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NRC Staff Responses to Licensing Board's Initial Questions Regarding Environmental Matters

Question 1, FEIS, Section 1.3 and 2.3.2.1, Pages 1-3, 1-7, and 2-39: As support for the purported need for a domestic supply of low enriched uranium (LEU), the FEIS offers a 2002 Department of Energy (DOE) letter referencing a statement taken from a U.S. Department of State "talking points" cable dated December 2001, FEIS at 1-7, and a statement from an unspecified DOE report to Congress from December 2000, FEIS at 2-39. Is there any more recent support for the proposition that a domestic supply of LEU is a priority as a matter of public policy?

Response 1 (B. Biwer, L. Hocking): It is the staff's understanding that a domestic supply of LEU remains a priority as a matter of public policy. More recent statements relating to U.S. policy regarding the need for domestic uranium enrichment and its importance to energy security include the following:

- In a May 2010 DOE press release concerning the \$2 billion loan guarantee for the Eagle Rock Enrichment Facility, Secretary of Energy Steven Chu stated, "Increasing uranium enrichment in the United States is critical to the nation's energy and national security. Existing reactors will need additional sources of enriched uranium soon. New nuclear plants that could start to come on line as early as 2016 will also need a steady, reliable source of uranium enrichment services. AREVA's project will help to meet that demand." (NRC000160)
 - In response to a question from Senator Murkowski during a congressional hearing on June 15, 2010, the Chief Operating Officer for Nuclear Energy at the U.S. Department of Energy (DOE), R. Shane Johnson, stated that "DOE does not believe its releases of uranium [i.e., the sale of downblended surplus Highly Enriched Uranium from DOE's stockpile] relative to the total uranium market have resulted in a greater dependence on foreign sources of uranium. However, 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." (NRC000161)

Question 2, FEIS, Section 1.3.1, Pages 1-5 to 1-7: *Notwithstanding the purported policy need for an independent domestic supply of LEU, to what degree does the NRC staff's analysis of the purpose and need for the Eagle Rock Enrichment Facility (EREF) presume that utilities will purchase separative work units (SWUs) from new domestic sources, rather than from their existing foreign suppliers? Put another way, must the staff conclude that the supply from foreign sources will be reduced substantially to justify the EREF as satisfying an otherwise unmet need for LEU?*

Response 2 (B. Biwer): The staff does not need to conclude that the supply from foreign sources will be reduced substantially to justify the EREF as satisfying an otherwise unmet need for LEU because of the anticipated loss of domestic production in several years due to the expected shutdown of the Paducah Gaseous Diffusion Plant (PGDP). As discussed in Section 1.3.1 of the FEIS (NRC000134 at 1-4 to 1-7), the staff's analysis considered an expected decrease in both existing foreign and domestic sources of low enriched uranium (LEU), resulting in the need for additional sources of LEU to fulfill U.S. electricity requirements. Approximately half of U.S. demand for LEU is currently supplied by the Megatons to Megawatts Program (a foreign source) and the PGDP (a domestic source), both of which are not expected to be available within the next several years (NRC000134 at 1-6). Utilities in the United States would then find it necessary to find new supplies of LEU for fuel fabrication. This expected decrease in supply from both foreign and domestic sources is expected to occur at about the same time that the EREF would begin production. As such, the staff believes it is reasonable to presume that with both foreign and domestic sources of LEU decreasing, utilities in the United States would tap new domestic sources to fulfill their needs.

Question 3, FEIS, Section 1.3.1, Pages 1-4 to 1-5: *The staff's purpose and need analysis relies upon an anticipated increase in the number of newly-licensed nuclear power plants in the United States beginning in 2011. Does the aftermath of recent events at the Fukushima Daiichi facility associated with the March 2011 earthquake and tsunami call that assumption into question and if not, why not?*

Response 3 (S. Lemont): The aftermath of recent events at the Fukushima Daiichi facility has no impact on the staff's assumptions in its purpose and need analysis. These assumptions are

based upon the number of new reactor combined license applications (COLAs) that the staff has received (NRC000134 at 1-5). To date, no combined license applicant has withdrawn its application or sought suspension of the staff's review thereof in response to the Fukushima events. Thus, the staff's analysis remains unchanged.

