UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 15, 2012

Mr. Adam C. Heflin
Senior Vice President and Chief Nuclear Officer
cc: Sarah Kovaleski
Callaway Plant, Unit 1
Union Electric Company
P.O. Box 620
Fulton, MO 65251

SUBJECT: ENVIRONMENTAL SITE AUDIT REGARDING CALLAWAY PLANT, UNIT 1 (TAC NOS. ME7715 AND ME7716)

Dear Mr. Heflin:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing Ameren Missouri's license renewal application for Callaway Plant, Unit 1 (Callaway). The environmental site audit will be conducted at Callaway during the week of May 20, 2012, by NRC and Ecology and Environment, Inc. The environmental audit activities will be conducted in accordance with the enclosed environmental audit plan.

To develop the Supplemental Environmental Impact Statement, the NRC staff requests the information described in the enclosed environmental audit needs list be made available, to the extent possible, during the environmental site audit. A draft schedule of tours and meetings for the audit is also enclosed. The NRC staff informally transmitted this information to your staff (Sarah Kovaleski), via e-mail on May 4, 2012.

If you have any questions, please contact me by telephone at 301-415-6337 or by e-mail at Carmen.Fells@nrc.gov.

Sincerely,

Carmen Fells, Project Manager
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosures:
1. Regulatory Environmental Audit Plan
2. Environmental Audit Draft Schedule
3. Environmental Audit Needs List
4. SAMA Audit Requests Document

cc w/encls: See next page

**LICENSE RENEWAL ENVIRONMENTAL AUDIT PLAN**
**CALLAWAY PLANT, UNIT 1**

## 1. Background

By letter dated December 15, 2011, Ameren Missouri (Ameren or applicant) submitted to the U.S. Nuclear Regulatory Commission (NRC or staff) an application to renew Callaway Plant, Unit 1, operating license NPF–30. The staff is reviewing the information contained in the environmental report (ER) of the license renewal application (LRA) per Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54).

During the staff's review, an environmental audit is conducted at the Callalway site. This audit is conducted with the intent to gain understanding, to verify information, and to identify information that will require docketing to support the basis of the licensing or regulatory decision. Specifically, the NRC staff will identify pertinent environmental data, review the facility and area, and obtain clarifications regarding information provided in the ER.

Per NRC guidance, the NRC staff prepares a regulatory audit plan that provides a clear overview of audit activities and scope, team assignments, and schedule.

## 2. Environmental Audit Bases

License renewal requirements are specified in 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." Licensees are required by 10 CFR 54.23 to submit an ER that complies with the requirements in 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," as part of the LRA. Review guidance for the staff is provided in NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Supplement 1 – Operating License Renewal."

NRC staff is required to prepare a site-specific supplement to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants." During the scoping process required in 10 CFR Part 51, NRC staff is required to define the proposed action, identify significant issues which must be studied in depth, and to identify those issues that can be eliminated from further study.

## 3. Environmental Audit Scope

The scope of this environmental audit for the Callaway license renewal is to identify those issues which are significant and those issues which can be eliminated from further study and to identify the environmental resources that must be adequately described and evaluated in the site-specific supplemental Environmental Impact Statement. Audit team members will focus on reviewing the documents and requested information listed in the Callaway Environmental Audit Needs List (Enclosure 3) and discussing the information with plant personnel subject matter experts.

**4. Information and Other Material Necessary for the Environmental Audit**

The Severe Accident Mitigation Alternatives (SAMA) team will also participate in the audit. The information requested by environmental and SAMA reviewers may be found within enclosures 3 and 4, respectively.

**5. Tentative Team Assignments Area of Review Assigned Auditor**

The environmental audit team members and their specific discipline assignments are shown in Table 1. Contract team members represent Ecology and Environment, Inc. (E&E) and Pacific Northwest National Laboratory (PNNL).

**Table 1 Environmental Audit Team Members and Resource Assignments**

| Discipline | Team Members |
|---|---|
| Environmental Project Manager | Carmen Fells, NRC<br>Jacquelyn Gillings (Program Manager), E&E<br>Jone Guerin (Project Manager), E&E |
| Aquatic | Dennis Logan, NRC<br>Gregory Netti, E&E<br>Sean Meegan, E&E |
| Cultural Resources | Emily Larson, NRC<br>Nastasha Snyder, E&E |
| Environmental Justice and Socioeconomics | Jeffrey Rikhoff*, NRC<br>Jone Guerin, E&E |
| Health Physics | Stephen Klementowicz*, NRC<br>John Mauro, E&E |
| Hydrology | William Ford, NRC<br>David Back, E&E |
| Land Use | Jeffrey Rikhoff*, NRC<br>Deepali McCloe*, E&E |
| Meteorology/Air | Andrew Stuyvenberg*, NRC<br>Bruce Wattle, E&E |
| Terrestrial | Briana Balsam, NRC<br>Gregory Netti, E&E<br>Sean Meegan, E&E |
| Severe Accident Mitigation Alternatives (SAMA) | John Parillo, NRC<br>Garill Coles, PNNL |
| Waste Management | Stephen Klementowicz*, NRC<br>Donna Kassel, E&E<br>Gregory Hofer, E&E |
| * May not be participating in environmental site audit. | |

**6. Logistics**

The environmental audit will be conducted at Callaway from May 22-24, 2012. An entrance meeting will be held with plant management at the beginning of the audit. An exit meeting will be held at the end of the environmental team audit and again at the conclusion of the SAMA audit.

**7. Special Requests**

The staff requests the applicant make available the information identified on the Environmental Audit Needs List. Plant staff who are subject matter experts in the disciplines listed on the Environmental Site Audit Needs List should be available for interviews and to provide tours which have been identified on the Environmental Audit Draft Schedule (Enclosure 3).

**8. Deliverables**

A report should be issued by the NRC staff to the applicant within 90 days from the end of the environmental audit

**CALLAWAY PLANT, UNIT 1**
**LICENSE RENEWAL ENVIRONMENTAL SITE AUDIT DRAFT SCHEDULE**

Tuesday, May 22, 2012
Site Entrance Meeting
General Plant Overview Presentation
Site and Vicinity Tour
REMP/Met Tour
Cultural Resources Tour
Hydrology/Ecology Tour
Waste Management Tour
Debrief

Wednesday, May 23, 2012
REMP/Rad Waste Discussion
Air/Meteorology Discussion
SAMA Discussion
Cultural Resources Discussion
Transmission Lines Discussion
Groundwater/Surfacewater Discussion
Aquatic/Terrestrial Discussion
REMP/Rad Waste Discussion
Environmental Site Exit Meeting

Thursday, May 24, 2012
SAMA Discussion
SAMA Site Exit Meeting

ENCLOSURE 2

**CALLAWAY PLANT, UNIT 1**
**LICENSE RENEWAL ENVIRONMENTAL SITE AUDIT NEEDS LIST**

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed Appendix E of the Environmental Report (ER) for Callaway Plant, Unit 1 (Callaway), license renewal application (LRA) and has found that it meets the requirements of 10 CFR 51.45.

