPDES) permit from the NDEQ.⁶¹¹ The Staff also notes that CBR has stated that it has no current plans for treating and discharging the pond water under an NPDES permit and that CBR will be required to apply for additional permits from the State of Nebraska for any land

⁶⁰⁷ Ex. NRC-010 at 65; *see also* Ex. NRC-001-R at 97.

⁶⁰⁸ Ex. NRC-010 at 66; *see also* Ex. NRC-001-R at 97.

⁶⁰⁹ Ex. NRC-010 at 10-11; *see also* Ex. NRC-001-R at 97.

⁶¹⁰ Ex. NRC-010 at 9; *see also* Ex. NRC-001-R at 100.

⁶¹¹ Ex. NRC-010 at 12; *see also* Ex. NRC-001-R at 100.

application activity associated with the disposal of evaporation pond wastewater that is not included in CBR's NPDES permit.⁶¹²

6.190. The Staff discusses the potential environmental impacts of aquifer restoration on surface water, including from the land application of wastewater, in Chapter 4 of the EA. In Section 4.6.1.3 of the EA, the Staff describes CBR's process for disposing of ISR process wastewater, which begins with treating the wastewater using a reverse osmosis (OS) unit to reduce the total dissolved solids and other constituents in the ground water, which produces water with reduced constituents (permeate) and brine. The Staff explains that CBR currently disposes of the treated wastewater (permeate) and brine by injection of the wastes into the two evaporation ponds and then into two NDEQ-permitted non-hazardous on-site deep disposal wells. The Staff then explains that, in accordance with a license amendment issued by the NRC in 1993 and its NPDES permit, CBR is also permitted to use land application to dispose of the treated wastewater. The Staff states that CBR has not used the option and has indicated that it has no plans to do so in the future.⁶¹³ The Staff concludes that the potential impacts to surface water resources during the restoration phase at the CBR facility would be SMALL.⁶¹⁴ The Staff also concludes that the overall potential impacts to wildlife from relicensing of the CBR facility would be SMALL.⁶¹⁵

6.191. On July 23, 2015, the Staff issued an Errata to the EA.⁶¹⁶ The Errata corrects information in Section 2.4.1 concerning the terms of CBR's NPDES permit for land application of treated process wastewater. Specifically, the Errata corrects an erroneous statement in Section

⁶¹² Ex. NRC-010 at 12-13; *see also* Ex. NRC-001-R at 100.

⁶¹³ Ex. NRC-010 at 12; *see also* Ex. NRC-001-R at 100-101.

⁶¹⁴ Ex. NRC-010 at 73; *see also* Ex. NRC-001-R at 101.

⁶¹⁵ Ex. NRC-010 at 94-98; *see also* Ex. NRC-001-R at 101.

⁶¹⁶ Ex. NRC-092.

2.4.1 – that “[l]and application after wet weather events will not be utilized by CBR” – to state that “[l]and application *except during and immediately after* wet weather events will not be utilized by CBR[.]”⁶¹⁷ The Staff asserted that the “characterization of the NPDES permit’s terms regarding the permitted timeframe for the use of land application during and immediately after wet weather events was a drafting error that does not affect the NRC staff’s analyses or conclusions in the EA, nor the issuance of the FONSI.”⁶¹⁸

6.192. With Contention 12, the Intervenor challenge the sufficiency of the EA’s assessment of the impacts relating to tornadoes and to the impacts of selenium in treated process wastewater disposed of using the land application method. We consider each of these arguments and their technical bases below.

1. Impacts Related to Tornadoes

6.193. The Intervenor offered no testimony or evidence regarding the impacts of tornadoes at the CBR facility. The sum of their arguments relating to tornado impacts in this proceeding amounts to their claims in their respective proposed contentions that the EA fails to analyze the foreseeable impact of tornadoes on the facility.⁶¹⁹

6.194. The Staff acknowledged that while the EA discusses the site characteristics and potential environmental effects related to wind, they do not include a discussion of wind effects related to tornadoes.⁶²⁰ The Staff explained that wind is a more pervasive meteorological feature at the CBR site and more likely to present an identifiable environmental impact at the site than a tornado, and that wind and tornadoes are different in nature.⁶²¹ Thus, while CBR

⁶¹⁷ *Id.* (emphasis added).

⁶¹⁸ *Id.*

⁶¹⁹ CI New Contentions at 96; OST New Contentions at 108.

⁶²⁰ Ex. NRC-001 at 97.

