

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:

AREVA ENRICHMENT SERVICES LLC

(Eagle Rock Enrichment Facility)

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Docket No. 70-7015-ML

APPLICANT'S PROPOSED FINDINGS OF FACT AND
CONCLUSIONS OF LAW ON UNCONTESTED ENVIRONMENTAL ISSUES

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August 12, 2011

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I. INTRODUCTION

1.1. This Final Initial Decision pertains to the application by AREVA Enrichment Services LLC (“AES” or “Applicant”) to the U.S. Nuclear Regulatory Commission (“NRC”) for a license to construct and operate a uranium enrichment facility — designated the Eagle Rock Enrichment Facility (“EREF”) — near Idaho Falls, Idaho. In particular, this decision involves Atomic Safety and Licensing Board (“Board”) review of the environmental considerations specified in paragraph II.E of the Commission’s “Notice of Hearing and Commission Order” (“Hearing Notice and Order”), which was published in the *Federal Register* on July 30, 2009.¹ The Board is considering uncontested “environmental” issues and uncontested “safety” issues on separate tracks. The Board issued its decision on uncontested safety issues in LBP-11-11, dated April 8, 2011. This is the final decision by the Board in this proceeding, which authorizes the NRC Staff to issue a Part 70 license for the EREF.

1.2. In accordance with Section II.F of the Hearing Notice and Order, the Board must address those environmental considerations that were not the subject of any

¹ 74 Fed. Reg. 38052 (July 30, 2009).

contested proceeding. Here, there was in fact no contested proceeding and therefore this final initial decision will be the sole decision related to environmental considerations. To fulfill its responsibilities in this uncontested proceeding, the Board presents below its findings of fact on the environmental matters identified by the Commission in its Hearing Notice and Order. With respect to those topics upon which the Board sought clarification from the NRC Staff or AES during the July 2011 mandatory hearing session, the Board elaborates as needed upon the rationale for certain of its findings. As set forth below, based upon its findings, the Board also makes appropriate conclusions of law.

1.3. The Board finds that the application and the record of the proceeding contain sufficient information, and that the review of the application by the NRC Staff has been adequate, to support the findings to be made by the Director of the Office of Nuclear Material Safety and Safeguards (“NMSS”) with respect to the applicable standards in 10 C.F.R. Part 51 and the Commission’s Notice and Hearing Order. The Board also concludes that that the requirements of Sections 102(2)(A), (C), and (E) of the National Environmental Policy Act (“NEPA”) have been satisfied; that an independent weighing and balancing of the environmental, technical, and other costs and benefits of the proposed facility supports issuance of the license; and that the license should be issued.

1.4 Accordingly, the Board orders herein that the Director of NMSS is authorized to issue the license for which application was made by AES.

II. PROCEDURAL BACKGROUND

2.1. By application filed December 30, 2008, AES seeks a license to possess and use source, byproduct, and special nuclear material in order to enrich natural uranium to a maximum of five percent uranium-235 by the gas centrifuge process. AES proposes to construct

and operate the proposed EREF near Idaho Falls, Idaho, for that purpose. The requested license, if granted, would be issued under 10 C.F.R. Parts 30, 40, and 70, and be for an initial term of thirty years.

2.2. On July 30, 2009, the Commission provided notice of the receipt and availability of the AES license application and of the opportunity for a hearing on the application. The Hearing Notice and Order, as published in the *Federal Register* (74 Fed. Reg. 38052), provided interested persons with the opportunity to participate as parties in the proceeding by filing a written petition for leave to intervene in accordance with the provisions of 10 C.F.R. § 2.309.² No interested person requested a hearing on the AES application.

2.3. In February 2011, the NRC Staff published the Final Environmental Impact Statement for the Eagle Rock Facility in Bonneville County, Idaho (NUREG-1945) (“FEIS”). Exhs. NRC000134, NRC000135.

2.4. On April 15, 2011, the Board issued a Memorandum and Order (Initial Board Questions Regarding Environmental-Related Matters and Associated Administrative Directives). Both AES and the NRC Staff provided written responses to these questions on May 2, 2011. Exhs. AES000064, NRC000136.

2.5. On April 22, 2011, the Board issued a Memorandum and Order (Second Set of Board Questions Regarding Environmental-Related Matters). Both AES and the NRC Staff provided written responses to these questions on May 9, 2011. Exhs. AES000079, NRC000170.

² As discussed further below, in the Hearing Notice and Order, the Commission also addressed the nature of the hearing to be conducted on the AES license application. The Commission identified the specific matters of fact and law to be considered by the Board. The Commission also provided guidance on certain procedural matters and applicable regulatory requirements.

2.6. On May 12, 2011, the Board issued a Memorandum and Order (Third Set of Board Questions Regarding Environmental-Related Matters). Both AES and the NRC Staff provided written responses to these questions on May 27, 2011. Exhs. AES000095, NRC000176.

2.7. On May 23, 2011, the Board issued a Memorandum (Site Visit Information) regarding a site visit to the proposed EREF site in connection with the hearing on uncontested environmental issues.

2.8. On June 2, 2011, the Board issued a Memorandum and Order (Providing Presentation Topics, Additional Questions, and Administrative Directives Associated with Mandatory Hearing on Environmental Matters). The Order contained additional questions for the parties and identified presentation topics for the environmental portion of the uncontested proceeding. AES and the NRC Staff filed responses to the additional questions on June 16 and June 17, 2011, respectively. Exhs. AES000099, NRC000184. On June 2, 2011, the Board also issued a Memorandum and Order (Updated General Schedule), which included a schedule and associated administrative directives related to the uncontested hearing on environmental issues, and a Notice of Hearing (Notice of Evidentiary Hearing and Opportunity to Provide Oral and Written Limited Appearance Statements).

2.9. On July 12 and July 13, 2011, the Board convened the environmental-related portion of the uncontested hearing in Idaho Falls, Idaho. Pursuant to the Board's request, AES and the NRC Staff made expert witnesses available and gave presentations on the following environmental topics: Purpose and Need for the Proposed Action, Preconstruction Activities, Greenhouse Gas Impacts of Facility's Production Power Consumption, Construction and Preconstruction Air Quality Impacts, Radiological Effluent Monitoring Program, and

Historic/Cultural Resources Memorandum of Agreement and Associated Mitigation Measures. These presentations and other exhibits, including the FEIS and the written responses to the Board's questions, were admitted into evidence at the hearing.

2.10. Subsequent to the July 2011 hearing, the Board issued an order relating to various administrative matters (*e.g.*, transcript corrections). *See* Memorandum and Order (Adopting Transcript Corrections; Admitting Additional NRC Staff Exhibits; Closing the Evidentiary Record of Mandatory Proceeding), dated August 2, 2011.

2.11. In accordance with the Board's schedule for the environmental-related portion of the uncontested hearing, on August 12, 2011, AES and the NRC Staff submitted their proposed findings of fact and conclusions of law.

III. LEGAL STANDARDS GOVERNING THE BOARD'S REVIEW

3.1. Sections II.D through II.F of the Hearing Notice and Order describe the legal determinations that the Board must make as part of the hearing on uncontested issues. As set forth in Section II.D, with respect to uncontested matters, the Board is to determine, without conducting a *de novo* review of the license application:

(1) whether the application and record of the proceeding contain *sufficient information* to support license issuance and whether the NRC staff's review of the application has been *adequate to support findings* to be made by the Director of the Office of Nuclear Materials Safety and Safeguards, with respect to the matters set forth in paragraph C of this section, and (2) whether the review conducted by the NRC staff pursuant to 10 CFR Part 51 *has been adequate*.

74 Fed. Reg. at 38054 (emphasis added). Section II.C of the Hearing Notice and Order, in turn, states that:

The matters of fact and law to be considered are whether the application satisfies the standards set forth in this Notice and Commission Order and the applicable standards in 10 CFR parts 30, 40 and 70, and whether the requirements of NEPA and the NRC's implementing regulations in 10 CFR part 51 have been met.

74 Fed. Reg. at 38054. With respect to NEPA or Part 51 issues in particular, Section II.E provides that the Board must:

[D]etermine whether the requirements of sections 102(2)(A), (C), and (E) of NEPA and Subpart A of 10 CFR part 51 have been complied with in the proceeding; independently consider the final balance among conflicting factors contained in the record of proceeding with a view to determining the appropriate action to be taken; and determine, after weighing the environmental, economic, technical, and other benefits against the environmental and other costs, and considering reasonable alternatives, whether a license should be issued, denied, or conditioned to protect environmental values.

Id. As the Hearing Notice and Order further states, this Board obligation must be met irrespective of whether the proceeding involves contested issues. *See id.*

3.2. In Section II.F, the Commission explained that, to the extent that the Board has admitted intervenor contentions, the Board is to make the foregoing determinations only with respect to matters *not* covered by those contentions. *See id.* That is, in performing its “sufficiency” review of the application, the record, and the NRC Staff’s licensing determinations, the Board is not to revisit contested issues that it has resolved on the merits. As noted above, there were, however, no admitted contentions in this proceeding.

3.3. On March 18, 2005 the Chief Administrative Judge of the Atomic Safety and Licensing Board Panel certified to the Commission six questions concerning the NRC’s statutory duty to conduct a “mandatory hearing.”³ In answering those certified questions, the Commission provided additional guidance to its licensing boards with respect to the conduct of mandatory hearings. The Commission stated that:

[W]e expect licensing boards conducting mandatory hearings on uncontested issues to take an independent “hard look” at NRC staff safety and environmental findings, but not to replicate NRC staff work. Giving

³ *See* LBP-05-7, 61 NRC 188 (2005).

appropriate deference to NRC staff technical expertise, boards are to probe the logic and evidence supporting NRC staff findings and decide whether those findings are sufficient to support license issuance.⁴

In this regard, the Commission emphasized again that “the boards should conduct a simple ‘sufficiency’ review of uncontested issues, not a *de novo* review.”⁵ With respect to uncontested matters, the Board must merely “decide whether the *staff’s* review has been adequate to support [its] findings.”⁶

3.4. The Commission also provided guidance with respect to the scope of the Board’s review under NEPA. The Commission stated that the Board in this proceeding must conduct the “weighing” of the proposed facility’s environmental costs against its various economic, technical, and other benefits required by 10 C.F.R. § 51.105(a)(3).⁷ Additionally, the Commission confirmed that the Board must consider “reasonable alternatives” to the proposed action before deciding whether the license should be issued.⁸ However, the Commission clarified that in making the “independent judgments” required by NEPA and Section 51.105(a)(2), the Board should follow the approach spelled out in the D.C. Circuit’s seminal *Calvert Cliffs’* decision.⁹ While the Board must independently review the NRC Staff’s NEPA-

⁴ *Exelon Generation Co., LLC* (Early Site Permit for Clinton ESP Site) *et al.*, CLI-05-17, 62 NRC 5, 34 (2005).