Please make the following available to staff during the environmental site audit.

| | ER Section | Information Needed | Responsibility |
|---|---|---|---|
| **G** | | **General** | |
| G-1 | | Provide originals of all ER figures in .jpeg, .png or .tif format at a resolution of at least 300 dpi, and sized correctly. | |
| **AQ** | | **Aquatic Ecology** | |
| AQ-1 | 2.2.4 | The ER and the Combined Operating License Application (COLA) Unit 2, Environmental Report cite or describe historic and recent studies on aquatic ecology of the Missouri River near Callaway. Please provide review copies of these studies and someone knowledgeable on either the studies or the use of them in the ER. | Dennis Logan (NRC) / Greg Netti (E&E) |
| AQ-2 | 2.2.4 | Clarify the location of the discharge point for blow-down water and other waste streams to the Missouri River. | Dennis Logan (NRC) / Greg Netti (E&E) |
| AQ-3 | 2.5 | Provide copies of or, if copies are not available, descriptions of pre-operational surveys of fish conducted in 2007 and 2008 within reach of the Missouri River adjacent to Callaway's cooling water intake mentioned on page 20, plus any associated reports or documentation. | Dennis Logan (NRC) / Greg Netti (E&E) |

ENCLOUSURE 3

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|---|---|---|---|
| AQ-4 | 2.5 | Please provide reports or documentation related to the Missouri Department of Conservation fish surveys in the Missouri River near the Callaway site, in particular the surveys that have resulted in collection of pallid sturgeon. If possible, please provide someone knowledgeable about either the studies or the use of them in the ER. | Dennis Logan (NRC) / Greg Netti (E&E) |
| AQ-5 | 2.5 | Provide any associated reports or documentation related to the historical records and contacts with state and federal resource agencies mentioned on page 20 of the ER regarding occurrence of federally listed mussels in the vicinity of Callaway, if they are not already included in Attachment C. | Dennis Logan (NRC) / Greg Netti (E&E) |
| AQ-6 | 3.1.2 | Section 3.1.2 does not compare plant water withdrawal rates to river flow. Please provide additional details regarding the assumptions and calculation of Callaway's volume of water withdrawal for cooling towers (~ 56 cfs) in relation to Missouri River's flow rates. | Dennis Logan (NRC) / Greg Netti (E&E) |
| AQ-7 | 3.1.2 | Describe in more detail the intake velocity at the traveling screens, design and operation of the traveling screens, and any other operational procedures or structural designs that affect impingement and entrainment at the Callaway Pump Station on the Missouri River. Also please provide information regarding the depth of the intake and the means by which flow is regulated for the flow intake structure. | Dennis Logan (NRC) / Greg Netti (E&E) |
| AQ-8 | 3.1.2 | Section 3.1.2 on page 3 of 14 states that the "The bays contain fish escape openings in the side walls, but a fish-return system is not provided (nor is required)." Please provide copies for review of any studies or documentation of the effectiveness of this mitigation system. | Dennis Logan (NRC) / Greg Netti (E&E) |

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| AQ-9 | 3.1.2 | The ER in *Section 3.1.2 Cooling and Auxiliary Water Systems* states that<br><br>*"Callaway injects anti-scalants and dispersants, biocides, and corrosion inhibitors."*<br>and<br>*"Water from the River Intake Structure is pumped to the Water Treatment Plant where suspended solids are removed in three clarifiers utilizing flocculants. Sodium hypochlorite and a molluscicide are also added as needed."*<br><br>Please provide information on identity and application rates of the chemicals used. | Dennis Logan (NRC) / Greg Netti (E&E) |
| AQ-10 | 2.5 | The ER *Section 2.5 Threatened or Endangered Species* states that various species have not been documented or reported on plant property. Please provide for review the available studies, documentation, or procedures that Ameren funds, undertakes, or uses to document the presence or absence of protected species near or on the plant site. Among these, please provide reports from contractors who "examined historical records and consulted resource agencies" to see if protected fish species occur near the site (page 20). | Dennis Logan (NRC) / Greg Netti (E&E) |
| AQ-11 | 4.10 | The ER *Section 4.10 Threatened or Endangered Species* states that<br><br>*"Similarly, a few threatened or endangered aquatic species (e.g., freshwater mussels, pallid sturgeon) occur within the Missouri River drainage near the plant site and additional listed species (e.g., Topeka shiner, Niangua darter) occur or historically occurred in the Missouri River tributaries that feed the Missouri River."*<br><br>Please provide for review the available studies or procedures that Ameren funds, undertakes, or uses to document that protected species are not impinged or entrained at the intake or affected by the thermal effluent. These species should include the fish species used by the glochidial stages of protected freshwater mussels. | Dennis Logan (NRC) / Greg Netti (E&E) |

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| AQ-12 | 2.4 | According to the ER (Section 2.4, page 17 of 71), the Reform Conservation Area (RCA) is on land owned by the plant and protected for conservation and restoration of plants and wildlife, among other uses. Please provide for review studies or other documentation on any sensitive or important terrestrial or aquatic habitats in the RCA and any ongoing conservation, environmental protection, or educational projects or activities that Ameren supports in the RCA. Please provide a review copy of the Reform Conservation Plan if it is not publicly available. | Dennis Logan (NRC) / Greg Netti (E&E) |
| **CR** | | **Cultural Resources** | |
| CR-1 | 2.14 | Provide copies of pre- and post-construction aerial photographs of the entire Callaway property, including the plant site, and existing transmission lines. Provide copies of aerial photographs of any areas where CR surveys have been done for other proposed projects in the recent past (e.g. for the Unit 2 COLA, proposed pipeline/access road corridor and transmission line corridor). | Emily Larson (NRC) / Nastasha Snyder (E&E) |
| CR-2 | 2.14 | Provide a map detailing the locations of previous and existing ground disturbance within the Callaway property, including the plant site; along the existing transmission lines; and within any areas of previously proposed development. | Emily Larson (NRC) / Nastasha Snyder (E&E) |
| CR-3 | 2.14 | Provide color copies of full-size U.S.G.S. 7.5-minute topographic quadrangle maps showing the boundaries of the entire Callaway property, the plant site, and existing transmission lines. Include maps developed for previously proposed projects. | Emily Larson (NRC) / Nastasha Snyder (E&E) |
| CR-4 | 2.14 | Provide vegetation/land-use maps of the Callaway property, the plant site, and associated transmission lines. Include maps developed for previously proposed projects. | Emily Larson (NRC) / Nastasha Snyder (E&E) |
| CR-5 | 2.14.2 | Provide color copies of all documents referenced in Section 2.14.2 of the ER, including reports for all previous cultural resources studies (archaeological surveys and any architectural and historical analysis) of Callaway's entire property, including the plant site and the existing transmission lines and of any previously proposed development. | Emily Larson (NRC) / Nastasha Snyder (E&E) |

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| CR-6 | 2.14.2 | Provide information on whether the Callaway plant and existing transmission lines are or would be visible from any surrounding NRHP-listed or -eligible historic properties, including, but not limited to, those historic properties identified in Table 2.14-1 of the ER. | Emily Larson (NRC) / Nastasha Snyder (E&E) |
| CR-7 | 2.14.2 | Provide copies of all correspondence to and from the MO State Historic Preservation Officer (SHPO), including attachments, regarding determinations of NRHP-eligibility of all cultural resources (archaeological and architectural) identified to date and any findings of effect (Effects Determinations) for activities within the entire Callaway property, including the plant site, along the existing transmission lines, and for any previously proposed development. This correspondence would be in addition to that included in the ER. | Emily Larson (NRC) / Nastasha Snyder (E&E) |
| CR-8 | 2.14.3 | Provide a color copy of Ameren's Cultural Resource Management Plan for Callaway, revised and/or updated through 2006. This plan is cited as AmerenUE 2006 in Section 2.14.3 of the ER. | Emily Larson (NRC) / Nastasha Snyder (E&E) |
| CR-9 | 2.14.3 | Provide a color copy of Ameren's Excavation Construction and Safety Standards procedure. This procedure is cited as AmerenUE 2010 in Section 2.14.3 of the ER. | Emily Larson (NRC) / Nastasha Snyder (E&E) |
| **EJ & S** | | **Environmental Justice & Socioeconomics** | |
| EJ-1 | | Provide information about any observed subsistence consumption behavior patterns—specifically fish and wildlife consumption—by minority and low-income populations in the vicinity of Callaway. This subsistence consumption behavior could consist of hunting, fishing, and trapping of game animals and any other general food gathering activities (e.g., collecting nuts, berries, and other plant material) conducted by minority and low-income individuals. | Jeff Rikhoff (NRC) / Jone Guerin (E&E) |