⁶²¹ *Id.* at 97-98.

engages in mitigative practices to address the impacts of wind at the site, such as the application of water to unpaved roads, there are no such mitigative practices used to address the potential environmental impacts of tornadoes.⁶²² In addition, the Staff testified that the NRC has generically considered the potential consequences of tornadoes at ISR facilities in NUREG/CR-6733, *A Baseline Risk-Informed, Performance-Based Approach for In Situ Leach Uranium Extraction Licensees*,⁶²³ and determined that no changes to an ISR facility or operations would be required to mitigate these consequences.⁶²⁴

6.195. The Staff also maintained that it did not believe that the possibility of a tornado in the area of the CBR facility necessitated a specific discussion of the potential environmental impact of tornadoes in the EA.⁶²⁵ The Staff testified that its determination that the EA adequately assesses the potential environmental effects of the proposed action, notwithstanding the omission of a specific discussion of tornadoes, is supported by NRC guidance.⁶²⁶ The Staff explained that NUREG-1748, which guides the Staff's environmental assessment of the renewal application, states that it may not be necessary for the evaluation of potential environmental impacts to require a discussion of severe weather phenomena such as tornadoes.⁶²⁷

6.196. Furthermore, the Staff testified that the ISR GEIS assessed the meteorological conditions and potential environmental impacts for the area encompassing the Crow Butte site and, having considered public comments regarding tornadoes when the draft GEIS was issued

⁶²² *Id.* at 97 (citing Ex. NRC-010 at 10-11, 66).

⁶²³ Ex. NRC-017.

⁶²⁴ Ex. NRC-001 at 98.

⁶²⁵ *Id.*

⁶²⁶ *See id.*

⁶²⁷ *Id.* (citing Ex. NRC-014 at 6-12).

for comment, chose not to include a discussion of the impacts of tornadoes in the final GEIS.⁶²⁸ The GEIS notes, however, that a discussion of tornadoes may be warranted on a site-specific basis.⁶²⁹ The Staff asserted that it did not find that the inclusion of such a discussion was necessary in the EA because the information that the Staff examined regarding tornadoes in the area of the Crow Butte facility indicated that tornadoes are a very low probability event. Specifically, the Staff notes that CBR identified the probability of a tornado in the region near the CBR facility as approximately 4.8×10^{-4} per year.⁶³⁰

6.197. Addressing criticism directed at the EA on this matter at the hearing, the Staff affirmed that even if – as postulated by the Board – the probability of a tornado at the site was nearly twice that identified in the SER, that circumstance would not cause it to revisit its determination not to include a discussion of tornadoes in the EA.⁶³¹ The Staff considered not only the probability of a tornado identified in the SER, but also the information in NUREG/CR-6733, NUREG-1748, and the ISR GEIS, and the LRA, among other factors, in arriving at the decision not to single out tornadoes in its assessment of environmental impacts.⁶³²

6.198. Based on the preponderance of the evidence, we conclude that the Staff's analysis of wind impacts in the EA is adequate for the purposes of NEPA. Neither the CI nor the OST provided alleged facts or expert opinion in support of their contention at the time it was made.⁶³³ In finding Contention 12 admissible in part, the Board acknowledged that contentions

⁶²⁸ *Id.* at 98-99 (citing Ex. NRC-045 at G-215). While the EA does not explicitly tier from the GEIS in its discussion of wind impacts, the GEIS is still a source of information for the Staff's site-specific environmental review of an ISR project. Ex. NRC-045 at 1-28.

⁶²⁹ Ex. NRC-045 at G-215; *see also* Ex. NRC-001-R at 99.

⁶³⁰ Ex. NRC-009 at 158.

⁶³¹ Tr. at 1998, 2002-03 (Goodman).

⁶³² *Id.* (Goodman).

⁶³³ CI New Contentions at 96; OST New Contentions at 108.

of omission do not require the support of alleged facts or expert opinions.⁶³⁴ This standard applies only at the contention admissibility stage, however; once a contention has been admitted for hearing, the Intervenor bears the burden of coming forward with sufficient evidence to establish a prima facie case that the EA is legally deficient.⁶³⁵ The Intervenor has failed to support their allegation with any evidence to show that the omission of a discussion in the EA of the foreseeable impact of tornadoes on the facility is inconsistent with the dictates of NEPA.

6.199. In addition, we find reasonable the Staff's determination, in accordance with NUREG-1748 and the ISR GEIS, that there is no site-specific reason to include a specific discussion of the potential environmental impacts from a tornado at the CBR site.⁶³⁶ Therefore, based on the preponderance of the evidence before the Board, we resolve this portion of Contention 12 in favor of the Staff and CBR.