⁵ *Id.* at 39.

⁶ *Id.* at 36 (emphasis in original) (citation omitted).

⁷ *Id.* at 44.

⁸ *See id.* at 47-49.

⁹ *See* CLI-05-17, 62 NRC at 44 (citing *Calvert Cliff’s Coordinating Comm. v. AEC*, 449 F.2d 1109 (D.C. Cir. 1971)).

related conclusions, it must do so “on the basis of the evidence in the record.”¹⁰ This means that the Board should not “second-guess underlying technical or factual findings made by the NRC Staff,” absent a Board finding that the NRC Staff’s review is incomplete or the NRC Staff’s findings are insufficiently explained in the record.¹¹ It is with the foregoing principles in mind that we make the findings of fact and conclusions of law set forth below.

IV. FINDINGS OF FACT

A. Adequacy of Review Conducted by NRC Staff Under 10 C.F.R. Part 51

4.1. The proposed EREF site is located in Bonneville County, Idaho, about 20 miles west-northwest of the city of Idaho Falls. The proposed EREF site is located on a 186-hectare (460-acre) section of a 1700-hectare (4200-acre) parcel of land that was previously native rangeland, non-irrigated seeded pasture, and irrigated cropland. The primary function of the facility will be to enrich natural uranium, in the form of UF₆, from its natural isotopic concentration of about 0.7 percent uranium-235 to 5 percent uranium-235. *See* Exh. NRC000134 at xxvii.

4.2. The scope of activities authorized under the license would include the construction, operation, and decommissioning of the proposed EREF. The FEIS evaluates the potential environmental impacts of preconstruction activities and of the proposed action, which is to construct, operate, and decommission the proposed EREF. Also, the FEIS describes the environment potentially affected by AES’s proposal, evaluates reasonable alternatives to the proposed action, describes AES’s environmental monitoring program and mitigation measures,

¹⁰ *Id.* at 45.

¹¹ *Id.*

and evaluates the costs and benefits of the proposed action. *See generally* Exhs. NRC000134 and NRC000135.

1. *Written Responses to ASLB Questions*

4.3. Upon completing its review of the FEIS, the Board sought additional information from the NRC Staff and AES on a number of environmental issues, including need for the facility, background surveys, historic preservation, impacts on recreational opportunities, accidents, greenhouse gas emissions, cylinder storage impacts, waste disposal, site selection, noise impacts, dose to workers, transportation impacts, air quality monitoring, and mitigation. The need for the facility, historic preservation, greenhouse gas emissions, and air quality monitoring were also the subject of oral presentations and testimony by NRC Staff and AES experts. For these topics, the responses to the written questions are discussed in Section IV.A.2 in conjunction with the testimony presented at the oral hearing.

4.4. In its April 15 Order, the Board sought information on the methodology for performing initial and final radiation surveys. Three AES experts — Nicholas Panzarino, Mark Strum, and Jim Kay¹² — explained that the initial site radiation survey determines the natural background radiation levels in the area of the proposed EREF. The final site radiological survey will measure radioactivity over the site for comparison to the original benchmark survey. The AES experts explained the sampling processes and scope for both initial and final surveys. Exh. AES000064 at 1. Collectively, soil samples have been taken (pre-construction samples) or will be taken (construction samples) in the same areas that will be designated survey units during decommissioning. To ensure that decommissioning surveys are representative of the areas being decontaminated or decommissioned, AES will follow the NUREG-1575, “Multi-Agency

¹² *See* Exhs. AES000069 (Panzarino Professional Qualifications), AES000014 (Strum Professional Qualifications), and AES000012 (Kay Professional Qualifications).

Radiation Surveys and Site Investigation Manual (MARSSIM),” Revision 1, guidance. *Id.*, citing Exh. AES000073. The MARSSIM approach represents a process that the NRC and EPA have endorsed for this purpose. MARSSIM is used to establish the survey units (both present and future), and the conduct of those surveys (prior to construction, during construction, and during decommissioning) ensures the surveys are representative and similar in scope to afford a proper comparative basis for making a decontamination decision. *Id.*

4.5. The Board also sought information on potential mitigation measures. April 15 Order, Attachment A, at 2; May 12 Order, Attachment A, at 4; June 2 Order at 6. The AES experts, Jim Kay and George Harper,¹³ explained that Tables 5-3 and 5-4 in the FEIS (Exh. NRC000134) summarized the potential mitigation measures recommended by the NRC for consideration during construction and operation of the EREF and provided a table indicating the mitigation measures that AES will implement. Exh. AES000064 at 5-6. The NRC Staff expert, Steve Lemont,¹⁴ explained that the mitigation measures identified by NRC and summarized in Tables 5-3 and 5-4 were suggestions on the part of the NRC Staff following its evaluation of the potential environmental impacts for the project, but were non-binding on AES and would not become license conditions. With regard to state and local agencies’ authority related to potential mitigation measures, the NRC expert explained that AES must comply with all applicable laws and regulations, including obtaining all appropriate construction and operating permits.

4.6. The NRC Staff expert stated that the mitigation measures to which AES originally committed were sufficiently protective of human health and the environment. Exh. NRC000176 at 5-9. The NRC Staff expert explained that it developed the additional potential

¹³ See Exhs. AES000011 (Harper Professional Qualifications) and AES000012 (Kay Professional Qualifications).

¹⁴ See Exh. NRC000155 (Lemont Professional Qualifications).

mitigation measures in FEIS Tables 5-3 and 5-4 as recommendations for two reasons: First, if implemented by AES, the additional measures could potentially serve to further reduce or avoid environmental impacts; second, in some cases, the additional measures were included in response to requests from other Federal and State agencies for additional mitigation measures and related actions. *Id.* The NRC expert also explained the reasons that the NRC Staff found AES's reasoning for not adopting certain measures related to roofing and wildlife protection to be reasonable. Finally, AES explained, in response to a question from the Board in its June 2, Order, that it will coordinate with Idaho Department of Fish and Game to determine corrective action or mitigation for the offsite public lands lost to wildlife due to project effects. Exh. AES000099 at 1, 5.

4.7. The Board also sought clarification regarding the number of visitors to Hells Half Acre Wilderness Study Area. April 15 Order, Attachment A, at 3. The NRC Staff expert, Daniel O'Rourke,¹⁵ explained that the NRC Staff contacted the Bureau of Land Management ("BLM") regarding visitor use. Mr. O'Rourke explained that the NRC Staff confirmed that the visitor use data provided in the ER were reflective of the past visitor use at Hells Half Acre. Exh. NRC000136 at 5. BLM also indicated that visitor use of Hells Half Acre in fiscal year 2008 was between 6,000 and 7,000, and visitor use in fiscal year 2009 was between 5,000 and 6,000. *Id.*

4.8. In response to another question by the Board regarding the designation status of Hells Half Acre and its treatment during the site selection process (*see* May 12, Order, Attachment A at 4), the AES experts, Robert Poyser, Ed Redente, and George Harper,¹⁶

¹⁵ *See* Exh. NRC000156 (O'Rourke Professional Qualifications).

¹⁶ *See* Exhs. AES000094 (Poyser Professional Qualifications); AES000084 (Redente Professional Qualifications); and AES000011 (Harper Professional Qualifications).

explained that National Natural Landmarks (“NNLs”) do not rise to the same level of sensitivity as other nationally-designated property types used to define the “Sensitive Properties” criterion in the site selection process. Exh. AES000095 at 1-2. The AES experts explained the differences in the manner in which NNLs are designated, owned, administered, and protected relative to other nationally-designated property types, such as National Parks, National Monuments, and National Forests. *Id.* For example, the NNL designation, by itself, does not afford special protections under federal law, and administration of the NNL Program does not provide mandatory protection status to NNL sites. *Id.* NNL status also does not constitute a federal land withdrawal, does not change the ownership of an area, does not dictate or limit activities within the area, and does not cause the designated area to become part of the National Parks, National Forest, or any other federal land management system. *Id.* NNL status also does not require or mandate, under Federal law, the development or application of any further State or local planning, zoning, or other land-use actions or decisions that would be afforded other nationally-designated lands (*e.g.*, National Parks, National Monuments, or National Forests). *Id.*

4.9. In its response to the Board’s June 2 Order, the NRC Staff discussed its review of the AES site selection process with respect to NNLs. Exh. NRCR00184 at 1. The NRC Staff explained that it looked to NRC Regulatory Guide 4.9, “Preparation of Environmental Reports for Commercial Uranium Enrichment Facilities, Revision 1,” October 1975 (“RG 4.9”) (Exh. NRC000188) and NUREG-1748, “Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Final Report,” August 2003 (Exh. NRCR00077). The NRC experts, Steve Lemont, Bruce Biber, and Daniel O’Rourke,¹⁷ explained that neither RG 4.9 nor NUREG-1748 specifically discussed NNLs. Although RG 4.9 discusses factors that should be

¹⁷ See Exhs. NRC000151 (Biber Professional Qualifications), NRC000155 (Lemont

considered by an applicant when comparing alternative sites in the plant siting process (*see* Exh. NRC000188, Chapter 7, 4.9-21 to 4.9-24), it does not specifically discuss NNLs.¹⁸ Consequently, AES had no applicable NRC regulatory guidance to follow for its site screening process and, therefore, on how to treat NNLs in its site screening process. The NRC Staff experts also stated that they were not aware of any previous site screening processes that considered NNLs in the screening process.