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| EJ-2 | | Provide information about current or past wildlife sampling and testing of game animals such as deer, squirrel, turkey, pheasant, duck, fish and other game birds and animals that may have been conducted in the vicinity of Callaway. Wildlife sampling and testing may have been conducted before, during, and after plant construction and in the early days of plant operation, but was discontinued after determining that tissue samples consistently showed no significant or measurable radiological impact on the environment from plant operations. | Jeff Rikhoff (NRC) / Jone Guerin (E&E) |
| S-1 | 2.10 | Provide updated property tax information, similar to the data provided in Tables 2.10.1 and 2.10.2 of the ER. Include data for the years 2009, 2010 and 2011, if available. | Jeff Rikhoff (NRC)/Jone Guerin (E&E) |
| S-2 | 2.10 | Provide additional information about tax payments to Callaway County and the portion of the county tax monies allocated to the "Callaway County General Fund," road and bridge maintenance funds, several fire districts, the County library, several municipalities, the County ambulance, a handicapped/sheltered workshop, and the State of Missouri." According to the tax information presented in Tables 2.10.1 and 2.10.2 in the ER, the South Callaway County R-II School District receives approximately 70 percent of the Ameren tax payments to Callaway County. A brief explanation of how the state of Missouri taxes utilities and how these payments are allocated would be helpful. A table showing the distribution of the remaining 30 percent of the Ameren tax payment compared to revenues would also be helpful. It's important to know how dependent some of these entities may be on the revenue received from the Callaway property tax payment via the county. | Jeff Rikhoff (NRC) / Jone Guerin (E&E) |
| S-3 | 2.10 | In addition to property tax payment information presented in Section 2.10 of the ER, describe any other major annual support payments, one-time payments, and other forms of non-tax compensation (if any) provided to local organizations, communities, and jurisdictions (e.g., county, municipality, townships, villages, incorporated places, and school districts) on behalf of Callaway. | Jeff Rikhoff (NRC) / Jone Guerin (E&E) |
| S-4 | 2.10 | Provide information about any anticipated changes in assessed property value or any other recent or anticipated payment adjustments that could result in notable increases or decreases in tax or other payments. | Jeff Rikhoff (NRC) / Jone Guerin (E&E) |

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| S-5 | | Provide data on the height of the tallest (visible from offsite locations) structures at Callaway and general information on the visibility of plant facilities from various offsite locations. | Jeff Rikhoff (NRC) / Jone Guerin (E&E) |
| S-6 | | Provide noise emissions studies conducted at Callaway, if any, and any information about noise that could be considered a nuisance to offsite property owners. Also, provide any information about noise complaints. | Jeff Rikhoff (NRC) / Jone Guerin (E&E) |
| S-7 | 3.4 | Provide updated workforce data (e.g., residential distribution of permanent workforce by county), similar to the data provided in Table 3.4-1, for the years 2010 or later, if available. | Jeff Rikhoff (NRC) / Jone Guerin (E&E) |
| **EM** | | **Electromagnetic Fields** | |
| EM-1 | 4.13 | ER Section 4.13 and Table 4.13-1 discuss and present the results of a calculation demonstrating compliance with NESC requirements to limit induced currents on the ground near transmission lines to 5 mA. For the computer code used to calculate the induced current, provide a brief summary of the code that describes the modeling used for the code and information on how the code was validated. | Stephen Klementowicz (NRC) / John Mauro (E&E) |
| **HH** | | **Human Health (Health Physics and Occupational Health)** | |
| HH-1 | 4.0 | Provide information on any abnormal/unusual spills, and leaks of radioactive material that occurred on site that are applicable to the criteria in 10 CFR 50.75(g) and NEI 07-07, "Industry Ground Water Protection Initiative – Final Guidance Document." | Stephen Klementowicz (NRC) / John Mauro (E&E) |
| HH-2 | 2.3.4 | Provide information on the radiological groundwater protection program (RGPP). | Stephen Klementowicz (NRC) / John Mauro (E&E) |

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| **HWQ-GW** | | **Hydrology and Water Quality - Groundwater** | |
| HWQ-GW-1 | 2.3 | Provide a map that identifies the closest private well to Callaway's deep well at the river water intake structure (Intake Well #1) that is located approximately 0.25 miles southeast of the Callaway intake structure well. | William Ford (NRC) / David Back (E&E) |
| HWQ-GW-2 | 2.3 | For Wells #1, #2, and #3 and Intake Well #1 we would like to view construction logs and schematics and records of water production covering the last 5 years. We would also like to know about any outage periods for these wells. | William Ford (NRC) / David Back (E&E) |
| HWQ-GW-3 | 2.3.2 | Provide the reporting submission provided to MDNR (since the water withdrawals exceed 70 gallons per minute (gpm). | William Ford (NRC) / David Back (E&E) |
| HWQ-GW-4 | 2.3..4.1 | We would like to discuss what is being learned from the "Site Groundwater Protection Initiative" that is part of the Nuclear Energy Institute (NEI) "Industry Ground Water Protection Initiative". We would like to understand the location and concentration of any radiological or non-radiological contaminants detected in groundwater underlying the site. We would like to know about any corrective actions taken or planned to prevent and cleanup groundwater contamination. We would like to view the most recent information and historical trend data that delineate the tritium contamination in ground water and a map showing the locations of the monitor wells constructed as part of the industry groundwater protection initiative. We would also like to view surface and groundwater studies (aquifer tests, modeling, etc.) conducted onsite since the facility was built. | William Ford (NRC) / David Back (E&E) |
| **HWQ-SW** | | **Hydrology and Water Quality – Surface Water** | |