Question 5, FEIS, Sections 4.2 and 5.1, Pages 4-31, 4-34, 4-45, 4-57, 4-64, 4-75, 4-90, and 5-21 to 5-24: *[a] Which, if any, of the potential mitigation measures identified by NRC in several parts of section 4.2 and summarized in Tables 5-3 and 5-4 will be implemented by AES? [b] Does NRC or state/local agencies have any authority to ensure that these measures are implemented? If so, how will the NRC or state/local agencies ensure effective implementation of the mitigation measures?*

Response 5(b) (S. Lemont): The mitigation measures identified by NRC and summarized in Tables 5-3 and 5-4 are suggestions on the part of the staff following its evaluation of the potential environmental impacts for the proposed EREF (NRC000134 at 5-21). They are non-binding on AES and would not become part of the license as conditions.

With regard to state and local agencies' authority related to potential mitigation measures, AES must comply with all applicable laws and regulations, including obtaining all appropriate construction and operating permits. A discussion of applicable laws and regulations is included in Chapter 1 of the FEIS (NRC000134 at 1-19 et seq.). The NRC staff cannot attest to how a state or local agency would implement its laws and regulations.

Question 6(a), Section 4.2.2.1, Pages 4-6 to 4-7: *Have NRC, the Idaho State Historic Preservation Office (SHPO), and AES signed the memorandum of agreement (MOA) described in this section? Specifically, has the Idaho SHPO accepted the completed mitigation of site MW004 and AES's unanticipated discoveries and monitoring plan? Have the Shoshone Bannock Tribes signed as a concurring party on the MOA?*

Response 6(a) (S. Lemont): As of the May 2, 2011, filing date of this response, the NRC, the Idaho SHPO, and AES have not yet signed the MOA discussed in Section 4.2.2.1 of the FEIS; and the Shoshone-Bannock Tribes have not yet signed as a concurring party on the MOA. However, 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 (NRC000162); Mr. Jim Kay, Licensing Manager, AES (NRC000163); and Ms. Carolyn Smith, Cultural Resources Coordinator, the Shoshone-Bannock Tribes (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 plans to hold a webinar or teleconference with all the parties (tentatively planned for May 3, 2011) to discuss and resolve any comments on the Draft MOA before preparing a final MOA for signature. The NRC has obtained comments from the Idaho SHPO and AES and is awaiting comments from the Shoshone-Bannock Tribes.

The Draft MOA reflects that AES has completed the mitigation of site MW004 and incorporates by reference AES' unanticipated discoveries and monitoring plan. As discussed in the FEIS (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 conducted from October 5 to November 8, 2010 (NRC000165). In a letter dated November 26, 2010, Ms. Susan Pengilly, Deputy State Historic Preservation Officer, Idaho SHPO, indicated that the data recovery report for the project had been reviewed and accepted by Dr. [Kenneth] Reid, [State Archaeologist and Deputy Historic Preservation Officer, Idaho SHPO], and agreed to allow AES to conduct geotechnical drilling within the boundaries of site MW004 (NRC000166). As also stated in the FEIS (NRC000134 at 4-6), the Idaho SHPO was provided with AES' unanticipated discoveries and monitoring plan. However, the Idaho SHPO has not indicated, formally or informally, that it has accepted that plan, nor has it provided any comments on the plan. The Idaho SHPO's signature of the MOA will formalize its acceptance of the completed mitigation of site MW004 and AES' unanticipated discoveries and monitoring plan.

Question 7, FEIS, Section 4.2.3.2, Page 4-11: *The FEIS notes that operation of the proposed EREF is expected to have a MODERATE impact on the quality of the recreational experience of visitors to Hell's Half Acre Wilderness Study Area (WSA). Please describe the available data on the annual number of recreational visitors to the Hell's Half Acre WSA during the last decade, and the potential for increased recreational use of the Hell's Half Acre WSA over the next three decades.*

Response 7 (D. O'Rourke): During the EIS development process, the staff contacted the Bureau of Land Management (BLM), Upper Snake Field Office, landowner of the Hell's Half Acre Wilderness Study Area (WSA), regarding visitor use of the WSA. However, detailed information regarding visitor use levels was not offered by BLM at that time. The Applicant's Environmental Report (ER) for the EREF included the following information in Section 3.9.3: "Each year, about 9,000 to 10,000 people visit BLM Hell's Half Acre WSA and about 6,600 people use the loop hiking trail" (AES000070 at 3.9-1). The staff contacted BLM again on April 20, 2011, and BLM confirmed that the visitor use data provided in the ER are reflective of the fiscal year 2007 visitor use of the WSA. BLM also indicated that visitor use of the WSA 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. Although the data in the ER were not included in the EIS, the evaluation of visual resource impacts and determination of MODERATE impact level were made based on the expected quality of the visitor experience, not on past or projected future visitor use levels. Thus, this data does not change the staff's analysis.