4.10. The Board sought information from the parties regarding the environmental impacts of accidents, including transportation accidents. April 15, Order, Attachment A, at 3. The NRC Staff experts, John Arnish and Kurt Picel,¹⁹ explained that the accident scenarios chosen for evaluation in the FEIS were a subset of the scenarios evaluated in the Integrated Safety Analysis (“ISA”). Exh. NRC000136 at 5-8. NRC Staff performing the safety evaluation of the application collaborated with staff conducting the environmental and security reviews to select accident scenarios that could be initiated by natural phenomena, operator error, and equipment failure and that would support evaluation of potential environmental and human health impacts as well as terrorist considerations. *Id.* at 7. The selected accident scenarios encompassed a diverse set of events and a spectrum of consequences, and were consistent in scope with previously performed evaluations of an enrichment facility application such as the one performed for the National Enrichment Facility in NUREG-1827,

Professional Qualifications), and NRC000156 (O’Rourke Professional Qualifications).

¹⁸ RG 4.9 does indicate that applicants should discuss the scenic and natural significance of the site and nearby areas, with specific attention to the sites and areas listed in the National Registry of Natural Landmarks, which includes NNL sites. *See* Exh. NRC000188 at 4.9-7. AES followed RG 4.9 by discussing NNL sites (and Hells Half Acre specifically) in the ER. Exh. AES000070.

¹⁹ *See* Exhs. NRC000150 (Arnish Professional Qualifications) and NRC000158 (Picel Professional Qualifications).

Appendix A (*see* Exh. NRC000055). Regarding the characterization of the impacts in the FEIS, the NRC Staff explained that its evaluation followed the ISA, which used different terminology, but that it was ultimately able to conclude that the EREF poses an acceptably low risk to workers, the environment, and the public. *Id.* at 8. However, the NRC Staff acknowledged that the text of FEIS Section 4.2.15.2 should have included the determination that impacts from accidents would range from SMALL to MODERATE. *See* NRC000134 at xl, 2-63, 4-110 to 4-111, and 7-5. We find this explanation acceptable and hereby amend the FEIS *pro tanto* to reflect this conclusion.

4.11. Regarding transportation accidents, the NRC Staff expert, Karl Fischer,²⁰ explained that AES did not propose any mitigation measures relevant to radiological transportation accidents. Exh. NRC000136 at 5-6. The NRC Staff found that the potential environmental impacts of transportation accidents involving radioactive materials would be SMALL (*see* Exh. NRC000134 at 4-72) because transportation of radioactive materials would be conducted in accordance with NRC and U.S. Department of Transportation regulations governing packaging and transportation of radioactive materials. The NRC expert also explained that the routing restrictions identified in Section D.3.1.1 of FEIS would not necessarily be used for actual shipments. The carrier would be responsible for route selection (Exh. NRC000135 at I-164) and the route may vary due to factors such as road construction, season, weather, and local road restrictions. Highway route controlled quantity (“HRCQ”) routing is not required for any EREF shipments because the quantity of radioactive material does not exceed the HRCQ threshold as defined in 49 C.F.R. § 173.403. However, the NRC Staff expert stated that HRCQ routing was assumed in the transportation risk analysis because it generally results in longer

²⁰ *See* Exh. NRC000152 (Fischer Professional Qualifications).

routes, thereby yielding greater potential impacts (*i.e.*, the routing is conservative).

4.12. Regarding the environmental impacts of decommissioning, the Board sought additional information on the content of the final decommissioning plan and related impacts. April 15 Order, Attachment A, at 4. The NRC Staff experts explained that, for most resource areas, the potential environmental impacts associated with decontamination and decommissioning (“D&D”) are not expected to exceed the impacts of preconstruction and construction, except possibly in two areas: historic/cultural resources and ecological resources. Because D&D activities at the site are expected to primarily disturb land areas that were previously disturbed during construction and operation of the facility, potential impacts to historic/cultural resources and ecological resources would generally be short-term and could be mitigated, resulting in SMALL impacts. But, there could be circumstances where impacts to historic and cultural resources and ecological resources could possibly exceed those of construction/operations. For example, decommissioning could impact lands not currently included in the current Area of Potential Effect. In such a situation, the impacts could be LARGE. With respect to ecological impacts, if disturbance were to occur outside of previously disturbed areas, the impact could potentially be LARGE.

4.13. The Board later sought clarification from the NRC Staff on whether the discussion of potential impacts to historic and cultural resources at the EREF site during D&D was hypothetical. May 12 Order, Attachment A, at 1. The NRC Staff expert, Steve Lemont, explained that the NRC Staff was referring only to a hypothetical situation. Exh. NRC000176 at 2. Dr. Lemont clarified that there is no specific historic property or ecological resource on the EREF site that might be impacted during D&D activities. *Id.*

4.14. The Board sought additional information from the parties regarding

detection of leaks from UF₆ cylinders.²¹ April 15 Order, Attachment A, at 5. The AES experts, Barry Tilden and Nicholas Panzarino,²² explained that the EREF does not solely rely on the physiochemical effluent monitoring and radiological environmental monitoring systems to detect potential leakage from the storage cylinders. Exh. AES000064 at 7-10. Before the depleted UF₆ cylinders are placed on the storage pads, they are surveyed for external contamination. At the storage pad, UF₆ leaks from the cylinders would be detected by the inspection program. ER Section 4.13.3.3 (Exh. AES000070) describes the AES cylinder management program, including a management and monitoring program. Cylinders are stored on concrete or similar saddles to avoid corrosion and are inspected annually for damage or surface coating defects, corrosion, valve integrity, damage, and leaks. *See also* FEIS Section 2.1.5 (Exh. NRC000134). Any signs of leakage discovered on the cylinder during these inspections would result in an investigation of the cause and a corrective action plan to correct the situation. Further, small leaks of UF₆ cylinders caused by improper handling and storage are self sealing because a UF₄ hydrate plug forms at the point of leakage. *See* DOE/EIS-0269, *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride*, Appendices B (Exh. AES000075) and D (Exh. AES000076). This makes it very unlikely for a “small but continuous” leak of UF₆ to occur from a cylinder.

4.15. As the AES experts explained, small but continuous leaks from a UF₆ cylinder are very unlikely, but would nevertheless be detected by both the effluent monitoring and the radiological environmental monitoring systems. Exh. AES000064 at 8-9. The detection

²¹ The AES radiological monitoring programs, including cylinder storage pad monitoring and leak detection, were also the subject of testimony at the oral hearing. That testimony is discussed in greater detail below in Section IV.A.2.e.

²² *See* Exhs. AES000015 (Tilden Professional Qualifications) and AES000069 (Panzarino Professional Qualifications).

levels are 2 percent or less of the limits in 10 C.F.R. Part 20 Appendix B, Table 2 (Effluent Concentrations). *Id.* Vegetation, groundwater, soil, and water contained in the basins are included in this monitoring program. The effluent monitoring program (physiochemical sampling) monitors soil, sediment, and vegetation for fluoride uptake using analyses methods that meet the EPA's Lower Limits of Detection. AES will also submit annual summary reports of the environmental sampling programs, which will note any increasing trends in the data and identify the actions taken in response to those trends.

4.16. Any leakage of UF₆ or its reaction products when cylinders are covered by snow could be trapped within the snow or ice cover and may not be immediately accessible to the physiochemical effluent monitoring or radiological environmental monitoring systems until runoff eventually occurred as temperatures rose during warm spells or the spring. Exh. AES000064 at 9-10. As during other times of the year, the self plugging feature of UF₆ cylinder leaks would tend to limit any leakage from the cylinders during these winter periods. *Id.* The AES experts explained that this ensures that the routine sampling and monitoring programs supplemented with the periodic cylinder inspections provide effective and adequate indication of any leakage from cylinders stored on the storage pads.

4.17. After noting that the State of Texas may authorize disposal of low-level radioactive waste disposal for States outside its compact, the Board sought information on AES' current plans for waste disposal. The AES experts, Jim Kay and George Harper,²³ explained that AES does not intend to utilize the Texas facility.

4.18. In the context of site selection, the Board asked for additional information on the use of seismic and winter weather avoidance areas and disqualifying screening criteria

during the site selection process. April 22 Order, Attachment A, at 1. The AES experts, George Harper, Ed Redente, and Richard Klimkiewicz,²⁴ explained that the first phase of the site selection process was to screen regions (not sites) using broad screening criteria to avoid clearly problematic areas. Exh. AES000079 at 2-4. This initial screening process was conducted to be inclusive of regions and to only exclude regions that clearly were in areas to be avoided, for example, because of winter weather or seismic concerns. Regions that were at the margins of avoidance areas were retained for further consideration.

4.19. The AES experts further explained that severe winter weather was used as a surrogate for road closure risk because long-term road closures could potentially disrupt operations (*e.g.*, material and personnel transportation). Exh. AES000079 at 3. The winter weather avoidance area boundary was developed based on broad continent wide data and maps to identify broad regions where winter weather may be an issue. The weather information was obtained from the National Oceanic and Atmospheric Administration (“NOAA”). *See* ER Chapter 2, 2.1-26-67 (Exh. AES000070). Snowfall was used as a surrogate for potential road closures. The data used was from mapped mean annual snowfall data, plus other information (annual mean maximum daily snowfall, mean days with snowfall greater than one inch). From these complex winter weather maps, AES developed a simplified illustration of the general winter weather region of concern for the regional screening process. The focus was to identify an area that should be avoided due to severe winter weather potential (generally across northern non-mountainous regions of the United States from Idaho eastward). The boundary in the

²³ Exhs. AES000012 (Kay Professional Qualifications) and AES000011 (Harper Professional Qualifications).

²⁴ *See* Exhs. AES000084 (Redente Professional Qualifications); AES000086 (Klimkiewicz Professional Qualifications); and AES000011 (Harper Professional Qualifications).

vicinity of the state of Idaho as shown in FEIS Figure 2-8 and ER Figure 2.1-6 was specifically drawn to include the region south of the boundary (through Idaho) that has reduced snow fall (cold desert climate) versus that north of the boundary (through Idaho) which includes areas of higher snow fall and possible road closure risk.