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| HWQ-SW-1 | 2.2.3 | Provide any notices of violation (NOVs), nonconformance notifications, or related infractions received from regulatory agencies associated with NPDES permitted discharges, sewage systems, ground water or soil contamination, including spills, leaks, and other inadvertent releases of fuel solvents, chemicals, or radionuclides (covering the past 5 years). We would like to view all nonradiological monitoring reports from the last 5 years, including discharge monitoring reports and surface water use/diversion reports. We would like to view the existing NPDES permit, including surface water monitoring requirements, and learn if a permit renewal is underway. The current permit expires February 12, 2014. If a NPDES renewal application has been prepared, provide a copy of this application for review. | William Ford (NRC) / David Back (E&E) |
| HWQ-SW-2 | 3.1.2 | For the Circulating Water System provide average flow rates over the last 5 years and identify any outage periods. Provide permitted quantity for discharge under the NPDES permit to the Missouri River. Section 4.1 of the ER provides an indication of the flow rate for this discharge, but not a quantity. | William Ford (NRC) / David Back (E&E) |
| HWQ-SW-3 | 3.1.2 | For Storm Water Retention and Proposed Settling Ponds<br>Provide data to establish past performance (e.g., adequately sized) and whether additional capacity is needed and preliminary design information for the proposed settling ponds. | William Ford (NRC) / David Back (E&E) |
| HWQ-SW-4 | 3.1.2 | Provide a discussion on the location and description of how and what chemicals must be added to the intake system for inspection, cleaning, etc. | William Ford (NRC) / David Back (E&E) |
| **LU-T** | | **Land Use and Transmission Lines** | |
| LU-T 1 | 2.11 | Please confirm that the 2005 land use/land cover data presented in Table 2.11-1 and Figure 2.11-1 has not changed. | Jeff Rikhoff (NRC) / Deepali McCloe (E&E) |

| MET | | Meteorology and Air Quality | |
|---|---|---|---|
| MET-1 | 2.13 | Provide a description of the primary meteorological tower and backup meteorological tower. Include a description of instrumentation installed and height of installation for each instrument. Describe any changes in land use around the tower sites that have occurred since installation and may affect any meteorological sensors. | Drew Stuyvenberg (NRC) / Bruce Wattle (E&E) |
| MET-2 | 2.13 | Provide seasonal and annual summary wind statistics in the form of wind direction and speed frequency distribution tables and wind roses. Also provide a text description of wind characteristics at the site. Specifically discuss predominant wind direction and speed by season and annual average, local terrain features affecting wind direction and speed, and provide a value for annual average wind speed and peak wind gust. | Drew Stuyvenberg (NRC) / Bruce Wattle (E&E) |
| MET-3 | 2.13 | Provide a list of permitted air emission sources in the Title V operating permit issued to Callaway and the associated permitted emission quantities. | Drew Stuyvenberg (NRC) / Bruce Wattle (E&E) |
| MET-4 | 2.13 | Provide the most recent five (5) years of annual emission statements to the MDNR for emissions of air pollutants resulting from operations at Callaway. | Drew Stuyvenberg (NRC) / Bruce Wattle (E&E) |
| **TE** | | **Terrestrial Ecology** | |
| TE-1 | 4.0 | Briefly describe the specific records or information Ameren reviewed to determine that no new and significant information exists for each of the terrestrial ecology Category 1 issues applicable to Callaway. | Briana Balsam (NRC) / Greg Netti (E&E) |
| TE-2 | 2.4 | The ER references several ecological studies conducted in 2007 and 2008 for the Callaway Plant, Unit 2 COLA and also references the COLA Environmental Report. Please provide copies of the terrestrial studies performed for the COLA, including the mammalian, avian, and herpetological studies mentioned on page 17 and the floral survey and 2007 land cover survey mentioned on page 2-226 of the COLA ER. | Briana Balsam (NRC) / Greg Netti (E&E) |

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| TE-3 | 2.4 | Provide a copy of the Standard Operating Procedures for the Callaway Plant, Unit 2 Siting Study and the Natural Resources Field Sampling and Analysis (MACTEC 2007), which is referenced on page 2-226 of the COLA Environmental Report. The document provides the methodology for the ecological studies referenced on page 17. | Briana Balsam (NRC) / Greg Netti (E&E) |
| TE-4 | 2.4 | From the staff's initial review, Callaway appears to overlap with the Central Missouri Hills-33 Important Bird Area (IBA) described here: http://iba.audubon.org/iba/viewSiteProfile.do?siteId=2587&navSite=state. The transmission line corridors do not appear to cross any designated IBAs. Confirm that these statements are true and describe the extent to which Callaway overlaps with the Central Missouri Hills-33 IBA. | Briana Balsam (NRC) / Greg Netti (E&E) |
| TE-5 | 2.4 | Provide a copy of Ameren's transmission line vegetative maintenance procedure(s). | Briana Balsam (NRC) / Greg Netti (E&E) |
| TE-6 | 2.4 | Describe the specific mitigation measures that Ameren takes to ensure that its transmission line maintenance does not impact any Federally listed species, including personnel training, coordination with State and Federal agencies, and specific precautions that workers must take in the field. Provide copies of related procedures, if applicable. | Briana Balsam (NRC) / Greg Netti (E&E) |
| TE-7 | 2.4 | Provide references or supporting studies documenting that bald eagles and Northern harriers do not currently nest on or near the Callaway site. | Briana Balsam (NRC) / Greg Netti (E&E) |
| TE-8 | 4.10 | Page 16 indicates that the Indiana bat does not occur on the Callaway site. However, page 2-240 of the COLA Environmental Report states: "Indiana bats have been recorded historically and are assumed to be present in the vicinity of the AmerenUE property." Please explain these seemingly contradictory statements. | Briana Balsam (NRC) / Greg Netti (E&E) |
| TE-9 | 2.4 | Provide the source of the following sentence on page 19: "...a gray bat was documented in a cave nearby in an off-site segment of Auxvasse Creek." | Briana Balsam (NRC) / Greg Netti (E&E) |

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| TE-10 | 2.4 | Page 21 states that the eastern hellbender has not been observed on the site. Provide the sources of information for this statement. | Briana Balsam (NRC) / Greg Netti (E&E) |
| TE-11 | 2.4 | Provide the following ER references:<br>▪ MDC (Missouri Department of Conservation) 2008. Reform Conservation Area: Area Plan 2006-2016.<br>▪ AmerenUE 2007. Ameren Transmission Vegetation Management Program. April, 2007. | Briana Balsam (NRC) / Greg Netti (E&E) |
| **WM** | | **Waste Management** | |
| WM-1 | – | If mixed waste is generated, provide general information on its generation, handling, processing, storage, and disposal. | Stephen Klementowicz (NRC) / Donna Kassel (E&E) |
| WM-2 | – | Provide information on the planned Interim Spent Fuel Storage Installation (ISFSI). | Stephen Klementowicz (NRC) / Donna Kassel (E&E) |
| WM-3 | – | Provide general information on liquid, gaseous, and solid nonradioactive waste management systems, including the types and approximate quantities of nonradioactive waste generated; the waste minimization program; and handling, processing, treatment, storage, and disposal. | Stephen Klementowicz (NRC) / Donna Kassel (E&E) |
| WM-4 | – | Provide information on any permitting required for atmospheric, liquid, or solid nonradioactive effluents (such as NPDES permitting) and Emergency Planning and Community Right to Know Act (EPCRA) reporting. | Stephen Klementowicz (NRC) / Donna Kassel (E&E) |