2. Impacts Related to Selenium in Treated Process Wastewater Applied to the Land

6.200. In support of their claim that the EA inadequately discusses the potential impacts of selenium contamination from land application of ISR mining wastewater, the Intervenor proffered a letter from the FWS to the NRC, dated September 5, 2007, on the topic of selenium contamination associated with ISR mining.⁶³⁷ The letter conveys comments on the draft ISR GEIS that was in development by the NRC at the time, and relies on a study of the effects of land application of ISR wastewater at an ISR facility in Wyoming, which was also provided in

⁶³⁴ LBP-15-11 at 437 (citing Calvert Cliffs 3 Nuclear Project, LLC, and Unistar Nuclear Operating Services, LLC (Calvert Cliffs Nuclear Power Plant, Unit 3), LBP-09-4, 69 NRC 170, 190 (2009)).

⁶³⁵ See *Amergen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-09-7, 69 NRC 235, 269 (2009) (“[W]here . . . one of the other parties contends that, for a specific reason . . . the permit or license should be denied, that party has the burden of going forward with evidence to buttress that contention.”).

⁶³⁶ Ex. NRC-001-R at 98-99.

⁶³⁷ Ex. INT-018.

support of this contention.⁶³⁸ This study, which was conducted at the Highland ISR site in Converse County, Wyoming, concluded that application of ISR wastewater containing elevated levels of selenium on a grassland can lead to bioaccumulation of selenium in the food chain, including red-winged blackbirds, lark buntings, and western meadowlarks.⁶³⁹

6.201. In its testimony, the Staff challenged the applicability of the study to the CBR site. The Staff asserted that the environmental conditions reported in this study did not support a conclusion that there would be comparable impacts at the CBR facility.⁶⁴⁰ First, the Staff noted that the levels of selenium reported in the FWS at the Highland site greatly exceeded the enforceable MCL limit of 0.05 mg/L for selenium in process wastewater applicable to land application at the CBR site.⁶⁴¹ Specifically, the study's authors documented that the selenium concentrations ranged from 340–450 mcg/L (0.34–0.45 mg/L) in eight water samples taken from the center pivot irrigator, which is nearly an order of magnitude greater than CBR's MCL.⁶⁴²

6.202. In addition, the Staff explained that selenium is present in much higher concentrations at all stages of the ISR process at the Highland site as compared to the CBR site.⁶⁴³ The Staff provided evidence to show that the average post-mining value for selenium at Highland A-Wellfield was 0.990 mg/L, whereas the comparable value for selenium at CBR Mine Unit 1 was 0.124 mg/L.⁶⁴⁴ The average value for selenium in ground water at the end of restoration at Highland A-Wellfield was 0.070 mg/L, whereas the comparable value for selenium

⁶³⁸ See Ex. INT-018 at 1-2 (citing Ex. INT-019).

⁶³⁹ Ex. INT-019 at 16; Ex. INT-048 at 20; see *a/so* Ex. NRC-001-R at 103.

⁶⁴⁰ Ex. NRC-001-R at 103.

⁶⁴¹ *Id.* at 104.

⁶⁴² *Id.* at 104; Ex. INT-019 at 13.

⁶⁴³ Ex. NRC-001-R at 104 (citing Ex. NRC-016 at 19-21).

⁶⁴⁴ *Id.* (citing Ex. NRC-016 at 19, 21).

at the end of restoration at CBR Mine Unit 1 was less than 0.002 mg/L.⁶⁴⁵ The Staff also testified that the values reported for selenium at Highland A-Wellfield greatly exceed those reported at another Wyoming facility, the Ruth Pilot R&D study.⁶⁴⁶ The Staff asserted that these data suggest that the results of the FWS study of the Highland project were not clearly indicative of environmental impacts to be expected at the CBR site.⁶⁴⁷

6.203. On balance, we agree with the Staff that FWS study does not compel a finding that the EA is deficient for failing to discuss selenium specifically in the context of environmental impacts of land application, nor that it impels a change in the EA's conclusion that such impacts would be greater than SMALL. While we agree with the Intervenor that the FWS study suggests that bioaccumulation can occur from the application of selenium in process wastewater to the land, it is not apparent that selenium will be present in the treated process wastewater at the CBR site in concentrations sufficient to cause noticeable or destabilizing environmental effects.⁶⁴⁸ Moreover, the Staff noted that the information in the FWS study was considered by the NRC in its preparation of the final ISR GEIS. The Staff stated in its testimony that the letter from FWS provided comments as input on the draft GEIS, and as a result, the Staff considered the information from the FWS based on the Highland study in its preparation of the final GEIS.⁶⁴⁹ The GEIS discusses the potential environmental impacts of land application on ecological resources and concludes they will be small.⁶⁵⁰ Thus, having considered this very information in an assessment of environmental effects related to land application of selenium in

⁶⁴⁵ *Id.* (citing Ex. NRC-016 at 19, 21).