Question 8, FEIS, Sections 4.2.9.2, 5.1, and D.3.1.1, Pages 4-69, 5-14, 5-24, and D-9: (a) *Why does the FEIS address the environmental impacts of an accident related to the transportation of radiological materials, but not mitigation measures to reduce the risk of such accidents? See FEIS at 4-69, 5-14, 5-24.*

Response to No. 8(a) (K. Fischer): Mitigation measures discussed in the FEIS include those proposed by the Applicant in the Environmental Report (AES000070 at 4.2-6) and any additional measures identified by the NRC staff. The Applicant did not propose any mitigation

measures that are relevant to radiological transportation accidents; all mitigation measures proposed by the Applicant and NRC are intended to reduce potential impacts from routine transportation (i.e., traffic volume, noise, fugitive dust, wildlife mortality, and the release of earth materials onto US 20 during pre-construction and construction activities).

The NRC found that the potential environmental impacts of transportation accidents involving radioactive materials would be SMALL (NRC000134 at 4-72). The potential impacts would be SMALL due in part to the fact that the transportation of radioactive materials would be conducted by a third-party carrier in accordance with applicable NRC regulations governing packaging and transportation of radioactive materials (10 C.F.R. Part 71), as well as U.S. Department of Transportation regulations in 49 C.F.R. Parts 171-178 and 383-397 governing packaging, routing, carrier training, and other shipping requirements (NRC000135 at D-12, D-7). Therefore, the NRC staff did not propose any mitigation measures.

(b) Would the routing restrictions identified for modeling purposes in section D.3.1.1 be employed for actual shipments? FEIS at D-9.

Response to No. 8(b) (K. Fischer): The routing restrictions identified in Section D.3.1.1 of FEIS would not necessarily be used for actual shipments. Radioactive material shipments would be conducted by a third-party carrier, and the carrier would be responsible for route selection (NRC000135 at I-164). Route selection may vary at the time of shipment due to factors such as road construction, season, weather, local road restrictions, and the availability of new routes in the future. As noted in the NRC response to Comment 066-16 (NRC000135 at I-165), highway route controlled quantity (HRCQ) routing is not required for any radioactive material shipments that would take place to or from the proposed EREF, since the quantity of radioactive material within any package would not exceed the HRCQ threshold as defined in 49 C.F.R. § 173.403. HRCQ routing was assumed in the transportation risk analysis because it generally results in longer routes, thereby yielding greater potential impacts (i.e., a more

conservative estimate of population risk) than if the shortest route with commercial, hazardous, and radioactive material restrictions were assumed.

Question 9, FEIS, Section 4.2.15, Pages 4-111 and 4-117 to 4-119: *(a) Why were the accident scenarios discussed in section 4.2.15 of the FEIS chosen for evaluation? FEIS at 4-111, 4-117.*

Response to No. 9(a) (G. Chapman): The accident scenarios chosen for evaluation are a subset of the scenarios evaluated by the Applicant for the facility's Integrated Safety Analysis (ISA) required under 10 C.F.R. § 70.62(c). Staff performing the safety evaluation of the application collaborated with staff conducting the environmental review and staff overseeing the security evaluation to select accident scenarios that could be initiated by natural phenomena, operator error, and equipment failure and which would support evaluation of potential environmental and human health impacts as well as terrorist considerations. The selected accident scenarios encompass a diverse set of events and cover a spectrum of consequences, and are 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, Appendix A (NRC000055). The accident scenarios discussed were also utilized when performing the safety evaluation for the proposed EREF to independently verify the Applicant's methodologies for categorizing accident scenarios and determining consequences in the ISA. This aspect of the staff's safety evaluation is documented in NUREG-1951, Appendix B (NRC000167).

(b) Why were the environmental impacts for the chosen accident scenarios not put in terms of the SMALL, MODERATE, LARGE significance scale? FEIS at 4-117 to -119.

Response to No. 9(b) (J. Arnish, K. Picel): Applicable regulations (10 C.F.R. §§ 70.61(b) and (c)) require the risk of credible high consequence and intermediate consequence events to be limited. The NRC staff's evaluation of accident scenarios was performed, in part, to verify the

Applicant's accident scenario categorization and consequence determination performed in support of the ISA. That evaluation, documented in NUREG-1951, Appendix B (NRC000167), was referred to in the FEIS without modifying those categories and consequences.