4.20. Regarding seismicity, the AES experts explained that the seismic avoidance area data was obtained from the United States Geological Survey (“USGS”) general seismic hazard maps through the nationalatlas.gov interactive map system. Exh. AES000079 at 4; *see also* ER Section 2.1.3.3.1 (Exh. AES000070). Areas with peak ground acceleration (“pga”) greater than 0.09g associated with a 10 percent probability of exceedance in 50 years were avoided. The USGS calculated hazard values used to generate these maps are based on a 0.05 degree in latitude by a 0.05 degree in longitude uniform grid. Therefore, a calculated pga value with a 10 percent probability of exceedance in 50 years is available for a relatively fine grid. The resolution of the maps is down to the county level, thus allowing a fairly accurate representation of the boundary shown on the FEIS and ER figures. While the distances between the EREF site and the subject avoidance area boundaries are relatively small compared to the scale of the FEIS Figure 2-8, the winter weather and seismic avoidance area boundaries were mapped with sufficient accuracy to determine that the EREF site was outside of the avoidance areas.

4.21. The AES experts also provided additional background on the screening process used during site selection. During Phase I screening, 44 sites were evaluated using eleven site selection criterion and publicly available data from agency and organizational websites, technical literature, and agency reports. Exh. AES000079 at 5-6. AES met with site representatives to gain a better understanding of the sites and site sponsors provided site-specific

information on screening criteria to assist AES. *Id.* The screening performed for the “sensitive properties” criterion was to determine that “no Native American Reservations, National Parks, Monuments, Forests, National Register of Historic Places or Properties, wildlife refuges, scenic river parkways, recreation areas, Class I air quality areas, or air quality non-attainment areas are immediately adjacent to or on the site.” *Id.* For this criterion, AES relied on data in government databases and on government websites. The AES experts explained that Hells Half Acre was not identified as a sensitive property based on its designation as a National Natural Landmark (“NNL”). *Id.* The Power County #1 site was disqualified based on its proximity to (1) Craters of the Moon National Monument, an NPS Class I Area, (2) the Fort Hall Indian Reservation, (3) American Falls Dam, and (4) the Snake River. *Id.* The Blackfoot Site located in Bingham County, Idaho, was disqualified because of its proximity to the Snake River and the Fort Hall Indian Reservation. *Id.* The Copeland Stone Site near Laurens, South Carolina, was disqualified for its proximity to the Sumter National Forest. *Id.*

4.22. In response to a Board question (April 22 Order, Attachment A, at 2), AES also provided additional information on noise impacts to wildlife, including noise at frequencies outside the range of human hearing. The AES experts, Jim Kay, Mark Wescoat, and Chris Andrews,²⁵ explained that the construction and earthmoving machinery planned for use during construction do not produce significantly high or low sound levels or frequencies that are considered harmful to living species and are typical of other large industrial construction projects. Exh. AES000079 at 7. During operation, noise impacts were evaluated by AES and considered sound levels generated by machinery used during operation, including the centrifuges. *Id.*; *see also* ER Section 4.7.1.2 (Exh. AES000070). The running frequency of the

²⁵ Exhs. AES000012 (Kay Professional Qualifications), AES000022 (Andrews Professional

centrifuges, which are housed in an enclosed insulated structure, is classified; however, it is within the frequency range that most humans can detect. Exh. AES000079 at 7. Noise levels from the running centrifuges are such that hearing protection is only required inside the cascade halls. *Id.* Outside the cascade halls, the running centrifuges will not cause discomfort or disruption to humans or wildlife. *Id.*

4.23. The Board sought clarification from AES on the classification of workers at the EREF site for dose monitoring purposes. April 22 Order, Attachment A, at 2. The AES experts, Nicholas Panzarino and Jim Kay, explained that classification as radiation workers will be based on actual radiation surveys at the time the construction work is performed. Exh. AES000079 at 8. These surveys will reflect actual radiological conditions and will determine the dose limits and radiological controls applied to the construction workers. If the actual survey results (performed prior to the start of construction work) on the cylinder storage pads confirm that the dose to the construction workers will exceed the 10 C.F.R. § 20.1301 dose limit, then the construction workers will be considered radiation workers and the occupational dose limits of § 20.1201 will apply. The workers will be subject to the requirements of the EREF radiation protection program as discussed in Chapter 4 of the Safety Analysis Report. *See* Exh. AES000037. These requirements include, in part, As Low As Reasonably Achievable (“ALARA”) reviews of the work to be performed, radiation protection training, compliance with radiation work permits, and compliance with postings. The construction workers will also be required to wear individual external dosimetry devices and will be subject to the site annual administrative limit of 10 mSv (1 rem), which is 20 percent of the NRC limit in § 20.1201. The AES experts also explained that dose to workers constructing the second-to-last 20 percent of the

Qualifications), and AES000092 (Wescoat Professional Qualifications).

cylinder storage pad was not calculated because the calculation performed for the construction of the last 20 percent of the cylinder storage pad is considered bounding. Exh. AES000079 at 8.

4.24. The Board sought additional information from the NRC Staff regarding the population densities used to calculate radioactive exposures along transportation routes. April 22 Order, Attachment A, at 2. The NRC Staff expert, Karl Fischer, explained that an increase in the total U.S. population between 2000 and 2010 does not necessarily mean increases in exposure to the population along a given transportation route. Exh. NRC000170 at 1. Although the 2010 Census indicates a 9.7 percent increase in the total U.S. population over that period (Exh. NRC000173 at Table 1), specific information regarding the change in population density along the transportation routes considered in the FEIS would be necessary to quantitatively assess the change in impacts. However, the NRC Staff expert explained that, even if the population density along a segment of a route changed significantly, the net change to the population density for the entire route would likely be small. In fact, population growth in most of the states through which eastward EREF shipments will travel exhibited a population growth that was less than the U.S. average (Exh. NRC000173 at Table 1). And, most of the observed population growth occurred in urban areas. By contrast, the population in areas outside urban areas grew by only 1.8 percent (Exh. NRC000173 at Table 2). Over 73 percent of all modeled routes traverse areas defined as rural population zone. FEIS Table D-2 (Exh. NRC000135 at D-10). Moreover, even if the estimated population dose were to increase by approximately 10 percent (*i.e.*, in proportion to the total U.S. population increase indicated by the 2010 Census), the NRC Staff expert concluded that the impact conclusions presented in the FEIS would not change. Exh. NRC000170 at 2.

4.25. In response to a Board inquiry regarding the atmospheric transport model (April 22 Order, Attachment A, at 3), the NRC Staff expert, John Arnish, explained that Equation (4) in FEIS Section E.2.5 (NRC000135 at E-6 to E-7), which is derived from Equation (1), is used to calculate ground-level, sector-averaged air concentrations and is incorporated into Version 3 of the CAP88-PC computer code. The NRC Staff expert explained that site-specific parameters were used in CAP88-PC when available. Specifically, the release height, H, was set such that the maximum dose was calculated from either a 40-meter release height (release height at the EREF) or a ground level release to simulate building wake effects. The release rate Q (curies per year) was estimated on the basis of emissions from a 6.6 million SWU enrichment facility. Exh. NRC000170 at 2; *see also* FEIS Table E-1 (Exh. NRC000135 at E-8). The wind speed, μ , atmospheric stability class, and the frequency the wind blows in any given direction were obtained from analyzing 2003-2007 atmospheric data from a nearby site. The horizontal plume dispersion coefficient, σ_z , is downwind-distance- and stability-class-dependent and was taken from Section 12.1.6 of the CAP88-PC User's Guide, Version 3.0 (Exh. NRC000174 at 61). The NRC Staff expert explained that, while the CAP88-PC computer code has not been specifically calibrated or verified for the EREF site, the Gaussian plume air dispersion model incorporated into CAP88-PC is well-documented and validated. He stated that the CAP88-PC code is appropriate for the EREF site given the relatively flat topography and the use of the Brigg's "open country" dispersion coefficients in CAP88-PC. Exh. NRC000170 at 4; *see also* NRC000175 at 29-30.

4.26. Based on our review of the complete FEIS and the NRC Staff and AES responses to our written questions, we find that the NRC Staff has adequately considered and addressed the primary considerations associated with construction, operation, and

decommissioning of the EREF in the areas discussed above. The responses provided by AES and the NRC Staff likewise are adequate to satisfy the NEPA requirement that impacts associated with facility construction, operation, and decommissioning be given a hard look.

2. *Presentations at Oral Hearing on Uncontested Environmental Issues*

4.27. As noted above, the Board also asked AES and the NRC Staff to make presentations on six topics in conjunction with the uncontested hearing on environmental issues. Each of these topics is discussed below.

a. Purpose and Need for the Proposed Action

4.28. The Board requested that the parties provide a presentation and testimony on the need for the EREF facility and the implications of the events at Fukushima Daiichi on the need for the facility. April 15 Order, Attachment A, at 1. AES presented two experts, Sam Shakir and Michael Schwartz,²⁶ regarding the purpose and need for the EREF. The NRC Staff also had two experts available, Steve Lemont and Bruce Biwer.²⁷ Mr. Shakir, who is the President of AES, gave an overview of the need for the EREF. *See* Exh. AES000102. Mr. Shakir explained that the need described in the EREF ER still exists. Mr. Shakir noted that, consistent with the Licensing Board decision in LBP-05-13 regarding the need for the National Enrichment Facility, the AES/Utility contracts signed to date provide the best evidence of the U.S. need for additional capacity. Mr. Shakir noted that, by about the end of 2009, and at least two years in advance of even receiving a license from the NRC, AES had signed contracts for the majority of the output of this facility, including very long-term contracts going out as far as

²⁶ *See* Exhs. AES000013 (Shakir Professional Qualifications) and AES000104 (Schwartz Professional Qualifications).