⁶⁴⁶ *Id.* (citing Ex. NRC-016 at 19, 22).

⁶⁴⁷ *Id.*

⁶⁴⁸ *See* Ex. NRC-010 at viii.

⁶⁴⁹ Ex. NRC-001-R at 104-05 (citing Ex. NRC-045 at A-13).

⁶⁵⁰ *Id.* (citing Ex. NRC-045 at 4.2-34, 4.2-62).

a generic setting, the NRC has previously determined that the impacts of selenium in treated process wastewater applied to the land would cause only small environmental effects. Given this, in addition to the low levels of natural selenium present at the CBR site as compared to the Highland site, we find no reason to upset the Staff's analysis or conclusions in the EA on the basis of the FWS study.

6.204. The Intervenor raised further claims regarding the impacts of selenium through the testimony of Ms. McLean, who asserted that “[t]he impacts of selenium on humans and wildlife if Crow Butte uses land application of mining wastes are material, adverse and potentially fatal to humans and wildlife exposed to selenium.”⁶⁵¹ The Intervenor stated that a water concentration of 10 mcg/L in water can increase to “over 5,000 times that amount” in the tissues of fish, and can cause harmless levels of selenium to reach toxic levels.⁶⁵² They claimed that selenium, as well as other toxic metals, would become concentrated in the area of wastewater discharge “for time immemorial,” and as a result of large volumes of wastewater generated and large surface area contaminated no effective and safe economical method of remediation and reclamation. They further asserted that any plants that are able to grow despite the toxicity of the land would be too contaminated to use for feeding.⁶⁵³

6.205. The Staff testified, however, that pursuant to Condition 10.17 of CBR's license, the concentration of selenium in the process wastewater that CBR is permitted to dispose of by land application cannot exceed a level equivalent to the EPA's maximum contaminant levels (MCLs) for selenium in drinking water.⁶⁵⁴ As the Staff explains, the EPA has set an MCL for selenium at 0.05 mg/L, which is based on the best available science to prevent potential health

⁶⁵¹ Ex. INT-048 at 19.

⁶⁵² *Id.* at 22.

⁶⁵³ *Id.* at 23.

⁶⁵⁴ Ex. NRC-001-R at 101-02; *see also* Ex. NRC-012 at 9-10.

problems.⁶⁵⁵ The EPA's enforceable MCL for selenium is equal to the EPA's health goal for selenium in drinking water, which is based solely on possible health risks and exposure over a lifetime with an adequate margin of safety.⁶⁵⁶ Additionally, CBR testified that the reverse osmosis equipment that would be used to remove contaminants from the wastewater is capable of reducing selenium concentrations to <0.001 mg/L.⁶⁵⁷ In light of these requirements, we do not find sufficient evidence to adopt the Intervenors' premise regarding the impacts of selenium at the Crow Butte site.

6.206. The Staff and CBR also noted that CBR possesses an NPDES permit for land application issued and enforced by the NDEQ.⁶⁵⁸ CBR testified that its NPDES permit prohibits land-applied treated wastewater from entering waters of the State under any circumstances, and to that end, directs that CBR can only use land application during or immediately after wet weather events and only under the condition that CBR "takes all reasonable steps during and after each precipitation event to treat or contain the wastewater discharge and to limit the amount of overflow or excess discharges."⁶⁵⁹ CBR's NPDES permit specifies a number of requirements concerning the condition of the land on which the wastewater can be applied and requires CBR to prepare a best management practices plan for land application.⁶⁶⁰ The Staff explained in the EA that CBR is subject to this NPDES permit and must apply for additional permits from the State of Nebraska for any activities not covered under the permit.⁶⁶¹

⁶⁵⁵ Ex. NRC-001-R at 102 (citing Ex. NRC-064 at 3).

⁶⁵⁶ Ex. NRC-001-R at 102 (citing Ex. NRC-065 at 1).

⁶⁵⁷ Ex. CBR-010 at 5-6; *see also* Tr. at 1941-41 (Teahon).

⁶⁵⁸ Ex. NRC-001-R at 100; Ex. CBR-010 at 7-8.

⁶⁵⁹ Ex. CBR-010 at 7 (citing Ex. CBR-043).

⁶⁶⁰ Ex. CBR-043 at 3-4.

⁶⁶¹ Ex. NRC-010 at 12. The Staff also noted in the EA that CBR has no current plans to use land application at the site. *Id.* CBR confirmed that it does not intend to use land application and that it does not currently have the infrastructure in place to utilize this method of disposal. Tr. at 1918-19, 1923,

6.207. We find that it is appropriate for the Staff to give substantial weight to NDEQ's decision that issuing the permit would be environmentally acceptable.⁶⁶² Although CBR is not required by the terms of its NPDES permit to conduct biological monitoring in conjunction with the land application of treated process wastewater,⁶⁶³ we are satisfied that there are sufficient protections in place to protect against the environmental impacts that concern the Intervenors in this contention.

