

**NRC Staff Responses to Licensing Board's
Third Set of Questions Regarding Environmental Matters**

Question 20, FEIS, App. I, Page I-130; NRC000136, Pages 3-4: *In its response to environmental question 6(a), the NRC staff indicated that the memorandum of agreement (MOA) regarding the Eagle Rock Enrichment Facility (EREF) site was still being finalized, with a teleconference on the matter tentatively planned for May 3, 2011. Relative to this MOA, please provide a discussion (a) updating the status of the MOA; and (b) addressing the concern expressed by the Idaho State Historic Preservation Office in comment 126-01 that to comply with National Historic Preservation Act section 106, the MOA must be signed before the record of decision (ROD) is issued.*

Response No. 20(a) (S. Lemont): Regarding the status of the MOA, the MOA has not yet been finalized. Comments on the Draft MOA have been received from the Idaho State Historic Preservation Office (SHPO) and AES. However, on May 11, 2011, the Cultural Resources Coordinator of the Shoshone-Bannock Tribes requested an additional 2 to 3 weeks to review the Draft MOA and present it to the Tribal Business Council, after which the Tribes could provide comments on the Draft MOA. Since this was a reasonable request, the staff agreed to allow the Tribes the additional time for the review. After the Tribes' comments are received, the staff will determine whether a teleconference is needed to discuss and resolve the comments among the parties to the agreement. After all comments have been resolved and agreed upon, the staff will incorporate the comments and will circulate the Final MOA for signature by the parties.

The staff's current goal is for the MOA to be completed and executed prior to the July 12-14, 2011, mandatory environmental evidentiary hearing, but if not, then by the time the Atomic Safety and Licensing Board (ASLB) issues the Partial Initial Decision (PID) on environmental issues on September 23, 2011.

Response No. 20(b) (S. Lemont): With regard to the Idaho SHPO's comment, neither the NRC's regulations nor the Advisory Council on Historic Preservation's (ACHP) regulations prevent the NRC from issuing the record of decision, as discussed in 10 C.F.R. §§ 51.102 and 51.103, prior to execution of the MOA. In order to ensure compliance with Section 106 of the National Historic Preservation Act (NHPA), however, the staff will not issue the license to AES

prior to execution of the MOA. The staff's determination that the MOA must be signed prior to license issuance is based on the following ACHP regulation at 36 C.F.R. § 800.6(b)(1)(iv):

If the [Federal] agency official and the SHPO/THPO agree on how the adverse effects will be resolved, they shall execute a memorandum of agreement. *The [Federal] agency official must submit a copy of the executed memorandum of agreement, along with the documentation specified in § 800.11(f), to the [Advisory] Council [on Historic Preservation] prior to approving the undertaking in order to meet the requirements of section 106 and this subpart.* (emphasis added).

Thus, the MOA will be completed and signed before the NRC issues a license to AES. As indicated above, the staff's target date for MOA completion is not later than the issuance date of the ASLB's PID on environmental issues.

Question 21, NRC000136, Pages 9-10: *In its response to environmental question 10, the staff indicated that "there could be circumstances where [decontamination/decommissioning (D&D)] impacts to historical and cultural resources and ecological resources could possibly exceed those of construction/operations" and suggested a scenario that might create such a circumstance whereby "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." In this answer, is the staff referring to a hypothetical situation or is there some specific property on the EREF site that the staff has in mind relative to this response?*

Response 21 (S. Lemont): In its response to environmental question 10, the staff was referring to a hypothetical situation, and there is no specific historic property on the EREF site that the staff has in mind relative to this response.

Question 22, NRC000136, Pages 10-11: *In its response to environmental question 11, the staff indicated that greenhouse gas (GHG) emissions from electricity production for the EREF amounts to only a "minor indirect contribution to the EREF GHG operational footprint" for three reasons: dominant use of hydropower in Idaho; greater reliance on natural gas in Idaho; and the lesser energy demands of EREF compared to a conventional gaseous diffusion plant. The staff's response, however, does not provide a quantitative showing as to why EREF electricity use generates small GHG emissions compared to annual emissions during facility operation or construction.*

The staff does estimate that 100,000 separative work units (SWUs) are required to fuel a 1,000 megawatt reference reactor for one year, FEIS at 1-3 n.2, meaning that for a forty-year reference reactor, approximately 4 million SWUs would be required. Further, the staff has indicated that for the nominal gaseous diffusion process using coal-fired electricity production, the SWU output for a forty-year reference reactor would result in approximately 17 million metric tons of GHG emissions. See [EIS] for [COLs] for South Texas Project Electric Generating

Station Units 3 and 4: Final Report, NUREG-1937, app. I, at I-3. Moreover, at its nominal operating capacity the EREF will produce 6 million SWU annually. See FEIS at 1-3.