²⁷ *See* Exhs. NRC000151 (Biwer Professional Qualifications) and NRC000155 (Lemont Professional Qualifications).

2028. Tr. at 398-399. Mr. Shakir stated that 90 percent of the output of the first 3.3 million SWU is already sold. *Id.* at 399, 402-404.

4.29. Mr. Shakir also explained that the business case for the EREF was always based on the existing U.S. fleet without any new build. *Id.* at 390-391. Mr. Shakir highlighted the consistent U.S. policy supporting expansion of domestic enrichment capacity, as evidenced by the conditional loan guarantee granted to AES. *Id.* at 391, 396. The Board queried whether there were any recent statements regarding U.S. policy on the need for a domestic supply of enrichment services. April 15 Order, Attachment A at 1. The NRC Staff experts, Bruce Biber and Elizabeth Hocking,²⁸ explained that increasing domestic supply of low enriched uranium remains a priority as a matter of public policy. The NRC Staff pointed to a May 2010 DOE press release concerning the \$2 billion loan guarantee for the Eagle Rock Enrichment Facility, where the Secretary of Energy, Steven Chu, stated, that “[i]ncreasing uranium enrichment in the United States is critical to the nation’s energy and national security.” Exh. NRC000160. The NRC Staff experts also highlighted statements by DOE’s Chief Operating Officer for Nuclear Energy, R. Shane Johnson, during Congressional testimony that “to increase domestic uranium enrichment capacity, a critical element of the fuel cycle for nuclear power reactors, the Department has made available \$4 billion in loan guarantees for the deployment of advanced enrichment technology in the United States.” Exh. NRC000161.

4.30. The other AES expert, Michael Schwartz, Chairman of the Board at Energy Resources International, provided an overview of the current state of the enrichment market and discussed, at the Board’s request, hypothetical “stress tests” of the enrichment market. Exh. AES000103. Mr. Schwartz began by providing an overview of the enrichment

supply in the United States. Mr. Schwartz noted that domestic projects have experienced some schedule slippage and that, as a result, future U.S. supply is projected to be slightly lower than in the ER. *Id.* at 3 *citing* Exh. AES000070 at Table 1.1-4. Outside the U.S., Mr. Schwartz explained that there has also been some schedule slippage relative to the ER, thereby reducing projections of available supply, but that there has been an increase in the supply expected from China. *Id.* at 4. Overall, Mr. Schwartz stated that there have been only small changes in expectations regarding supply, with the exception of a large increase expected in China, relative to the ER.

4.31. In response to a specific hypothetical posed by the Board, Mr. Schwartz addressed the implications of two “stress tests” on the enrichment market involving forecasts of installed nuclear generating capacity, relative to the ER for the Reference and High Growth forecasts for 2020 and 2030, that reflect: (1) a 50 percent reduction of the net increase in installed nuclear generating capacity forecast for domestic capacity; and (2) a 25 percent reduction of the net increase in installed nuclear generating capacity forecast for non-U.S. capacity. Exh. AES000103 at 5-6. Mr. Schwartz stated that the ASLB-requested adjustments translate into an average annual reduction of 5.3 million SWU per year (8.2%) in world requirements for the period 2016 through 2030 under the Reference growth forecast, as compared to the values provided in ER Table 1.1-3 (Exh. AES000070). *Id.* Under the High growth forecast, the ASLB-requested adjustments translate into an average annual reduction of 9.4 million SWU per year (11.6%) in world requirements for the period 2016 through 2030, as compared to the values provided in ER Table 1.1-3 (Exh. AES000070). *Id.* Mr. Schwartz noted that the enrichment requirements that result from these ASLB-requested adjustments are lower

²⁸ See Exhs. NRC000151 (Biwer Professional Qualifications) and NRC000153 (Hocking

than enrichment requirements that would be consistent with recent post-Fukushima forecasts of installed nuclear generation. *Id.*

4.32. Mr. Schwartz explained that, using the ASLB-requested adjustments, U.S. requirements for enrichment services continue to exceed U.S. Base Supply over the period 2016 through 2030 for both the Reference and High growth requirements forecasts. Exh. AES000103 at 7. Without the EREF, U.S. requirements exceed supply by an even greater amount for both the Reference and High growth requirements forecasts. *Id.* Using the ASLB-requested adjustments, world average annual requirements for Base Supply exceed supply for the High growth forecast from 2016 through 2030, but Base Supply exceeds requirements for Reference growth forecast. *Id.* at 8. Without the EREF, world average annual requirements exceed supply for the High growth forecast from 2016 through 2030, but supply exceeds requirements for Reference growth forecast. *Id.*

4.33. Mr. Schwartz also presented information regarding a May 2011 forecast that reflects events that occurred subsequent to submittal of the ER. Exh. AES000103 at 9. Mr. Schwartz explained that the May 2011 forecast includes the impact of the Fukushima accident; U.S. license renewals and power uprates, which have continued following the Fukushima accident; the continued significant expansion of nuclear power in China; the downturn in the world economy; renewed interest in low-cost natural gas; difficulty in obtaining long-term financing for new nuclear power plants; statements of ongoing support for nuclear power from government and industry leaders in most countries with existing nuclear power programs. *Id.* Mr. Schwartz explained that the May 2011 forecast reflects significant reductions of demand in Japan and Germany, but only minimal impact on the rest of the world when compared to the ER.

Professional Qualifications).

Id. Mr. Schwartz noted that any decrease in requirements related to reductions in Japan and Germany are effectively offset by increases in expected demand in China. Tr. at 429. Mr. Schwartz noted that the ERI May 2011 forecast is conservative (*i.e.*, low) relative to other post-Fukushima forecasts with regard to expectations for installed nuclear generation capacity in the long-term. Exh. AES000103 at 9.

4.34. Mr. Schwartz explained that the May 2011 forecast supports the ER analysis. He stated that, using the May 2011 forecast, U.S. requirements exceed U.S.-based supply for both the Reference and High growth forecasts from 2016-2030. *Id.* at 10. Average annual U.S.-based supply deficit increases slightly from 0.8 to 1.1 million SWU for the Reference growth forecast. The deficit is greater without the EREF, but does not change due to the ERI 2011 forecast. *Id.* Average annual U.S.-based supply deficit increases slightly from 1.6 to 2.1 million SWU for the High growth forecast for the Base Supply case. The deficit is greater without the EREF and increases slightly due to the ERI 2011 forecast. *Id.* World Base Supply exceeds world requirements for the Reference growth forecast from 2016-2030, but world requirements exceed the world Base Supply for the High growth forecast during this period. And, world requirements exceed world Base Supply without the EREF for both the Reference and High growth forecasts from 2016-2030. *Id.*

4.35. Overall, Mr. Schwartz stated his professional judgment that, with the EREF and all other U.S.-based Base Supply, U.S. requirements for uranium enrichment services are expected to exceed U.S.-based supply over the long-term for both the Reference and High growth forecasts. *Id.* at 11. Without the EREF, he stated that U.S. requirements for uranium enrichment services are expected to exceed U.S.-based supply by an even larger amount for both the Reference and High growth forecasts. *Id.* With the EREF and all other Base Supply, Mr.

Schwartz noted that world supply is expected to exceed world requirements for the Reference growth forecast,²⁹ but requirements are expected to exceed supply for the High growth forecast. *Id.* However, without the EREF, he stated that world requirements for uranium enrichment services are expected to exceed world supply for both the Reference and High growth forecasts. *Id.* Mr. Schwartz stated that, in his judgment, the differences between the estimates in the ER and his current forecasts are small and that the forecasts are essentially the same. Tr. at 453.

4.36. At bottom, the Board finds that the best evidence of the need for the EREF is the willingness of its potential customers to purchase its product as indicated by having contracts in place for the output of the EREF. Certainly, that type of evidence is better than the results of efforts to model the exceedingly complex economic and policy factors involved in the market for enrichment services. For its part, AES has avoided this potentially difficult problem by substituting facts for speculative projections. Therefore, the Board finds that AES has demonstrated the need for the facility. The Board also finds that the NRC Staff has appropriately assessed the need for the EREF in the FEIS based on information available to it. The NRC Staff's independent assessment (Tr. at 436) also appropriately relied on the need for additional domestic production of enrichment supply and need for domestic supply for national energy security. Exh. NRC000134 at 1-4 to 1-7. The Board finds it was both necessary and useful to examine the international market for enrichment services, notwithstanding that an identified primary need for the EREF is to establish an additional domestic source for enrichment services.

²⁹ Mr. Schwartz explained that the enrichment market has historically had a slight excess of supply relative to demand (approximately 3 million SWU/year). Tr. at 454-455. Mr. Schwartz explained that this provides flexibility in the event of problems at any particular supplier and to ensure a reasonable level of competition in the market. *Id.* The NRC Staff expert, Dr. Biwer, also noted the actual demand can vary dramatically from year to year depending on where reactors are in their cycles and the fuel rod facilities are with the manufacturing. Tr. at 456.

In short, AES and the NRC Staff took different routes to reaching the same conclusion. Either approach is an acceptable means of demonstrating the need for the EREF. The information in the FEIS and the presentations and testimony provided by AES and the NRC Staff are adequate to satisfy the NEPA requirement that the need for the facility be given a hard look.

4.37. We further conclude, as did the NRC Staff (Tr. at 458) and AES (Tr. at 459-460), that the events at Fukushima Daiichi, while serious, are not new and significant information that call into question the analysis of the need for the EREF. Nor have any other events subsequent to the filing of the EREF application led to a recharacterization of the need for the EREF. To the extent that there have been changes in expected deployment of new nuclear facilities in the United States since the ER, the FEIS reflects current plans both with respect to new builds and license renewals and uprates of existing plants. With respect to changes due to other factors, including Fukushima and demand in China, the analysis in the ER that was the basis, in part, for the conclusions in the FEIS remains valid. *See, e.g., Marsh v. Oregon Natural Res. Council*, 490 U.S. 360, 374 (1989) (finding that agency decisions regarding new and significant information are subject to the “rule of reason”).