6.208. Regarding the Intervenors' claim that the EA must include a description of the environmental impacts of selenium from land application, we find persuasive the Staff's argument that the EA's assessment of the potential environmental impacts of restoration, including land application of treated process wastewater, is bounding for all constituents that may be present in the treated wastewater, including selenium; by describing the impacts associated with the disposal of treated process wastewater, the EA accounts for the impacts associated with each constituent present in that water.⁶⁶⁴ We do not find that it would serve the purposes of NEPA to require the Staff in its EA to separately assess each constituent present in the treated process wastewater.⁶⁶⁵ Nor are we persuaded that a specific assessment of

1929, 1931-32 (Teahon). CBR also testified that to do so would require a license amendment from the NRC for the wastewater treatment facility and a change to their surety bond. Tr. at 1929-30 (Teahon).

⁶⁶² *Public Serv. Co. of New Hampshire* (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503, 527 (1977) ("The fact that a competent and responsible state authority has approved the environmental acceptability of a site or a project after extensive and thorough environmentally sensitive hearings is properly entitled to 'substantial weight' in the conduct of our own NEPA analysis. . . . Such limited reliance is clearly acceptable under NEPA.") (citations omitted).

⁶⁶³ Tr. at 1946-47 (Teahon).

⁶⁶⁴ Ex. NRC-001-R at 101.

⁶⁶⁵ Courts may not "flyspeck" an agency's environmental analysis, looking for any deficiency, no matter how minor. See, e.g., *Fuel Safe Washington v. FERC*, 389 F.3d 1313, 1323 (10th Cir. 2004) (describing the court's inquiry as "deciding whether claimed deficiencies in a FEIS are merely flyspecks, or are significant enough to defeat the goals of informed decision making and informed public comment") (quotation marks omitted); *Half Moon Bay Fishermans' Mktg. Ass'n v. Carlucci*, 857 F.2d 505, 508 (9th Cir. 1988) ("The reviewing court may not 'flyspeck' an EIS.").

selenium in the EA would cause the Staff to alter its conclusion that the potential environmental impacts from restoration would be SMALL.⁶⁶⁶

6.209. Finally, the Intervenors raised a number of additional claims regarding the impacts of land application on the environment. They specified several consequences of selenium and other heavy metals on human health and wildlife, stating at times that these health impacts result from “low levels” of selenium and other heavy metals in the organism⁶⁶⁷ and at other times from “high levels” of these metals.⁶⁶⁸ They alleged that “land application for wastewater is destined for environmental contamination that will never be able to be remediated,”⁶⁶⁹ and further, that “[t]he subsequent plants grown, if they are able to grow at all from the toxicity, would be far too contaminated to be used for any feeding.”⁶⁷⁰ They also testified that “a water concentration of 10 ug/L . . . can increase to over 5,000 times that amount in fish tissues.”⁶⁷¹ As these claims are unsupported or nonspecific to the level of selenium that is permitted for land application, however, we agree with the Staff that they do not provide useful information for the Staff’s assessment of the potential environmental impacts of land application of treated process wastewater at the CBR site.⁶⁷²

⁶⁶⁶ See Ex. NRC-010 at 73, 94-98.

⁶⁶⁷ Ex. INT-048 at 9, 15, 18, 19, 22.

⁶⁶⁸ *Id.* at 8, 9, 12, 14, 15, 19-20, 24.

⁶⁶⁹ *Id.* at 20.

⁶⁷⁰ *Id.* at 23.

⁶⁷¹ *Id.* at 22.

⁶⁷² Ex. NRC-076-R2 at 76-78. Moreover, the Intervenors note that these impacts result from pathways other than the Crow Butte facility, including impacts from uranium acting in concert with calcium ions generated by ISR mining generally “as well as in runoff waters of the Rocky Mountains over old uranium open pit mines” and “legal dumping” of arsenic “into commercial fertilizers from mining and ore smelting waste since 1976.” Ex. INT-048 at 10, 14.

6.210. Therefore, based on the preponderance of the evidence before the Board, this portion of Contention 12 is also resolved in favor of the Staff and CBR.

I. Contention 14

6.211. In Contention 14, the Intervenors assert that the Staff violated NEPA and several NRC regulations⁶⁷³ by failing to provide an analysis of impacts from earthquakes, especially as it concerns secondary porosity and adequate confinement.