**Tours/Discussions Requested with Ameren:**

- Aquatic and terrestrial biologists would like to participate in the same tours.
- The aquatic ecologists would like a general tour of the project area to include intake structures on the Missouri River, as well as the location of the NPDES discharge back to the Missouri River. They would also like to meet with a staff member or contractor responsible for writing the aquatic communities portions of the ER and who can discuss the project and known aquatic resources.
- Both aquatic and terrestrial ecologists would like to see typical wetland and riparian communities especially around the intake and discharge and areas protected by the plant (the ER points out the ecological significance of riparian areas near the plant). In addition, they would like to see the Reform Conservation Area, which is apparently on land owned by the plant and protected for conservation and restoration of plants and wildlife, among other uses. It would be helpful to see any sensitive or important habitats and any ongoing conservation, environmental protection, or educational projects or activities that the plant supports in the Reform Conservation Area.
- The cultural resources expert would like a general tour of the archaeological sites and architectural resources within the Callaway property and along the transmission lines, and a tour of any adjacent areas of historical or cultural interest (such as the three NRHP-listed historic properties within 6 miles of Callaway), preferably led by an archaeologist. The ER indicated at least 129 cultural resources have been documented on the Callaway property, but the distribution of these resources and which sites are still present is unclear.
- The cultural resources expert would like a meeting with the applicant and member of the grounds maintenance team to review cultural resources management procedures to determine how they avoid impacting historic and archaeological resources and deal with inadvertent discovery of historic and archaeological materials and human remains.
- The cultural resources expert would like a meeting with the applicant and transmission line maintenance contractor to discuss right-of-way maintenance and monitoring and the procedures in place regarding protection of historic and archaeological properties along existing transmission line corridors.
- The human health reviewer would like a meeting with the applicant to discuss the impacts on public health from microbiological organisms.
- The health physics and waste reviewers would like a tour of the low-level radioactive waste storage facility, mixed waste storage facility, radiological waste processing and storage areas, planned independent spent fuel storage installation, radioactive effluent monitoring systems, and radiological environmental monitoring stations (e.g., air monitoring stations, including any co-located State monitoring stations).
- The hydrology expert would like to view (1) all NPDES outfall locations, (2) the surface water intake and discharge to the Missouri River, (3) the well that is located at the Missouri River and used to produce water to lubricate the pumps of the intake building, (4) the areas of groundwater contamination, and (5) the onsite well locations that supply potable and utility water.

- The hydrology expert would like a meeting with the applicant or contractor responsible for writing the hydrological portions of the ER to discuss the project and hydrological resources within the area of potential effect. "We would like to discuss what is being learned from the "Site Groundwater Protection Initiative" that is part of the Nuclear Energy Institute (NEI) "Industry Ground Water Protection Initiative". We would also like to understand the location and concentration of any radiological or non-radiological contaminants detected in groundwater underlying the site. We would like to know about any corrective actions taken or planned to prevent and cleanup groundwater contamination."
- The meteorology and air quality expert would like a tour of the meteorological tower site including any backup tower site and permitted emission sources.
- The terrestrial and aquatic ecologists would like a tour of the site that includes:
  - representative habitats of each type of natural habitat on the Callaway site (grassland, forest, cropland, wooded wetlands, limestone glades, riparian areas bordering permanent, and intermittent streams),
  - areas where biological investigations have been done,
  - the Reform Conservation Area, and
  - the limestone glade, a Missouri natural community of concern, that is mentioned in Section 2.4, page 16 of the Environmental Report.
- The terrestrial ecology expert would like a meeting with the applicant or responsible contractor for writing the terrestrial ecology portions of the ER who can discuss the project, known terrestrial resources, and the NRC's site audit need requests. This meeting should also include knowledgeable staff that can discuss Ameren's transmission line maintenance procedures, including specific procedures or mitigation measures Ameren takes to reduce impacts to waterbodies, wetlands, and Federally or state-protected species.
- The terrestrial ecology expert would like a meeting with knowledgeable staff that can discuss the following regarding transmission line maintenance: (1) Ameren's vegetative maintenance plans and procedures, (2) any specific procedures or mitigation measures Ameren takes to reduce impacts to waterbodies, wetlands, and Federally or state-protected species, and (3) any company initiatives that Ameren undertakes and/or the agencies with whom Ameren partners with to promote biodiversity and reduce long-term impacts within and along transmission line corridors.
- The waste reviewer would like a tour of the nonradioactive waste storage facility and nonradioactive effluent monitoring systems.

**Off-Site Meetings:**

**Meeting with the State Historic Preservation Office during the week of the audit, May 20, 2012:**

NRC will meet with the MO SHPO in Jefferson City at some point during the site audit to discuss the license renewal application and conduct an independent file search. The purpose of the meeting is to discuss NRC's licensing action, schedule, opportunities to participate in the NEPA process; the process for completing Section 106 by coordinating with NEPA (in accordance with 36 CFR 800.8c); and any questions or issues the SHPO may have concerning cultural resources.

**Callaway**

**Environmental Site SAMA Audit Needs List**

**Documents requested to be available for review**:

1. A21.0027, "Summary Report on the 4B Interim Update of the Callaway PRA," March 2011. Reference 2 from Attachment F of the Callaway Environmental Report.

2. ERIN Engineering and Research, Inc., "Callaway Level 2 Analysis," Rev. 1, April 2011. Reference 24 from Attachment F of the Callaway Environmental Report.

3. Erin Engineering and Research, Inc., "Level 3 PRA Consequence Analysis (MACCS2 Model) for Callaway Sever Accident Mitigation Alternative (SAMA) Evaluation, February 2011. Reference 25 from Attachment F of the Callaway Environmental Report.

4. The Callaway NFPA 805 LAR submittal (particularly Attachments S, U, V, and W)

5. The RAI letter against the LAR submittal dated March 2, 2012 (ML120600186)

6. Any sensitivity studies performed in response to RAIs in which fire CDF and/or LERF have been calculated

7. Any importance analysis performed for the fire PRA

8. The Callaway IPE

9. The source document for the seismic CDF estimate presented in the SAMA analysis

10. The MACCS, MAAP and PRA models to the extent they are needed to answer the audit questions

See Attachment for specific questions to be addressed at the audit. Note that additional questions may be developed and provided prior to the audit.

**Interviews**

**SAMA Interview**: Interviews with knowledgeable staff personnel on SAMA and any outstanding questions from review of the site audit needs material. If different than personnel above, interviews with knowledgeable staff on the development of Level 1, 2 and 3 PRA models as well as SAMA identification and evaluation.

**Tours**

No specific tour will be needed for the SAMA audit.

## CALLAWAY SAMA ASSESSMENT

## QUESTIONS FOR ENVIRONMENTAL AUDIT

1. Relative to the Level 1 PRA

   a. Table F.3-1 includes a station blackout and a loss of offsite power as initiating event types. Normally, an SBO is a subset of LOSPs as well as other initiators. Similarly ATWS is a subset of other initiators. Explain how the frequency of SBO can be determined separately from other categories and confirm that SBO includes those following LOSP initiator as well as those following other transients. Also ensure that the correct frequencies for each initiator as well as the contribution for SBO and ATWS for all initiators are provided.

   b. The internal events CDF is given as 1.66E-05 per year on page F-11. The CDF for the apparent latest revision, Update 4B, is given as 2.61E-05 per year on page F-20.

      i. Clarify the differences and the basis for that used in the SAMA analysis.

      ii. While this difference may be to be due to exclusion of internal flooding (9.14E-06 in Table 3-4) from the 1.66E-05 value and inclusion of it in the external events multiplier, adding this value for internal floods to the Table 3-1 value yields 2.57E-05, which is close but not equal to the 2.61E-05 value. If the difference is due to the exclusion of internal floods, provide justification of why this was done and discuss the impact on the SAMA analysis. Note that the first and third PRA updates included revisions to the internal flooding analysis.

      iii. Provide support for the validity of the importance analysis used for plant specific SAMA identification which excludes internal flooding.

   c. Provide the truncation value used for each PRA.

   d. Provide further discussion of the steps taken to insure the technical adequacy of the Level 1 PRA subsequent to the 2000 WOG peer review. Specifically address:

      i. Further support for the disposition of peer review F&Os IE-7 and ST-1 as described in Table 3-8 of the SAMA submittal.