While the categories and consequences were not modified from the ISA terms, the environmental impacts for accidents, in general, are characterized by the following statement at the end of Section 4.2.15.2 of the FEIS (NRC000134 at 4-119 to 4-120):

The NRC staff concludes that through the combination of plant design, passive and active engineered controls (Items Relied on for Safety [IROFS]), administrative controls, and management of these controls, accidents at the proposed facility pose an acceptably low risk to workers, the environment, and the public.

This statement is based on the staff's evaluation of a range of accidents from intermediate to high consequence for a hypothetical member of the public at the Controlled Area Boundary according to criteria defined in Table 4-30 of the FEIS (NRC000134 at 4-118). In consideration of such potential consequences, 10 C.F.R. §§ 70.61(b) and (c) require that applicants limit the risks of credible intermediate and high consequence events through the use of appropriate controls. The above statement concludes that this requirement would be met. This conclusion and the accident scenario consequence ratings serve to characterize accident impacts. The NRC staff, notes, however, 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, as stated in other sections of the FEIS (the Executive Summary, Table 2-6, Section 4.2.13, and Section 7.1.1). See NRC000134 at xl, 2-63, 4-110 to 4-111, and 7-5.

Question 10, FEIS, Section 4.2.16, Pages 4-120 to 4-127: *Although there is not a final decommissioning plan today to be used to assess the environmental impacts of decommissioning, the basic staff conclusion seems to be that the various impacts, such as water use impacts, associated with decontamination/decommissioning are bounded by the impacts associated with construction/operation. Nonetheless, are there any instances in which such decontamination/decommissioning impacts are not bounded by construction/operation impacts because, for instance, the decontamination/decommissioning activities are different from those associated with construction/operation or the impact could foreseeably exceed, even if unintentionally, the impacts arising during construction/operation?*

Response No. 10 (J. Arnish, T. Allison, K. Fischer, R. Kolpa, D. O'Rourke, T. Patton, K.

Picel, R. Van Lonkhuyzen): For most resource areas, it is not expected that the potential environmental impacts associated with Decontamination and Decommissioning (D&D) would exceed those from preconstruction and construction. Two areas where impacts from D&D could possibly exceed those of construction/operation are historic and cultural resources and ecological resources. Because D&D activities are expected to primarily disturb land areas that were previously disturbed during construction and operation of the facility, potential impacts to historic and cultural resources and ecological resources would generally be short-term and mitigable, resulting in SMALL impact levels. However, there could be circumstances where impacts to historic and cultural resources and ecological resources could possibly exceed those of construction/operations. Such circumstances would involve the use of external lands not included in the current Area of Potential Effect that would be needed for D&D activities, where the environmental baseline could include significant resources. For instance, the extra land needed could contain additional historic and cultural resources that could be affected. In this case, the impacts would not be greater than the LARGE impacts to cultural resources that would occur during construction of the EREF. There is one scenario that would result in a LARGE impact that could not be reduced to MODERATE even with mitigation: if a historic property was found on additional land needed for D&D, and if the significant resource could not be avoided and it was one of the only examples of that particular site type in the region. This scenario would result in an impact level greater than that found as a result of the construction of the EREF. However, this situation is not likely because the Applicant has greater latitude in choosing additional lands needed for D&D and would be able to avoid such unique resources.

With respect to ecological impacts, if disturbance were to occur outside of previously disturbed areas, habitats similar to those disturbed during construction would be expected to be affected. However, if important ecological resources, such as threatened or endangered

species, were to become established in the vicinity of the facility during the term of the license and were significantly disturbed during decommissioning, the impact could potentially be LARGE. Direct mortality, major behavioral changes, the establishment of noxious species to the exclusion of a threatened or endangered species, or other impact that would result in jeopardizing the local populations of threatened or endangered species would be considered a LARGE impact. Because of disturbances occurring during operations, as described in Section 4.2.7.2 of the FEIS, the likelihood of such resources becoming established in the vicinity of the facility is considered very unlikely (NRC000134 at 4-54 to 4-55).