6.212. The Intervenors first asserted that Section 3.4.3 of the EA fails to identify two earthquakes that occurred in South Dakota in 2011 and were felt in Crawford, Nebraska.⁶⁷⁴ Section 3.4.3 of the EA includes a brief description of typical seismic activity and the level of seismic hazard in the vicinity of the CBR facility. The EA notes that the facility is located in the “Stable Interior” of the United States, and provides information on historical earthquakes in Nebraska, including reported modified Mercalli index (MMI) values at the epicenters.⁶⁷⁵

6.213. The Intervenors were correct that the EA does not discuss the two earthquakes they identified. However, the Intervenors provided no testimony or exhibits on this issue to explain the significance of this omission.⁶⁷⁶

6.214. The Staff 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.⁶⁷⁷ This exhibit is based on information from the USGS earthquake database and NUREG-2115, a compilation of earthquake data in the Central

⁶⁷³ 10 C.F.R §§ 51.10, 51.70, and 51.71. The Staff notes that 10 C.F.R. §§ 51.70 and 51.71 pertain to EISs, not EAs.

⁶⁷⁴ OST New Contentions at 115. Although not an issue raised by the Intervenors, we suggested in LBP-15-11 that “the EA analysis might also be incomplete because it only reviewed earthquakes recorded in Nebraska, neglecting earthquakes felt in nearby states.” LBP-15-11 at 448.

⁶⁷⁵ Ex. NRC-001-R at 106-107.

⁶⁷⁶ *Clinton ESP*, CLI-05-29, 62 NRC at 811.

⁶⁷⁷ Ex. NRC-066.

and Eastern United States.⁶⁷⁸ Based on this information, the Staff testified that the two 2011 South Dakota earthquakes cited by the intervenors occurred approximately 25 miles from the CBR facility, and had magnitudes and depths typical of earthquakes in the region and typical of those reported in the EA.⁶⁷⁹

6.215. At the hearing, the Staff acknowledged that the EA would have been improved had these earthquakes been included.⁶⁸⁰ The Staff explained, however, that including information on the two earthquakes would not have significantly changed the characterization of typical seismic activity in the area.⁶⁸¹ The magnitudes of the two 2011 earthquakes identified by the intervenors correspond to MMI values of III and IV, which are within the range of MMI values for earthquakes reported in Table 3-8 of the EA.⁶⁸² Thus, in the Staff's view, the EA provided sufficient information for the public to understand the seismic activity and seismic hazards near the CBR facility even without the information concerning the 2011 earthquakes cited by the intervenors.⁶⁸³

6.216. Similarly, the Staff testified that providing information on all earthquakes within 100 miles of the site, regardless of geographic boundary, would likewise not significantly change the characterization of seismic activity.⁶⁸⁴ Again, the Staff acknowledged that including such

⁶⁷⁸ The Commission has described NUREG-2115 as "a key input to a probabilistic seismic hazard analysis." *DTE Elec. Co. (Fermi Nuclear Power Plant, Unit 3)*, CLI-15-13, 81 NRC 555, 571 n.93 (Apr. 30, 2015). NUREG-2115 "includes consideration of an up-to-date database, full assessment and incorporation of uncertainties, and the range of diverse technical interpretations from the larger technical community." *Id.*

⁶⁷⁹ Ex. NRC-001-R at 107-108.

⁶⁸⁰ Tr. at 1656 (Cao).

⁶⁸¹ Ex. NRC-001-R at 107-108; Tr. at 1656-57 (Cao).

⁶⁸² Ex. NRC-001-R at 107-108.

⁶⁸³ *Id.* at 108.

⁶⁸⁴ *Id.* at 108-109; Tr. at 1660-62 (Cao).

information would have improved the EA, and that distance from a facility is a better criterion than geographic boundaries. But the Staff also concluded that the EA still provides sufficient information regarding seismic activity and hazards near the CBR facility to satisfy NEPA requirements.

6.217. Once a contention has been admitted for hearing, the Intervenor bears the burden of coming forward with sufficient evidence to establish a prima facie case that the EA is legally deficient.⁶⁸⁵ We find that the Intervenor has failed to come forward with any evidence showing that the omission of two recent earthquakes from the discussion in Section 3.4.3 of the EA has any significant, material effect on the sufficiency of that discussion for NEPA purposes.

6.218. We also find that, although the EA would have been improved by including information regarding the two recent earthquakes, such a discussion would not have materially changed the seismology discussion in the EA in terms of its characterization of seismic activity and hazards in the vicinity of the CBR facility. As we noted above, the Intervenor provided no testimony to refute the Staff's explanation, and has thus failed to demonstrate the materiality or significance of this omission. We therefore find the Staff's description of seismology in Section 3.4.3 of the EA meets the NEPA "hard look" requirement despite the omission of the two recent earthquakes.