      ii. A description of the findings of the 2006 review against the 2005 revision of the ASME PRA standard and the disposition of any deficiencies for the SAMA application. Attachment U of the NFPA 805 Licensing Amendment

Request (LAR) provides this information relative to the fire risk application. Similar information is needed for the SAMA application.

iii. We understand from Attachment U of the NFPA 805 LAR submittal that the internal events PRA Human Reliability Analysis (HAR) modeling has been revised and undergone a focused scope peer review. This peer review is not discussed in the SAMA submittal. Discuss the scope, findings and disposition of those findings.

e. As a result of NRC review of Callaway's NFPA 805 submittal NRC has requested the results of sensitivity analyses to show the impact of potentially unacceptable modeling approaches (see PRA RAI-08 on influence weighting factors and PRA RAI-09 on control power transformer credit). Provide the impact of these sensitivity analyses on the calculated fire CDF and then show the impact of these higher fire CDFs on the SAMA analysis.

f. The description of PRA Update 4B mentions the Alternate Emergency Power System (AEPS) modification. Describe this modification and the temporary EDG modification mentioned for PRA Update 4A.

g. What was the freeze date for PRA Update 4B and have there been any changes to the plant, either physical or procedural, since that date that could have a significant impact on the results?

2. Relative to the Level 2 PRA

a. The 5th bullet in Section F.3.2 states that the sequences that contribute to LERF were determined based on source term calculations using MAAP 4.0.7. What was the basis for the source terms for the other release categories?

b. The last paragraph in Section F.3.2 states: "There were no changes to major modeling assumptions, containment event tree structure, accident progression, source term calculations or other Level 2 attributes, used in the IPE Level 2 analysis, when developing the initial and updated models." Discuss this statement in light of the many apparent changes discussed previously in this section and in the disposition of the Level 2 Peer Review F&Os in Table F.3-8.

c. Provide a description of the containment event tree or trees (CET) used in the level 2 analysis including a listing and description of the CET nodes. Include description of how phenomenological events and containment system failures are addressed in the CET.

d. Section F.3.4 identifies 8 release categories. Provide further information on each release category including: category definitions and their bases, how the CET end states are assigned to release categories, a description of the sequences that are the major contributors to each release category, the basis for the selection of MAAP case used for each release category, and a description of the MAAP cases used. Also, if the source terms for each release category are not bounding, then provide justification of how the impact of higher source term sequences are accounted for in determining the benefit of potential SAMAs.

e. Provide a discussion of the steps taken to insure the technical adequacy of the Level 2 PRA.

3. Relative to external events:

   a. Section F.3.1.2.2 states that:

      "For the IPEEE, Callaway used the EPRI seismic margins analysis (SMA) method. This analysis was transmitted to NRC in the IPEEE submittal. The latest estimate of the Callaway seismic contribution to CDF is 5.00E-6/yr."

      A SMA does not normally include an estimate of seismic CDF. What is the source and basis for the 5.00E-6/yr value?

   b. Section F.3.1.2.3 states that the risk for tornado events is 2.5E-05/yr and this is considered a contributor to the external events initiator group for calculating the external events multiplier.

      i. Provide the basis for this value.

      ii. Identify SAMAs to mitigate the contribution this makes to the total CDF.

4. Relative to the Level 3 analysis

   a. Tables F.3-9 and 3-10 provide the year 2044 population distribution used in the MACCS2 analysis. Provide the year 2000 population distribution (Table 2.6-1 provides only a partial breakdown).

   b. Section F.3.4.1 identifies that the population was projected to year 2044 using county growth estimates. Briefly describe how the county growth rates were applied (e.g. county weighted per sector, or state average uniformly applied across all sectors, other). Were any sectors/counties projected with negative growth, if yes, how were they treated.

   c. Section F.3.4.1 identifies that transient population data was included within the 10-mile radius. Provide the year 2000 transient population, and identify whether the transient population was scaled to year 2044. Briefly discuss how the transient population was included within the 10-mile radius.

   d. Section F.3.4.2 identifies that some generic economic data was used from NUREG-1150, and scaled using the CPI to May 2010. Provide the effective cost escalation factor applied.

   e. Three SECPOP2000 code errors have been publicized, specifically: 1) incorrect column formatting of the output file, 2) incorrect 1997 economic database file end character resulting in the selection of data from wrong counties, and 3) gaps in the 1997 economic database numbering scheme resulting in the selection of

data from wrong counties. Address whether these errors were corrected in the Callaway analysis. If they were not corrected, then provide a revised cost-benefit evaluation of each SAMA with the errors corrected.

f. The emergency response sensitivity shows a +7% change for slower evacuation and a +2.4% change for delayed evacuation. Is the higher impact for evacuation speed due to unsheltered travel and/or exposure to 'higher' initial dose releases versus early sheltering and lower delayed releases?

g. Provide the MAAP and MACCS2 (if different than MAAP) radioisotope grouping, and identify the release time for early versus late release.

h. Identify the specific reference for the Callaway Evacuation Study. Discuss whether and how the evacuation time was adjusted for the difference in population between year 2045 and the year of the referenced evacuation time estimate study. If not, briefly discuss the potential impact to the SAMA evaluation. Identify whether the EPZ was treated as a single evacuation zone.

i. Section F.3.4.5 indicates that the year 2008 meteorological data was more conservative than years 2007 and 2009. Briefly quantify the relative conservatism and identify of the tower heights (i.e. potential range of measurement elevations) for the onsite meteorology station and at the Prairie Fork Conservation.

j. Briefly describe additional MACCS2 input related to the following: rainfall, mixing heights, building wake effects, plume release energy, land fraction, region index, watershed index, growing season, fraction of farmland, and shielding and protection factors.

k. Table 3-15 provides ingestion doses. Briefly describe the model (e.g. the MACCS2 ingestion pathway model COMIDA2).

5. Relative to the selection and screening of Phase I SAMA candidates:

a. Table F.5-1 shows that while 6 out of the 171 SAMA candidates identified are plant-specific SAMAs identified from plant-specific risk insights, it appears that the fire PRA for the recently submitted NFPA 805 LAR was not used as a source to generate plant-specific risk insights. Table F.3-4 shows that the external event contribution to total CDF is greater (e.g., fire CDF is 2.0E-5/yr) than the internal events contribution (i.e., internal CDF is 1.7E-05/yr). Provide identification and evaluation of SAMAs based on plant specific insights from the post-transition fire PRA. Include as part of this identification consideration of fire PRA importance analysis, the dominant risk fire areas and associated sequences, and the risk of modifications that Callaway Plant has committed to. Also, describe how this information was used to identify SAMA candidates and evaluate any resulting SAMA candidates not already evaluated.

b. Section F.3.1.2.3 states the internal events PRA does not include internal flooding modeling. However, Section F.3.1.1.2 indicates that internal flooding was included in the IPE and in a PRA update as recently as 2004. Discuss the results of

applicable internal flooding analysis and potential internal flooding SAMAs based on internal event flooding.