4.38. Nevertheless, if the implications of Fukushima on the need for enrichment services domestically or internationally were considered new and significant information, we further conclude that, based on the evidence and testimony presented by the parties, Fukushima does not call into question the overall conclusions regarding the need for EREF in the FEIS. There is a demonstrated need for the output of the EREF both domestically and internationally.

b. Preconstruction Impacts

4.39. The Board requested that the parties provide a presentation and testimony on preconstruction activities at the EREF site, including a discussion of preconstruction activities

to date and any redress requirements related to such activities. June 2 Order at 2. AES presented two experts, Jim Kay and George Harper.³⁰ The NRC Staff also presented two experts, Steve Lemont and Bruce Biwer.³¹

4.40. Mr. Kay provided the Board with an overview of the exemption issued to AES that permitted preconstruction activities. Exh. AES000105 at 3-4. Mr. Kay noted that only limited preconstruction activities had been performed to date. These included the mitigation of historical resource MW004, road improvements, and clearing and grubbing. *Id.* at 5. These activities were performed in the fall of 2010. Mr. Kay explained that no pre-construction activities have been performed to date during 2011. *Id.*

4.41. Regarding the need for redress of any impacts associated with preconstruction activities, Mr. Kay explained that the NRC has no site redress requirements for the activities that are permitted under the exemption. Exh. AES000105 at 12. Mr. Kay's testimony is consistent with the conclusion reached by the Board earlier in this proceeding. *See* LBP-11-11 at 56 (“[T]here is no agency requirement that an applicant submit a redress plan relative to preconstruction activities.”). The NRC Staff expert agreed that there are no NRC redress requirements. Tr. at 476-477. Similarly, Mr. Kay explained that neither the State of Idaho nor Bonneville County have any site redress requirements. *Id.*

4.42. Nevertheless, Mr. Kay indicated that AES would take action to minimize any hazards to humans or wildlife and to minimize adverse environmental impacts. Exh. AES000105 at 12. For example, Mr. Kay and Mr. Harper indicated AES would re-grade worked

³⁰ *See* Exhs. AES000012 (Kay Professional Qualifications) and AES000011 (Harper Professional Qualifications).

³¹ *See* Exhs. NRC000151 (Biwer Professional Qualifications) and NRC000155 (Lemont Professional Qualifications).

and stockpiled areas to preclude erosion due to channeled runoff and to minimize ponding. *Id.* They explained that AES also anticipates stabilizing areas, as appropriate, where pre-construction activities occurred through soil placement and vegetation plantings. *Id.* Also, AES would likely remove all equipment or temporary structures and any added fencing. *Id.*

4.43. We find that the discussion of preconstruction impacts in the FEIS and as explained by the AES and NRC Staff experts is appropriate and that the NRC Staff has taken the requisite hard look at the impacts of preconstruction activities.

c. Greenhouse Gas Impacts of Facility's Production Power Consumption

4.44. The Board posed several written questions to the NRC Staff regarding greenhouse gas ("GHG") impacts and also asked that the NRC Staff provide a presentation and testimony on greenhouse gas impacts. April 15 Order, Attachment A, at 4; May 12 Order, Attachment A, at 2-3; June 2 Order at 3-4.

4.45. In response to a Board question on the GHG emissions associated with production of electricity used at EREF (April 15 Order, Attachment A, at 4), the NRC Staff expert, Ron Kolpa,³² explained that the NRC Staff analyzed GHG impacts in both the regional and national contexts while focusing on the most meaningful aspects of EREF operation. Exh. NRC000136 at 10. In determining which aspects of the EREF operation would be included in the impact analysis, the NRC Staff concluded that no new generating capacity was proposed to support EREF. *See id.* at 10-11 *citing* Exh. NRC000134 at 2-12. The NRC Staff considered developing a hypothetical bounding condition for GHG emissions from electricity production by assuming all required power would be generated by coal-fired power plants,³³ but ultimately

³² *See* Exh. NRC000154 (Kolpa Professional Qualifications).

³³ Coal-fired generation is the largest source of carbon dioxide emissions per unit of power produced among any of the existing utility-scale thermoelectric technologies. Exh.

determined that such an assumption would be contrary to the historical record, as no coal-fired power plants are currently operational in Idaho. *Id.* Given the relatively small projected energy requirements for the EREF, which could be provided without additional generation capacity, and the reasonable expectation that the majority of required power would be generated by relatively GHG-free Idaho hydroelectric technologies, the NRC Staff determined that generating the electricity needed to support EREF operations would represent a relatively minor indirect contribution to the EREF GHG operational footprint. *Id.* at 11-12.

4.46. In response to a follow-up question from the Board (May 12 Order, Attachment A, at 2-3), Mr. Kolpa provided a discussion of the GHG emissions from the electricity generated to power the EREF. *See* Exh. NRC000176 at 3-4. Mr. Kolpa explained that AES estimated a power demand of 78 megawatts (“MW”), which equates to 683,280 megawatt hours (“MWh”) of power, to support full production (6 million SWUs) of the EREF. *Id.* at 3 *citing* Exh. AES000080 at H-1. As coal-fired generation has the highest GHG footprint, the NRC Staff conservatively assumed that the power used to power the EREF was produced from coal. *Id.* at 3. Assuming that all of the required power for the EREF was produced by coal-fired power plants, the annual GHG emissions are estimated to be 674,900 metric tons. Exh. NRC000216 at 1. If the EREF were a gaseous diffusion facility of equivalent capacity, its annual production of enriched uranium would have resulted in the release of 25.5 million metric tons of GHGs. Exh. NRC000176 at 4.

4.47. At the Board’s request, Mr. Kolpa also prepared a presentation for the oral hearing on GHG emissions. Exh. NRC000190. Mr. Kolpa provided background information on the relative contributions of GHG emissions among generation sources and discussed the relative

NRC000136 at 11; Tr. at 494.

contributions among generation sources at the state, regional, and national levels. *Id.* at 3-9. Mr. Kolpa explained that assuming that all the power used to power EREF came from coal presents a bounding condition. *Id.* at 3-9; Tr. at 503-504. Even for this bounding case, the impacts from GHG emissions owing to operation of the EREF, from a national and global perspective, would be SMALL. Exh. NRC000216 at 3; Exh. NRC000190 at 11; Tr. at 508.

4.48. Based on the information in the FEIS and the NRC Staff testimony at the oral hearing, we find acceptable the NRC Staff's analysis of the GHG emissions associated with the generation of electricity used to power the EREF in the written responses to our questions and oral testimony. We further agree with the NRC Staff that the impacts of GHG emissions associated with the EREF are SMALL. Based on the NRC Staff's written answers and oral testimony, we conclude that the discussion of GHG emissions in the FEIS was reasonable. Although we find the evidence on the record sufficient for the NRC Staff to satisfy its obligations relative to NEPA, we nevertheless incorporate the discussion of the bounding case (*i.e.*, assuming all electricity used to power EREF is from coal-fired generation) into the record of decision, which amends the FEIS *pro tanto*.

d. Construction and Preconstruction Air Quality Impact

4.49. The Board requested that the NRC Staff provide an overview of the NRC Staff's FEIS analysis of construction and preconstruction air quality impacts, including a discussion of the air dispersion model, the data and assumptions used, and the results obtained. June 2 Order at 4. The NRC Staff expert, Ron Kolpa, explained that the NRC Staff used AERMOD, which was jointly developed by the American Meteorological Society ("AMS") and EPA. Exh. NRC000197 at 2. AERMOD is the preferred model for understanding impacts of

released pollutants in the Planetary Boundary Layer (“PBL”) and is the primary model used to demonstrate compliance with EPA regulations and for State air quality protection planning. *Id.*

4.50. Mr. Kolpa explained that one of the advantages of AERMOD is its flexibility and range of applicability. AERMOD can be used in rural and urban areas, for flat and complex terrain, for surface-level and elevated releases, for single or multiple sources, for point, area, line, and volume sources, and for one-hour to annual (or period) averaging times. Exh. NRC000197 at 4. Mr. Kolpa stated that the input meteorological data was collected from a variety of sources, including data from the Materials and Fuels Complex at Idaho National Laboratory, the National Weather Service (“NWS”) Station at Idaho Falls Regional Airport, and the NWS Station in Boise, Idaho. Exh. NRC000197 at 8. Surface data came from the USGS. *Id.* at 9. The activities generating air emissions were taken from the EREF ER and are described further in the FEIS. *Id.* at 11 *citing* ER Rev. 2, Section 4.6.1, Page 4.6-1 and Table 4.6-1 (Exh. AES000070); FEIS, Section 4.2.4.1, Table 4-2, Page 4-14 (Exh. NRC000134).