6.219. The Intervenor also asserted that the Staff failed to take a "hard look" at impacts of earthquakes on secondary porosity. The Intervenor, through Dr. LaGarry, alleged that "even small earthquakes represent flexing and shifting of the earth's crust, and are continuously creating, closing and redistributing the secondary porosity of the region's rocks and changing the flow pathways of the region's groundwater."⁶⁸⁶ Other than this statement by Dr. LaGarry,

⁶⁸⁵ See *Oyster Creek*, CLI-09-7, 69 NRC at 269.

⁶⁸⁶ Ex. INT-013 at 3.

which was provided in support of contention admissibility, the Intervenors provided no testimony or exhibits to support this assertion.

6.220. In its testimony, the Staff responded to Dr. LaGarry's assertion by discussing several reasons why it is highly unlikely for small earthquakes such as the two 2011 earthquakes in South Dakota to cause permanent changes in permeability in the mined aquifer (the Basal Chadron Sandstone) or the upper or lower confining layers at the CBR facility.⁶⁸⁷ The Staff explained the distinction between porosity and permeability, emphasizing that permeability, not porosity, determines whether and to what extent fluid migration will occur in porous rocks.⁶⁸⁸ The Staff also explained why an increase in porosity does not necessarily lead to an increase in permeability.⁶⁸⁹

6.221. The Staff discussed two reasons why it is highly unlikely that a small earthquake would affect permeability and confinement. First, the Staff explained that earthquakes typical of this region do not have sufficient energy to cause a rupture within the mined aquifer (Basal Chadron Sandstone) or its upper or lower confining units.⁶⁹⁰ Second, the Staff explained that the ground shaking associated with typical earthquakes in the region cannot generate stresses sufficient to cause fracture.⁶⁹¹

6.222. Finally, the Staff testified that the impacts from earthquakes on confinement are implicitly considered in the Staff's discussion of confinement in Section 3.5.2.3.2 of the EA.⁶⁹² As explained in the Staff's testimony, although a number of small earthquakes have occurred

⁶⁸⁷ Ex. NRC-001-R at 109-114.

⁶⁸⁸ *Id.* at 109.

⁶⁸⁹ *Id.* at 109-110.

⁶⁹⁰ *Id.* at 111-12.

⁶⁹¹ *Id.* at 112-14.

⁶⁹² Ex. NRC-010 at 38.

within 100 miles of the CBR facility since it began operating,⁶⁹³ there has been no evidence from excursion monitoring, pumping tests, or water quality data indicating changes in the confinement of the mined aquifer.⁶⁹⁴ CBR similarly testified that seismically induced changes or interconnectivity between aquifers would be noticed in flow changes in production and injection wells.⁶⁹⁵

6.223. When asked at the hearing to provide evidence showing changes in flow patterns due to earthquakes, Dr. LaGarry testified that Chadron Creek suddenly went dry in 2007.⁶⁹⁶ However, he stated that the “exact cause of this was still under investigation.”⁶⁹⁷ Dr. Lagarry provided no evidence of an earthquake preceding this event.

6.224. Finally, the Staff explained in its testimony that the thick clay layers above the Basal Chadron are saturated and would “self heal” in the highly unlikely event of an earthquake large enough to cause a fracture in those layers.⁶⁹⁸ At the hearing, Dr. LaGarry disagreed that the overlying Chadron formation is self-healing, but did not explain further.⁶⁹⁹ In response, the Staff suggested that if faults are being created during earthquakes as Intervenors allege, they would have to be self-healing, because there is no evidence of faulting in the License Area.⁷⁰⁰

6.225. Based on the record before us, we find that despite the occurrence of several small earthquakes since the CBR facility began operations, there is no evidence that small

⁶⁹³ Ex. NRC-066 at 1-2.

⁶⁹⁴ Ex. NRC-001-R at 114-15.

⁶⁹⁵ Tr. at 1668 (Teahon).

⁶⁹⁶ *Id.* at 1665 (LaGarry).

⁶⁹⁷ *Id.* at 1667 (LaGarry).

⁶⁹⁸ Ex. NRC-001-R at 115.

⁶⁹⁹ Tr. at 1131 (LaGarry).

⁷⁰⁰ *Id.* at 1132-33 (Back).

earthquakes have caused any changes in permeability or confinement of the Basal Chadron Sandstone aquifer at or near the CBR site. In addition, we find that the Staff has provided credible physical explanations for why small earthquakes will not cause fracturing of rocks within the Basal Chadron Sandstone aquifer or the upper and lower confinement, and, therefore, that changes in permeability due to typical earthquakes in the area are highly unlikely.