c. Section F.5.2 states that potential enhancements identified in the IPE were included in Table F.5-1. Only 4 of the 5 enhancements identified in IPE Section 6.2.1, "Plant Improvements to be Implemented" are included in Table F.5-1 and none of the 5 enhancements in Section 6.2.2, "Plant Improvements to be Considered" were included. Provide the status and an evaluation of:

   i. The missing improvement from IPE Section 6.2.1, addition of procedural guidance and the required hardware to enable the operators to feed one or more steam generators with a diesel driven firewater pump, and

   ii. the five improvements listed in IPE Section 6.2.2

d. Note 1 to Table F.3-2 states, "The current plant procedures and training meet current industry standards. There are no additional specific procedure improvements that could be identified that would affect the result of the human error probability (HEP) calculations. Therefore, no SAMA items were added to the plant specific list of SAMAs as a result of the human actions on the list of basic events with RRW greater than 1.005." This appears to imply that meeting current industry standards is sufficient to indicate that no additional SAMAs are needed.

   i. Provide support for that belief.

   ii. Explain the process used to make the determination that there are no opportunities to improve procedures and training. Include in the explanation how human error probability factors were considered (e.g., cognition, resources, timing, and stress level).

   iii. Discuss whether any of the risk significant operator action failures could be addressed by options other than training or procedures such as automated functions, testing and maintenance to reduce failure or event rates, or enhanced documentation. Specifically discuss the potential for automating the function associated with basic event OP-XHE-FOCCWRHX (OPERATOR FAILS TO INITIATE CCW FLOW TO THE RHR HXS) identified in Table 3-2.

e. In Tables 3-2, 3-6 and 3-7 the SAMAs associated with the various basic events in many cases are identified by generic titles such as "Service Water SAMAs" or "Safety Injection SAMAs" rather than site specific SAMAs that address the failure associated with the basic event. Also, these SAMA categories do not correlate to SAMA categories identified in Table 5-1. For example the categories "Service Water SAMAs" and "Safety Injection SAMAs" are not identified in the fourth column of Table 5-1. In light of this and the fact that only three SAMAs are identified in Table F.5-1 as a result of the importance analysis it is not clear the extent of the effort made to identify Callaway specific SAMAs for the important failures. Describe in more detail than provided in Section F.5.1 how the importance analysis was used to identify plant specific SAMAs. Revise Tables 3-2, 3-6, and 3-7 to indicate

which SAMAs address each specific basic event by providing the SAMA number or numbers.

f. In importance analyses Tables F.2-3, 3-6 and 3-7 some basic events are not assigned a candidate SAMA but rather with the notation that they are initiating events (i.e., IE-T3, IE-TMSO, IE-S3, IE-T2). Identify SAMAs for these initiating events that either reduce their frequency or mitigate their impact.

g. In Table 3-6 four basic events involving failure of a relay to transfer are presented and designated to be addressed by SAMA 79. SAMA 79 is replacement of existing pilot-operated relief valves with larger ones so that only one is needed to open for feed and bleed. Explain how this SAMA addresses relay failure to transfer.

h. Table F.6-1 indicates that SAMA 3 (Add additional battery charger or portable diesel-driven battery charger to existing DC system) is screened out on the basis that the intent of this SAMA is met by having 2 spare battery chargers. This SAMA also includes a diesel driven charger. Does Callaway have such equipment available?

i. Provide further information on the disposition (Replaced to add static switch and upgrade to newer design) of SAMA 16 (Improve uninterruptible power supplies) in Table 6-1.

j. Is the remote operation of the atmospheric steam dumps (ASDs) cited in the disposition of SAMA 40 in Table 6-1 functional in an SBO as is required for this SAMA?

k. In Table F.6-1 SAMAs 81, 82 and 83 were screened on the basis that the intent of these HVAC SAMAs was met at Callaway. Was the intent of these SAMAs met for all Callaway rooms or areas where room cooling failures are important contributors to CDF?

l. In Table F.6-1 SAMA 137 (Provide capability to remove power from the bus powering the control rods) is dispositioned with "Response procedure in place." Does this procedure include removing power from the bus powering the control rods?

m. In Table F.6-1 SAMA candidate 138 (Improve inspection of rubber expansion points on main condenser) is screened out as "Not Applicable" with the disposition that "No risk significant flooding sources identified in the turbine building." Although the current internal events PRA is stated not to include analysis of internal flooding, the Callaway IPE indicates that internal flooding contributed 31% to internal events CDF. Clarify how the risk significance of flooding sources in the turbine building was determined. If flooding sources can be risk significant identify and evaluate applicable SAMAs.

n. In Table F.6-1 SAMA 141 (Provide additional restraints for $CO_2$ tanks) is combined with other seismic SAMAs (i.e., 154, 155, 156, 157, 158, and

159). None of these SAMAs address this specific issue. Are the $CO_2$ tanks vulnerable and need additional restraint?

o. In Table F.6-1 SAMA candidate 144 (Install additional transfer and isolation switches) for reducing the potential for spurious actuation during a fire is screened out as "Intent Met" based on modification commitments made in the NFPA 805 LAR submittal. NFPA 805 LAR, Attachment S, does identify such an item (i.e., Item 07-0151 - Install redundant fuses and switches to prevent multiple spurious actions from stopping or starting safety equipment). However, this modification is specific to selected cables in the Main Control Room to Train B fed from NB02. Justify or evaluate other modifications that would reduce spurious actuations during a fire.

6. With regard to the Phase II cost-benefit evaluations:

a. Provide the percent reduction in OECR for each SAMA evaluated in Table F.7-1 and any other SAMAs evaluated in response to RAIs.

b. ER Section F.7.2 indicates that an expert panel developed the implementation cost estimates for each of the SAMAs. Briefly, describe the level of detail used to develop the cost estimates (i.e., the general cost categories considered). Also, clarify whether the cost estimates accounted for inflation, contingency costs associated with unforeseen implementation obstacles, replacement power during extended outages required to implement the modifications, and maintenance and surveillance costs during plant operation.

c. For certain Phase II SAMAs listed in Table F.7-1, the information provided does not sufficiently describe the associated modifications to know what is included that justifies the cost estimate. Provide a more detailed description of both the modification and cost estimate for SAMAs 11, 15, 64, 94, 104, 116, 163, and 164.

d. For certain Phase II SAMAs listed in Table F.7-1, the calculated benefit does not seem consistent with the percent reduction in CDF or off-site dose or there was no CDF or off-site dose information to compare to the calculated benefit. Provide corrections or more justification for the benefit calculated for SAMAs 39, 160, 161, 162, 163, 164, and 171.

e. In Table 7-1, SAMA 1 (add additional DC battery capacity) is evaluated by eliminating TDAFW pump dependency on DC power while SAMA 2 (replace lead-acid batteries with fuel cells) is evaluated by eliminating all SBO. For SAMA 1 (and SAMA 5 - provide DC buss cross ties also evaluated by eliminating the TDAFW pump DC dependency) is the TDAFW pump availability the only impact of the loss of DC? Both SAMAs 1 and 2 extend DC power availability during SBO. Explain the reasons for the difference evaluations that do the same thing.

f. In Table 7-1 the reduction in CDF for SAMA 2 is given as 12.17%. This is evaluated as eliminating SBO events. Table F.3-1 presents a value for SBO that is 28% of the total. Explain this difference.

g. SAMA 15 is evaluated by SAMA case LOSP1 which is described as leading to no tornado LOSP events. Provide additional information on the model changes made and their applicability to this SAMA. Also, does Callaway already have a gas-turbine?

h. In Table F.7-1 SAMA 24 (Bury off-site power lines) is shown as costing >$3M, and as not being cost beneficial. However, the potential benefit of this SAMA is high ($1.2M) and the estimated cost of this SAMA reported in the Seabrook ER (a recent Westinghouse PWR-4 submittal) is lower (>$1M). (In the South Texas, Diablo Canyon, or Salem ERs, this SAMA was not evaluated as a Phase II SAMA.) Provide a more detailed description of this modification and justification for the estimated cost.