4.51. Mr. Kolpa stated that the results of the air modeling, as presented in the FEIS, were based on the application of adequate and representative inputs and conservative assumptions. Exh. NRC000197 at 18. The modeling results indicate that particulate concentrations could be greater than the National Ambient Air Quality Standard (“NAAQS”) at the EREF property boundary. *Id.* But, the NRC Staff concluded that successful execution of Best Management Practices and appropriate mitigation will minimize or prevent NAAQS exceedances.³⁴ *Id.* As a result, the NRC Staff concluded that preconstruction and construction would have a SMALL impact on ambient air quality for all criteria pollutants except particulates,

³⁴ The NRC Staff expert also explained that the assumptions used were inherently conservative (Tr. at 545), and that there is a positive bias in the model for low wind speed conditions (Tr. at 547-550; *see also* Exh. NRC000197 at 16).

but would have a MODERATE impact on near-field air quality (as modeled at the EREF property boundary) with respect to particulates when fugitive dust-producing construction activities (site clearing, grading, travel on unpaved onsite roads, transfer and stockpiling of materials) coincide with low prevailing wind speeds in the direction of the closest property boundary from the proposed EREF industrial area. Exh. NRC000134 at 4-22. Such wind directions are expected to occur less than 4 percent of the time. *Id.*

4.52. We conclude that, based on the information presented in the FEIS and the testimony at the oral hearing, the NRC Staff has taken a hard look at the air-related impacts of preconstruction and construction activities and otherwise complied with NEPA.

e. Radiological Effluent Monitoring Program

4.53. The Board requested that the NRC Staff provide it with information regarding the NRC Staff's FEIS-related analysis of the AES monitoring program, including a discussion of the features of the program; the methods used to determine the types of effluents monitored and the number, type, detection limits, and locations of monitoring equipment; the basis for the conclusion that the program is adequate for the EREF construction, operation, and decommissioning phases and for normal and off normal (*e.g.*, accident or extreme weather) operation; and the measures used to ensure that the program will be properly implemented, adequately tested, and fully capable during the period from two years before the start of operations to the end of decommissioning. June 2 Order at 5. The NRC Staff presented two

experts to address the Board's question, Karl Fischer and Deborah Seymour.³⁵ AES presented two experts, Barry Tilden and Mark Strum.³⁶

4.54. Mr. Fischer explained that there are two complementary, but distinct, monitoring programs: the Radiological Environmental Monitoring Program ("REMP") and the Radiological Effluent Monitoring Program ("EMP"). Exh. NRC000207 at 3. The AES programs were designed by following applicable NRC guidance. Guidance documents include NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs* (Exh. NRC000189 at 5-26, 6-30), which identifies information to be provided in the EIS and ER on radiological monitoring program; NUREG-1520, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility* (Exh. NRC000031 at 9-12 to 9-15), which provides radiological monitoring program acceptance criteria for NRC Staff's safety review; RG 4.15, *Quality Assurance for Radiological Monitoring Programs –Effluent Streams and the Environment* (Exh. NRC000208); RG 4.16, *Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluent from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants* (Exh. NRC000209); and NUREG-1302, *Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for BWRs* (Exh. NRC000210 at 39-42, 46-49, 59-66, 70-72, 83, and 87-91).

4.55. Mr. Fischer explained that the radiological effluent monitoring program is designed to ensure the effectiveness of effluent controls and to verify that operations have no detrimental radiological impact. Exh. NRC000207 at 9. The program includes continuous

³⁵ See Exhs. NRC000152 (Fischer Professional Qualifications) and NRC000121 (Seymour Professional Qualifications).

³⁶ See Exhs. AES000015 (Tilden Professional Qualifications) and AES000014 (Strum Professional Qualifications).

sampling at all release points for airborne and liquid effluents. *Id.* There is no direct discharge of industrial liquid effluents to surface waters or groundwater at the EREF. *Id.* Results are reported to the NRC on a semi-annual basis and the program may be modified as necessary to maintain collection and reliability of data based on changes to regulatory requirements or facility operations. *Id.* With respect to the cylinder storage pad, Mr. Fischer explained that AES will capture, retain, and monitor storage pad stormwater runoff (and basin sediment). Exh. NRC000207 at 13 *citing* Exh. AES000070 at 4.13-6 and 6.1-5. AES will also monitor external (direct) radiation exposure using TLDs placed along the fence line. *Id. citing* Exh. AES000070 at 6.1-7. These programs compliment the cylinder inspection program. *Id. citing* Exh. AES000070 at 4.13-4 to 4.13-6.

4.56. Mr. Fischer explained that the environmental monitoring program provides a supplemental check of containment and effluent controls. Exh. NRC000207 at 14. The program focuses on locations within 3 miles of the EREF, but may include more distant control locations. *Id.* The program will be initiated two years prior to expected startup (and arrival of UF₆) to establish background and baseline data. *Id.* The program is based on the model program in NUREG-1302 and requires semiannual reporting to the NRC. *Id.* The program includes monitoring of airborne particulates, groundwater, stormwater and basin sediment, treated domestic sanitary sewage, soil and vegetation, and direct exposure from various locations on the EREF site. *Id.* at 15-22.

4.57. Mr. Fischer also explained that the REMP and EMP do not address off-normal operation specifically. Tr. at 579. Radiological effluent and environmental monitoring is designed to ensure that releases of radioactive materials remain within prescribed limits that have been established to ensure public health and safety. *Id.* The program focuses on normal

operations, where any elevated sample analysis results would trigger action to determine and remedy the cause within the facility's process systems. *Id.* Off-normal or extreme conditions such as accidental releases, by their nature, cannot be predicted with any certainty as to the location or amount released. *Id.* at 580. However, data from the radiological monitoring programs would provide a baseline for determining the extent of contamination should an accident or other extreme event occur. *Id.* at 579-580. With respect to UF₆ cylinders specifically, the NRC Staff expert, Bruce Biwer, explained that, when UF₆ cylinders are breached, moist air reacts with exposed UF₆ and iron, forming a dense plug of UF₄ and iron fluoride hydrates that prevents rapid loss of cylinder material. Exh. NRC000207 at 26. Dr. Biwer confirmed that these plugs would form even in a very low humidity environment. Tr. at 612-613.

4.58. In reviewing AES' proposed monitoring programs, Mr. Fischer explained that the NRC Staff considered the detailed description of the monitoring programs, including (a) number and location of sample collection points, measuring devices used, and pathway sampled or measured; (b) sample size, sample collection frequency, and sampling duration; and (c) methods and frequency of analysis including lower limits of detection. Exh. NRC000207 at 25. The NRC Staff reviewed the justifications of the choice of sample locations, analyses, frequencies, durations, sizes, and lower limits of detection. *Id.* The NRC Staff also considered AES's quality assurance procedures. *Id.*

4.59. Regarding implementation, Ms. Seymour discussed the NRC's radiological monitoring program inspection objectives. Exh. NRC000207 at 28. She stated that the purpose of the inspection program is to determine whether AES has implemented its monitoring program in compliance with NRC regulations and license requirements and whether

AES has implemented adequate management controls for the program. *Id.* Ms. Seymour indicated that the AES program would be inspected under IP 88045, *Effluent Control and Environmental Protection* (Exh. NRC000212). *Id.* at 29. The results of the NRC's inspections will be documented in inspection reports that will be available to the public. *Id.* at 30. Ms. Seymour explained that NRC inspections begin approximately one year prior to receipt of special nuclear material onsite and hot acceptance testing. *Id.* at 31. The NRC inspections will focus on those portions of the radiological monitoring program needed for scheduled activities and will verify effective implementation of the monitoring program. *Id.* The radiological monitoring program will be inspected on an annual basis and will verify continued effective implementation of the program. *Id.* at 33 citing NRC Inspection Manual Chapter 2600, *Fuel Cycle Facility Operational Safety and Safeguards Inspection Program* (Exh. NRC000213). If significant inspection findings are identified, additional inspection resources may be allocated to verify effective disposition of the issues. *Id.* Annual inspections will continue during the operational lifetime of the EREF, and will continue through the decommissioning phase, as needed.

4.60. Based on the information in the FEIS and the testimony of the NRC Staff and AES experts, the Board finds that the NRC Staff has taken the requisite hard look at the AES monitoring programs. We further conclude that the NRC Staff review of the proposed monitoring programs is adequate to satisfy NEPA.

f. Historic/Cultural Resources Memorandum of Agreement and Associated Mitigation Measures

4.61. The Board posed several written questions to the NRC Staff and AES regarding historical and cultural resource impacts, including the status of the Memorandum of Agreement and associated mitigation measures. April 15 Order, Attachment A, at 2. The Board

also requested that the NRC Staff provide a presentation and testimony on the status of the MOA. June 2 Order at 5-6.

4.62. In response to the written questions, the NRC Staff expert, Steve Lemont,³⁷ presented an overview of NRC activities related to historic and cultural resource consultation. Exh. NRC000136 at 3-4. Dr. Lemont stated that, as of May 2, 2011, the NRC, the Idaho State Historic Preservation Officer (“SHPO”), and AES had not yet signed the MOA discussed in Section 4.2.2.1 of the FEIS. *Id.* at 3; *see also* Tr. at 627 (noting that as of the July 13, 2011, the MOA had not been signed). Also, the Shoshone-Bannock Tribes have not yet signed as a concurring party on the MOA. Exh. NRC000136 at 3. However, Dr. Lemont stated that, with letters dated March 30, 2011, the Draft *Memorandum of Agreement Among the United States Nuclear Regulatory Commission, the Idaho State Historic Preservation Office, the Shoshone-Bannock Tribes, and AREVA Enrichment Services LLC Regarding The Proposed Eagle Rock Enrichment Facility Project In Bonneville County, Idaho*, was transmitted to Ms. Susan Pengilly, Deputy State Historic Preservation Officer, Idaho SHPO (Exh. NRC000162); Mr. Jim Kay, Licensing Manager, AES (Exh. NRC000163); and Ms. Carolyn Smith, Cultural Resources Coordinator, the Shoshone-Bannock Tribes (Exh. NRC000164). The letters requested that each party review and provide written comments to the NRC on the Draft MOA and also stated that the NRC will confer with the parties to discuss and resolve any comments on the Draft MOA before preparing a final MOA for signature.

4.63. At the oral hearing, Dr. Lemont stated that the NRC has obtained comments from the Idaho SHPO and AES, but is still awaiting comments from the Shoshone-Bannock Tribes. Exh. NRC000214 at 3. Dr. Lemont indicated that he had been in contact with

³⁷ *See* Exh. NRC000155 (Lemont Professional Qualifications).

the tribal representative, who told him that she had completed her review and had no comments, but that the MOA was submitted for legal review to ensure that it does not diminish the Tribes' treaty rights. *Id.* The MOA must then be presented to the Tribal Business Council. *Id.* After obtaining comments from the tribe, the NRC Staff will resolve and incorporate comments and finalize the MOA. *Id.* at 4. After signature by the parties, the MOA will be filed with the Advisory Council for Historic Preservation. *Id.* Dr. Lemont indicated that the MOA would be signed before license issuance. Tr. at 628; *see also* Exh. NRC000176 at 1-2 (indicating that the MOA will be completed and signed before the NRC issues a license to AES).