Question 11, FEIS, Section 4.2.17.4, Pages 4-136 to 4-137: *Section 4.2.17.4 indicates that the greenhouse gas (GHG) emissions during operations comprise emissions from workforce transportation, deliveries of radiological and nonradiological materials, and consumption of fossil fuels onsite to support miscellaneous activities. However, the EISs for combined license (COL) applications indicate that uranium enrichment facilities are primarily responsible for the carbon footprint of the uranium fuel cycle due to their high energy demands, primarily supplied by coal-fired generation. See, e.g., [EIS] for [COLs] for South Texas Project Electric Generating Station Units 3 and 4: Final Report, NUREG 1937, at 6-9; id. app. I, at 3 (recognizing the lower energy demands by gas centrifuge technology over gaseous diffusion technology). Why does the FEIS include a discussion of emissions generated by workforce transportation as being sufficiently related to the proposed action to be considered a source of GHG emissions, but not GHG emissions from the provision of electricity to power the centrifuges?*

Response 11 (R. Kolpa): The NRC staff analyzed GHG impacts in both regional and national contexts while attempting to focus on the most meaningful aspects of EREF operation. In determining which aspects of the EREF operation would be included in the impact analysis, the staff reviewed available historical data on Idaho and national GHG emissions. Projections provided by Rocky Mountain Power regarding how required power would be provided to the EREF indicated that modifications to existing substations, the addition of one new substation, and construction of a 161-kV transmission line would be needed, but no new generating capacity was proposed (NRC000134 at 2-12). Although it was impossible to specify the relative contributions from Idaho generating sources, it was possible to calculate a hypothetical bounding condition for GHG emissions from electricity production by assuming all required

power would be generated by coal-fired power plants (the largest source of carbon dioxide emissions per unit of power produced among any of the existing utility-scale thermoelectric technologies).

However, the staff determined that such an assumption would be contrary to the historical record since no coal-fired power plants are currently operational in Idaho and, although an earlier State of Idaho moratorium on new coal plants has since expired, none are proposed for the foreseeable future. Natural gas-fired power plants, the only fossil fuel plants currently operating in Idaho, release roughly one third of the GHGs than coal-fired plants for equivalent amounts of power. Furthermore, the staff's review of available state and national data (NRC000168) revealed that natural gas accounts for only 14 percent of Idaho electricity, while over 80 percent is generated by hydroelectric facilities, resulting in the electricity sector representing a relatively minor contribution to statewide total GHG emissions and Idaho accounting for only 0.1 percent of the national GHG emissions from electricity production. Data from state and national inventories of GHG emissions presented in Table 4-33 (NRC000134 at 4-133) further reveal that while transportation-related GHG emissions in Idaho and the United States (in calendar year 2000) accounted for virtually the same percentage of the state and national total GHG emissions (27 percent and 26 percent, respectively), percentages of GHG emissions related to electricity consumption were dramatically different (13 percent of the statewide total versus 32 percent of the national total).

Given the relatively small projected energy requirements for the EREF, which Rocky Mountain Power has indicated it can provide 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 staff determined that generating the electricity needed to support EREF operations would represent a relatively minor indirect contribution to the EREF GHG operational footprint and that the licensing decision, which this EIS supports, would be better informed by concentrating the GHG impact analysis on other aspects of EREF

operation. Statewide GHG emission projections (NRC000134 at 4-132) revealed that by 2020, the transportation sector would make the largest contribution to statewide GHG, followed by agriculture-related activities and fuel consumption. Consequently, since both transportation and on-site fuel consumption were integral to EREF operation, the staff focused its GHG impact analysis on EREF's potential contribution to the transportation and fuel consumption sectors.

Regarding the manner in which the environmental impacts of the uranium fuel cycle were introduced into the EIS for the South Texas Project Electric Generating Station Units 3 and 4 COL, NRC regulations at 10 C.F.R. § 51.51(a) require that the contributions of the uranium fuel cycle be evaluated and added to the environmental costs of a proposed new nuclear power plant. It was also appropriate for the South Texas Project's EIS to include a GHG assessment of the nuclear fuel cycle since the results of such an analysis would provide an important reference point for the proposed action against which to evaluate the GHG footprints of alternative power generating technologies. However, as acknowledged in Section 6.1 of the South Texas Project's EIS (NRC000169), the electric power demand for the gas centrifuge enrichment technology proposed for the EREF is significantly less than that for gaseous diffusion enrichment technology. Thus, coupled with the information discussed above regarding the low impact to GHG emissions from generation of electricity to power the proposed EREF, the staff focused its analysis in the EREF EIS on other sources of GHG emissions associated with EREF operations.