6.226. Therefore, we find by a preponderance of the evidence that the Staff adequately addressed seismology in its environmental review despite failing to discuss in the EA the two 2011 earthquakes cited by the Intervenors. We also find that there is no evidence in the record demonstrating that earthquakes have caused environmental impacts, such as contamination of ground water, or that future impacts would result from typical earthquakes in the area. We therefore find that it was unnecessary for the Staff to include a specific discussion of earthquake impacts in the EA, and that the Staff's consideration of earthquakes meets the requirements of NEPA. Accordingly, we resolve Contention 14 in favor of the Staff and CBR.

VII. CONCLUSIONS OF LAW

7.1 The Board has considered all of the evidence presented by the parties on Contentions A, C, D, F, 1, 6, 9, 12 and 14. Based upon a review of the entire record in this proceeding, and based upon the findings of fact set forth above, which are supported by reliable, probative and substantial evidence in the record, the Board has decided all matters in controversy concerning these contentions, and reaches the following conclusions.

7.2 This Board finds that the Staff's EA complies with the requirements of NEPA. We find that the EA adequately analyzed the impacts of the biweekly monitoring frequency for perimeter monitoring wells and the impacts associated with the use of the excursion indicator parameters currently required by CBR's license.

7.3 We find that the Staff's review of potential impacts to surface waters, including the White River, and its conclusion that such impacts would be SMALL, complied with the requirements of NEPA.

7.4 We find that the Staff's review of potential impacts to ground water quality, including its assessment of whether there is interconnection among aquifers, and its conclusion that such impacts would be SMALL, complied with the requirements of NEPA. We also find that the Staff appropriately applied its EJ guidance and determined there would be no "disproportionately high and adverse" impacts to residents of the Pine Ridge Reservation. We therefore find that the Staff's analysis of EJ, including its consideration of cumulative impacts, complied with NEPA.

7.5 We find that the Staff, in its review of site geology and hydrogeology, appropriately considered recent research related to geology and therefore complied with the requirements of NEPA.

7.6 We find that the Staff's analysis of potential impacts to cultural resources complied with the NHPA and NEPA. We find that the Staff meaningfully consulted with the OST on a government-to-government basis, offering the OST a reasonable opportunity to identify its concerns about historic properties, to advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, and to articulate its views on the undertaking's effects on such properties. We further find that the Staff's critical review of information from previous cultural resources inventories, relevant literature, local expert contacts, site visits (including visits with Tribal members), and a Tribal-led TCP survey constitute a hard look at the potential for impacts to cultural resources.

7.7 We find that the Staff's conclusion that consumptive use due to CBR's aquifer restoration activities will have a no greater than MODERATE impact on ground water quantity reflects a hard look at CBR's historical and projected consumptive use rates, the available head in the Basal Chadron Sandstone aquifer, and the expected effects of drawdown in that aquifer. We therefore find that the Staff's conclusion complies with NEPA.

7.8 We find that because the EA explains that CBR will be required to restore ground water to the standard in 10 C.F.R. Part 40, Appendix A, Criterion 5B(5), the EA includes a

sufficient discussion of the mitigative effects CBR's aquifer restoration efforts will be required to have on ground water quality.

7.9 We find that the Staff and CBR presented evidence that demonstrates that the Staff, as required under NEPA, examined sufficient information on groundwater conditions at the Crow Butte site to support its assessment of the potential impacts of license renewal. We hold that the Intervenor has failed to establish that the Staff is required as a matter of law to consider additional information concerning the impacts of tornadoes or selenium from land application to support its environmental review of this licensing action.

7.10 We find that the Staff and CBR presented evidence that demonstrates that the Staff, as required under NEPA, examined sufficient information on seismology and potential impacts of earthquakes at the CBR facility to support its assessment of the potential impacts of license renewal. We hold that the Intervenor has failed to establish that the Staff is required as a matter of law to consider additional information concerning the impacts of earthquakes to support its environmental review of this licensing action.

7.11 We therefore affirm that the Staff's environmental review, and its EA and FONSI, comply with the requirements of NEPA, and we hereby resolve Contentions A, C, D, F, 1, 6, 9, 12 and 14 in favor of the Staff and CBR.

Respectfully submitted,

/Signed (electronically) by/

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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
)	
(License Renewal for the In Situ Leach)	ASLBP No. 08-867-02-OLA-BD01
Facility, Crawford, Nebraska))	

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing "NRC STAFF'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW" in the above-captioned proceeding have been served this 23rd day of November, 2015, via the Electronic Information Exchange (EIE), and via e-mail to David Frankel and Thomas Ballanco, counsels for Consolidated Intervenors, which to the best of my knowledge resulted in transmittal of the foregoing to those on the EIE Service List for the above captioned proceeding.

Signed (electronically) by

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