i. Provide additional information on the changes made for SAMA Case LOCA12 used to evaluate SAMAs 25, 26 and 39. What modeling change was made to eliminate failures of the charging or SI pumps. Were the assumed failures limited to LOCAs or did they include failure due to loss of AC?

j. Provide additional information on the changes made for SAMA Case LOCA03 used to evaluate SAMA 28. What modeling change was made to eliminate failures of the low pressure pumps. Were the assumed failures limited to LOCAs or did they include failure due to loss of AC?

k. Table F.7-1 indicates that the expert panel judged SAMA 29 to be potentially cost beneficial without quantifying a benefit or cost. ER Section 9.0 indicates that SAMA 29 is currently being evaluated to understand the impacts of injection of non-borated water. Provide estimation of the cost and benefit based on the results of this evaluation

l. In Table F.7-1 benefit for SAMA 39 given as $748K. Obviously an error. See SAMA 25.

m. Table F.7-1 indicates that SAMA 46 (Add a service water pump) was modeled by assuming there were no failures of ESW pumps. Does this include ESW pump unavailability due to test and maintenance?

n. Phase II SAMAs 55 and 56 listed in Table F.7-1 appear to be identical except for the cost estimates (i.e., $1M versus >$500K). Provide correction or explanation.

o. In Table F.7-1 SAMA 94 (Install a filtered containment vent to remove decay heat) is shown as >$2M, and as not being cost beneficial. However, the potential benefit of this SAMA is high ($1.2M) and the estimated cost of this SAMA reported in the Seabrook ER is lower (>$500K). (In the South Texas, Diablo Canyon, or Salem ERs, this SAMA was not evaluated as a Phase II SAMA.) Provide a more detailed description of this modification and justification for the estimated cost.

p. In Table F.7-1 SAMA 113 (Increase leak testing of valves in ISLOCA paths) is shown as costing >$1M, and as not being cost beneficial. However, the potential benefit of this SAMA is moderate ($123K), and the cost of this SAMA, as it does not require hardware modification seems high. The Seabrook ER reports and

estimated cost of >$100K for this SAMA. (In the South Texas, Diablo Canyon, or Salem ERs, this SAMA was not evaluated as a Phase II SAMA.) Provide a more detailed description of this modification and justification for the estimated cost.

q. In Table F.7-1 SAMA 119 (Institute a maintenance practice to perform a 100% inspection of steam generator tubes during each refueling outage) as costing >$3M, and as not being cost beneficial. However, the potential benefit of this SAMA is high ($1.2M), and the cost of this SAMA, as it does not require hardware modification seems high. The Seabrook ER reports and estimated cost of >$500K for this SAMA. (In the South Texas, Diablo Canyon, or Salem ERs, this SAMA was not evaluated as a Phase II SAMA.) Provide a more detailed description of this modification and justification for the estimated cost.

r. Table F.7-1 in combination with Table F.5-1indicates that the expert panel judged SAMA 160 to be potentially cost beneficial without quantifying a benefit. Although the current internal events PRA is stated not to include analysis of internal flooding, Section 3.1.1.2 indicates that the internal events flooding PRA model did exist in the IPE and was updated as recently as 2004. Provide estimation using the best means available the benefit of SAMA 160.

s. Describe the RCP seal LOCA modeling in the Callaway PRA and the changes made for Case RCPLOCA.

t. Section F.8.2 indicates that the uncertainty factor used for the ratio of the 95th to mean value CDF is 2.11. In Table F.8-1 the ratio of the base case benefit to the 95th percentile case for SAMAs 91, 93, and 94 appears to be low (i.e., 1.4). Explain this apparent discrepancy or if this is a mistake recalculate the $95^{th}$ percentile benefit for these three SAMAs.

7. With regard to alternative SAMAs

a. A note at the end of Table F.5-1 indicates that recent industry submittals of like-kind plants (i.e., Wolf Creek, South Texas, Diablo Canyon, and Seabrook) were used as a source of candidate SAMAs. It is not clear the extent to which these submittals were examined, as only two SAMA candidates were identified in Table F.5-1 as being from these sources (i.e., SAMA 162 and 165). Also, it appears that a cost beneficial SAMA identified in the Diablo Canyon submittal might represent an unevaluated SAMA candidate for Callaway (i.e., SAMA 24 – Prevent clearing of RCS cold leg water seals). Describe the extent to which the four cited SAMA submittals were used as sources to generate candidate SAMAs, and evaluate each SAMA determined to be cost beneficial in those submittals or show how they could be screened out using criteria presented in ER Section F.6.0

b. SAMA 64 (Implement procedure and hardware modifications to allow manual alignment of the fire water system to the component cooling water system, or install a component cooling water header cross-tie) is evaluated by eliminating CCW pump failures. Consider a similar SAMA that provides fire water to the ESW system.

c. SAMA 80 (Provide a redundant train or means of ventilation) appears to be the only SAMA identified to address the eleven HVAC related failures in Table 3-2. Table 7-1

indicates that elimination of all HVAC dependencies for SAMA 80 results in a 6% reduction in CDF. The individual HVAC failures listed in Table 3-2 appear to involve unrelated pieces of equipment in various rooms or buildings. Discuss the possibility of lower cost alternatives that address the more important contributors to CDF. Note that two of the above cited failures (VD-FAN-FR-CGD02A and -CGD02B) appear to be the reason for SAMA Case HVAC02 described on Page F-109. This case is not used in the Phase II analyses described in Table 7-1.

Letter to A. Heflin from C. Fells dated May 15, 2012

SUBJECT: ENVIRONMENTAL SITE AUDIT REGARDING CALLAWAY PLANT, UNIT 1 (TAC NOS. ME7715 AND ME7716)

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Mr. Adam C. Heflin
Senior Vice President and Chief Nuclear Officer
cc: Sarah Kovaleski
Callaway Plant, Unit 1
Union Electric Company
P.O. Box 620
Fulton, MO 65251

SUBJECT: ENVIRONMENTAL SITE AUDIT REGARDING CALLAWAY PLANT, UNIT 1 (TAC NOS. ME7715 AND ME7716)

Dear Mr. Heflin:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing Ameren Missouri's license renewal application for Callaway Plant, Unit 1 (Callaway). The environmental site audit will be conducted at Callaway during the week of May 20, 2012, by NRC and Ecology and Environment, Inc. The environmental audit activities will be conducted in accordance with the enclosed environmental audit plan.

To develop the Supplemental Environmental Impact Statement, the NRC staff requests the information described in the enclosed environmental audit needs list be made available, to the extent possible, during the environmental site audit. A draft schedule of tours and meetings for the audit is also enclosed. The NRC staff informally transmitted this information to your staff (Sarah Kovaleski), via e-mail on May 4, 2012.

If you have any questions, please contact me by telephone at 301-415-6337 or by e-mail at Carmen.Fells@nrc.gov.

Sincerely,

***/RA/***

Carmen Fells, Project Manager
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-483

Enclosures:
1. Regulatory Environmental Audit Plan
2. Environmental Audit Draft Schedule **(ML12131A451)**
3. Environmental Audit Needs List **(ML1215A332)**
4. SAMA Audit Requests Document **(ML12131A477)**

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|---|---|---|---|---|
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| DATE | 5/15/12 | 5/10/12 | 5/15/12 | 5/ 15 /12 |

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