Therefore, if the EREF were a gaseous diffusion plant using coal-fired electricity production (rather than a gas centrifuge facility using hydroelectric/natural gas electricity production), it seemingly could be responsible for producing up to 17 million metric tons of GHG emissions in 2/3 of a year (to generate 4 million SWUs) or approximately 25.5 million metric tons of GHGs annually (to generate 6 million SWUs).

Further, in the EREF FEIS, the staff finds annual GHG emissions on the order of 10,000 metric tons to be worthy of discussion, even though ultimately they are deemed to result in SMALL impacts. See FEIS at 4-136 to -137 (26,136 metric tons of GHG annually from EREF operation and 7,745 metric tons of GHG averaged for each year of the seven-year preconstruction and heavy construction period for the facility). Given the nature of the staff's FEIS GHG analysis generally, and the apparent differential the staff analysis suggests exists between annual GHG emissions from a gaseous diffusion facility using coal-fired electricity production and the EREF, as a gas centrifuge facility using hydroelectric/natural gas electricity production, please provide a discussion that shows, on a quantitative basis, what annual GHG emissions would result from the EREF's electricity consumption.

Response No. 22 (R. Kolpa): In Revision 2 of the Environmental Report, AES estimated a power demand of 78 megawatts (MW) to support full production (6 million SWUs) of the EREF (AES000080 at H-1). Providing 78 MW of power continuously over the course of one year (8,760 hours) would result in the delivery of 683,280 megawatt hours (MWh) of power. Assuming that amount of power would be generated by coal-fired power plants defines a bounding condition with respect to electricity-related GHG emissions. The amount of GHGs released from the combustion of coal falls within a wide range of values, based primarily on coal rank and boiler firing conditions. The boiler's state of tune, the power plant's overall thermal efficiency, internal loads (including pollution control devices, but excluding carbon capture and sequestration), transmission line losses, and many other factors can also affect GHG emissions related to power delivered from coal combustion. However, for the northwest sector of the United States (the geographic region within which a coal-fired power plant that would provide EREF power is likely to be located), the U.S. Environmental Protection Agency (EPA) estimates that, on average in 2007, 888.7 pounds of carbon dioxide equivalents, CO₂-e (the sum of all GHGs emitted from a given activity, expressed as CO₂), were released for every MWh of power produced. Three GHGs, CO₂, methane (CH₄), and nitrous oxide (N₂O), comprise the majority of

GHGs released in fossil fuel combustion: 858.79 lb CO₂/MWh, 16.34 lb CH₄/MWh, and 13.64 lb N₂O/MWh . The national average of GHGs released from electricity production for that period was 1,344.41 lb CO₂-e/MWh (NRC000182).

Therefore, the EREF's annual power consumption would be responsible for the release of 276,036 metric tons of CO₂-e if all of the required power were produced by coal-fired power plants (888.77 lb/MWh × 683,280 MWh ÷ 2200 lb/metric ton = 276,036 metric tons). 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, nearly 100 times more than the annual GHG emissions projected from the amount of coal-fired electricity production needed to support the EREF's operations.

Finally, the projections of GHG emissions from preconstruction, construction and operation of the EREF that were provided in the FEIS (NRC000134 at 4-130 *et seq.* and 4-136 *et seq.*) focused primarily on those activities that AES could directly control and that are directly connected to facility operation such as commuting of the workforce and deliveries of feedstock and wastes. AES cannot dictate the source of the power being delivered to the EREF, and it is possible that at any given time, electricity being supplied to the EREF will have been produced by GHG-free hydroelectric, which, as noted in the staff's initial response to ASLB Question 11 (NRC000136 at 11-12), is the predominant electricity generating technology in Idaho. As discussed in the FEIS (NRC000134 at 4-131), very little coal is used in the in-state (Idaho) production of electricity, and there is no evidence to suggest that EREF will itself be responsible for a dramatic shift in the way in which electricity is produced in, or imported into, Idaho. The profile of electricity technologies currently in place in Idaho, combined with the relatively small power demands of the EREF (when compared to a gaseous diffusion plant of equivalent capacity) suggest that electricity will not be a primary factor responsible for GHG emissions relating to EREF operation.