4.64. Dr. Lemont also described the mitigation measures included in the draft MOA. NRC000136 at 4. The Draft MOA acknowledges that AES completed the mitigation of site MW004 and incorporates by reference AES' unanticipated discoveries and monitoring plan. As discussed in the FEIS (Exh. NRC000134 at 4-6), AES's archaeological consultant, Western Cultural Resource Management, Inc. ("WCRM"), provided a letter to the Idaho SHPO, dated November 17, 2010, summarizing its activities during mitigation (professional excavation and data recovery) of site MW004 (Exh. NRC000165). In a letter dated November 26, 2010, the Deputy State Historic Preservation Officer, Idaho SHPO, indicated that the data recovery report for the project had been reviewed and accepted by the State Archaeologist and Deputy Historic Preservation Officer, Idaho SHPO, and agreed to allow AES to conduct geotechnical drilling within the boundaries of site MW004 (Exh. NRC000166).

4.65. As stated in the FEIS (Exh. NRC000134 at 4-6), the Idaho SHPO was provided with AES' unanticipated discoveries and monitoring plan. The objectives of this plan are to ensure monitoring and protection of archaeological sites and historic properties, establish the process for addressing unanticipated discoveries of human remains and previously

unidentified archaeological sites, and establish procedures for evaluation and treatment of unanticipated discoveries. Exh. NRC000214 at 5; Tr. at 631. A qualified cultural resources monitor will perform the services required under this plan. Exh. NRC000214 at 6. According to the plan, the monitor will meet or exceed the Secretary of Interior's professional qualifications standards for archaeology. *Id.* As specified in the plan, the monitor will work closely with construction personnel to ensure that impacts do not occur to documented significant sites or sites that have not had an official determination of eligibility for listing in the National Register of Historic Places. *Id.* The monitor will identify and document previously undocumented cultural resources exposed by the ground-disturbing activities, if any, and consult with appropriate parties. *Id.* The monitor will evaluate newly-discovered resources with regard to their potential eligibility for listing in the National Register of Historic Places and recommend treatment of discovered resources that qualify as historic properties. *Id.*; *see also* Tr. at 631-632. The monitor will also have the authority to stop work in the event of an unexpected discovery of human remains. Tr. at 635-636. No additional activities will be allowed at the location until appropriate consultations and reviews have been completed. *Id.* at 636; *see also* Exh. NRC000214 at 8-9.

4.66. Based on the information presented in the FEIS, the written responses to the Board's questions and the testimony of the NRC Staff experts at the oral hearing, we conclude that the NRC Staff review of cultural and historic resources has been adequate to support the NRC Staff's conclusions. The NRC Staff has satisfied the NEPA requirement that impacts to cultural and historic resources associated with facility construction, operation, and decommissioning be given a hard look.

B. Independent Review of NRC Staff's NEPA-Related Conclusions

4.67. We now turn our attention to the NEPA-related findings required by Section II.E of the Commission's Hearing Notice and Order. The Board's environmental findings are threefold, *i.e.*, the Board must: (1) ascertain whether the NRC Staff has complied with NEPA's principal procedural requirements; (2) independently consider the "final balance among conflicting factors" in the record of the proceeding; and (3) determine whether a license should be issued, denied, or conditioned to protect the environment. *See* Section III, *supra*. As discussed above, in making those findings, the Board must give appropriate deference to the factual and technical findings of the NRC Staff.

1. Staff Compliance with Sections 102(2)(A), (C), and (E) of NEPA

4.68. The Board has reviewed the FEIS in its entirety and concludes that the NRC Staff has complied with the procedural requirements set forth in Sections 102(2)(A), (C), and (E) of NEPA. 42 U.S.C. §§ 4332(2)(A), (C), and (E); *see also* 10 C.F.R. §§ 51.71, 51.91, & App. A to Part 51. Section 102(2)(A) requires that the NRC Staff "utilize[] a systematic, interdisciplinary approach" that will ensure the integrated use of natural and social sciences in the environmental decision making process. As documented in FEIS, the NRC Staff considered in detail the potential impacts of the proposed facility on an array of physical, biological, economic, and social parameters.³⁸ *See generally* Exh. NRC000134 at Chs. 3 & 4. The FEIS includes consideration of both radiological and non-radiological (including chemical) impacts.

³⁸ Section 1.4.3 of the FEIS (Exh. NRC000134) lists the specific environmental subjects (and related impacts) studied in detail by the NRC Staff as part of its NEPA evaluation of the proposed action. They include: the need for the facility, alternatives to the proposed action, applicable regulatory requirements, land use, historic and cultural resources, visual and scenic resources, air quality, site geology and soils, water resources, ecological resources, socioeconomic impacts, environmental justice, noise, transportation, public and occupational health, waste management, decontamination and decommissioning, depleted uranium disposition, accidents, cumulative impacts, and resource commitments.

And, the NRC Staff sought to coordinate its environmental review with its safety evaluation of the proposed EREF, so as to evaluate the health, safety, and security impacts of the proposed action in a comprehensive manner. *See* Exh. NRC000134 at 1-8. For its environmental review, the NRC Staff relied on the expertise of a diverse body of professional scientists, engineers, and social scientists. Chapter 10 (List of Preparers) of the FEIS lists the principal contributors to the FEIS and identifies each individual's area of expertise or contribution, educational training, and level of experience.

4.69. Section 102(2)(C) of NEPA requires a federal agency to address in its environmental impact statement: (1) the environmental impact of the proposed action, (2) any unavoidable adverse impacts associated with implementation of the proposed action, (3) alternatives to the proposed action, (4) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and (5) any irreversible and irretrievable commitment of resources that might result from the proposed action. 42 U.S.C. § 4332(2)(C). The NRC Staff has thoroughly addressed each of these considerations in its FEIS for the proposed facility. *See* Exh. NRC000134, Chs. 2, 4, and 8.

4.70. In addition, Section 102(2)(C) requires that an agency "consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved." 42 U.S.C. § 4332(2)(C). Based upon its review of the FEIS, the Board finds that the NRC Staff also has complied with this requirement. *See* Exh. NRC000134 at Section 1.5.3 (Cooperating Agencies) and 1.5.4 (Consultations), Ch. 9 (Agencies and Organizations Consulted); Exh. NRC000135 at App. B (Consultation Correspondence), and App. I (concerning public comments).

4.71. Finally, Section 102(2)(E) of NEPA requires a federal agency to “study, develop, and describe appropriate alternatives to the recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.” 42 U.S.C. § 4332(2)(C). As set forth in Chapter 2 of the FEIS, the NRC Staff prepared a detailed discussion of alternatives to the proposed action. The types of alternatives considered by the NRC Staff included the “no-action” alternative, alternative sites, alternative sources of low-enriched uranium, alternative enrichment technologies, alternatives for depleted UF₆ disposition, and alternative deconversion technologies. *See* Exh. NRC000134 at Ch. 2 (Alternatives). The Board finds that the NRC Staff has met its obligations under NEPA relative to the consideration of alternatives.

2. *Independent Consideration of the Final Balance Among Conflicting Factors*

4.72. In Section 2.5 of the FEIS, the NRC Staff concludes that the overall benefits of the proposed EREF outweigh the environmental disadvantages and costs. *See* Exh. NRC000134 at 2-65. The NRC Staff cites two principal considerations in support of this conclusion. These include (1) the need for an additional economical domestic source of enrichment services; and (2) the environmental impacts from the proposed action are generally SMALL, although they could be as high as MODERATE for certain aspects of the areas of historic and cultural resources, visual and scenic resources, ecological resources, and transportation and as high as LARGE for certain aspects of air quality on a temporary basis. *See id.*

4.73. Based upon its review of the record of the proceeding, the written responses to the Board’s questions, and the oral testimony at the uncontested hearing on environmental issues, and an independent “weighing” of the proposed facility’s environmental, economic, technical, and other benefits against the environmental and other costs, and

considering reasonable alternatives, the Board reaches the same conclusion as the NRC Staff. That is, as set forth in the FEIS and as modified by this initial decision, the various benefits of the proposed facility outweigh its environmental costs.

3. *Ultimate Determination Regarding License Issuance*

4.74. Based upon its review of the FEIS and the record of the proceeding, the Board agrees with the NRC Staff's recommendation that the license be issued to AES. The Board agrees that the proposed mitigation measures and the environmental monitoring program described in Chapters 5 and 6 of the FEIS, respectively, would eliminate or substantially lessen any potential adverse environmental impacts of the proposed action.

V. CONCLUSIONS OF LAW

5.1. The Board has given careful consideration to all of the documentary and oral evidence presented by the parties. Based upon our review of the entire record of this proceeding and the foregoing findings of fact and conclusions of law, the Board makes the following determinations on the ultimate issues concerning the environmental aspects of the mandatory proceeding.

5.2. With respect to environmental issues, the Board has determined that the review conducted by the NRC Staff pursuant to 10 C.F.R. Part 51 has been adequate; that the requirements of Sections 102(2)(A), (C), and (E) of NEPA have been satisfied; that an independent weighing and balancing of the environmental, technical, and other costs and benefits of the proposed facility supports issuance of the license; and the requested license should be issued.

VI. ORDER

It is ORDERED, in accordance with 10 C.F.R. § 2.713, that this Final Initial Decision shall constitute the final decision of the Commission forty days from the date of

issuance, unless a petition for review is filed in accordance with 10 C.F.R. § 2.341, or the Commission directs otherwise. It is further ORDERED that the Director of NMSS is authorized to issue to AES a license to construct and operate a uranium enrichment facility. Pursuant to 10 C.F.R. § 2.340(k), the Director of NMSS shall issue the license to AES within ten days from the date of issuance of this Final Initial Decision.

Respectfully submitted,

/s/ signed electronically by

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Dated at San Francisco, California
this 12th day of August 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:)
)
AREVA ENRICHMENT SERVICES, LLC) Docket No. 70-7015-ML
)
(Eagle Rock Enrichment Facility))

CERTIFICATE OF SERVICE

I hereby certify that copies of “APPLICANT’S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW ON UNCONTESTED ENVIRONMENTAL ISSUES” in the captioned proceeding have been served via the Electronic Information Exchange (“EIE”) this 12th day of August 2011, which to the best of my knowledge resulted in transmittal of the foregoing to those on the EIE Service List for the captioned proceeding.

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