Question 24, AES000064, Table I, Pages 13-15: *In its response to environmental question 5(a), AES provided a table that outlines AES's planned implementation actions relative to each of the staff's recommended construction/operation mitigation measures. Please provide a discussion regarding whether, and why, the staff is satisfied with the planned AES implementation actions described in Table I concerning the activities associated with (a) stormwater management with respect to roofs; (b) wildlife protection for basins with water quality unsuitable for wildlife; (c) wildlife protection for offsite lands lost to wildlife due to project effects; and (d) radiological effects relative to using empty cylinders to reduce external exposure to workers.*

Response No. 24 (T. Patton, R. Van Lonkhuizen, and B. Biwer): The following response addresses the four parts, (a) through (d), of Question No. 24, which relates to AES's response to Question No. 5(a) regarding its plans for implementation of the NRC-recommended mitigation measures in Tables 5-3 and 5-4 of the FEIS. The NRC staff found that the mitigation measures to which AES originally committed, as listed in Tables 5-1 and 5-2 of the FEIS, are sufficiently protective of human health and the environment. However, the staff presented the additional potential mitigation measures in FEIS Tables 5-3 and 5-4 as recommendations. The staff did so for two reasons. First, if implemented by AES, the additional measures may 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 agencies and from State agencies for additional mitigation measures and related actions. However, as discussed in the FEIS (NRC000134 at Page 4-1 to 4-2), the NRC-recommended mitigation measures in Tables 5-3 and 5-4 are not requirements being imposed upon the applicant.

Response No. 24(a) (T. Patton): The additional NRC-recommended mitigation measure during operation related to stormwater management with respect to roofs is:

Reduce the size of impervious surfaces (parking lots, roads, and roofs) to the extent possible.

AES's response regarding its planned implementation action was:

Yes, though roofs are not included.

The NRC-recommended mitigation measure cited above was included at the request of the U.S. Environmental Protection Agency (EPA) Region 10 (see NRC000135 at I-142) and is consistent with best management practices (BMPs) promoted by EPA and cited in EPA's report, "Using Smart Growth Techniques as Stormwater Best Management Practices" (NRC000183). One of the goals of these EPA BMPs with regard to stormwater management is to reduce the area of impervious surfaces (and thus the volume of surface runoff) to the maximum extent possible. NRC000183 at 20, 22, and 23. AES has agreed to implement this measure for parking lots and roads, but not for roofs.

The NRC staff is satisfied with AES' proposed implementation of this mitigation measure. The staff considers the implementation of this recommended mitigation measure for the areas specified except for roofs to be reasonable on AES's part because other required factors related to engineering design and safety would have to take precedence in determining buildings' sizes and configurations (and, therefore, roof sizes). In addition, AES has stated that it will divert stormwater to an on-site stormwater detention basin to avoid increasing surface runoff to adjacent properties (see AES000070 at 4.4-4). Thus, the staff considers the stormwater management measures to be implemented by AES to be adequate to control surface runoff and any related impacts.

Response No. 24(b) (R. Van Lonkhuizen): The additional NRC-recommended mitigation measure during operation related to wildlife protection at basins with unsuitable water quality is:

For basins with water quality unsuitable for wildlife, use animal friendly fencing and netting or other suitable material over basins to prevent use by migratory birds.

AES's response regarding its planned implementation action was:

Since the EREF will not discharge any treated UF₆ process waters to the basins, the need for netting (or other suitable mitigation methods) is not anticipated. However, AES will consult with the appropriate Idaho authorities when basin designs are complete to discuss this issue further. Animal friendly fencing will be utilized around the basins.

The NRC staff is satisfied with AES's planned implementation action since the staff believes that AES's consultation with "appropriate Idaho authorities" would include coordination with the Idaho Department of Fish and Game (IDFG). Coordination with the IDFG regarding this matter would result in the adequate protection of migratory birds because IDFG is the state wildlife authority and has the requisite expertise in the protection of wildlife, including migratory birds.

Response No. 24(c) (R. Van Lonkhuyzen): The additional NRC-recommended mitigation measure during operation related to wildlife protection for offsite lands is:

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.

AES's response regarding its planned implementation action was:

Not necessary. None anticipated.

The NRC staff recommended implementation of this additional mitigation measure for potential impacts to ecological resources during operation for reasons discussed below.

The attachment to the April 14, 2010, email from Sharon Kiefer of the IDFG, to Stephen Lemont of the NRC included the following statement (see NRC000135 at B-30):

The Department offers the following as our assessment of likely impacts due to the project, and we request in order of preference that NRC require in the license that:

- The licensee to take measures to avoid and reduce wildlife and wildlife-related recreation impacts and subsequently,
- The licensee be required to fully mitigate for unavoidable wildlife, habitat, and wildlife-related recreational impacts due to project construction and operation.

We believe consultation with the Department and other natural resource managers would ensure implementation of effective measures to avoid, reduce, and mitigate adverse wildlife effects and ask the NRC to support such an approach.

The same attachment also included the following statement (see NRC000135 at B-31):

If wildlife avoid public lands surrounding the project due to noise, lights, roads, or human presence due to the facility, we urge NRC to require that the licensee study and disclose these effects, and fully mitigate for lands lost to wildlife due to project effects....

In addition, the IDFG's comments on the Draft Environmental Impact Statement included the following (see NRC000135 at I-155):

If monitoring indicates sage-grouse do avoid public lands surrounding the facility due to post construction operational effects, such as lights and roads, we request AES to determine corrective action or to mitigate the offsite public lands lost to wildlife due to project effects.

Based on the above statements/requests from the IDFG, the NRC staff recommended that coordination with the IDFG regarding this issue should be conducted because the IDFG's requests are reasonable, and it generally is good environmental practice to coordinate with such natural resource agencies to provide opportunities to identify and resolve issues efficiently and effectively. Furthermore, such coordination is not expected to constitute a significant effort for AES as it would be consistent with what the staff understands to be AES's intentions regarding cooperation with natural resource agencies (including the IDFG) on the minimization of ecological impacts. The staff's understanding is based on statements made by AES in Revision 2 of its Environmental Report (AES000070), including the following:

AREVA, IDFG, and USFWS agreed to continue discussions as the proposed project planning evolves and, as appropriate, develop mitigations to minimize impacts to ecological resources. AES000070 at 4.5-6.

...AES will consider all recommendations of appropriate state and federal agencies, including the United States Fish and Wildlife Service and the Idaho Department of Fish and Game. AES000070 at 5.2-5.

...additional consultation with all appropriate agencies (Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, Bureau of Land Management) will continue. Agency recommendations, based on future consultation and monitoring program data, will be considered when developing action and/or reporting levels for each element. AES000070 at 6.3-1 to 6.3-2.

Based on the above, the staff still maintains that AES should consider implementing this mitigation measure.

Response No. 24(d) (B. Biwer): Response No. 24(d) (B. Biwer): The additional NRC-recommended mitigation measure during operation related to reducing worker radiological exposure is:

Store 'empty' cylinders with heels in the middle of a storage pad between full tail cylinders to reduce external exposure to workers.

AES's response regarding its planned implementation action was:

"Empty" cylinders will be stored in accordance with ALARA practices. AES will also consider, as practicable, storing cylinders so as to maximize shielding from nearby cylinders.

"Empty" tail cylinders pose a greater external radiation hazard to workers than full tail cylinders (i.e., cylinders filled with depleted uranium hexafluoride) for the reasons discussed in Section D.3.5 of the FEIS (NRC000135 at D-21). Storing "empty" cylinders in the middle of a storage pad between full tail cylinders is a practice that would reduce external exposure to workers because of the shielding characteristics of the full tail cylinders. As indicated in AES000064, Table 1 (page 15), AES's implementation action would include storage of "empty" cylinders in accordance with ALARA ("As Low As Reasonably Achievable") practices. It is the NRC staff's understanding that AES will also "consider, as practicable," storing "empty" cylinders so as to maximize shielding by full tail cylinders. The NRC staff is satisfied with AES's planned implementation action because AES has indicated that "empty" cylinders will be stored in accordance with ALARA practices, which is sufficiently protective of human health and the environment.