U.S. EPR DCWG Meeting
August 14, 2008
USNRC Offices, Rockville, MD

U.S. EPR DCWG Overview

Unistar Nuclear Energy	George Wrobel, Vice President Regulatory Affairs John Tynan, Callaway Plant Unit 2 Project Manager Steve Strout, Licensing Consultant Jim Freels, Licensing Consultant Christian Clement, Licensing
AmerenUE	Scott Bond, Manager, Nuclear Generation Development Dave Shafer, Assistant Manager (Licensing) Roger Wink, Licensing Supervisor Al Passwater, Licensing Consultant Peter LeRoy (AREVA), Licensing Consultant
PPL	Rocky Sgarro, Manager, Nuclear Regulatory Affairs, Bell Bend
Paul C. Rizzo Associates, Inc.	Melissa Dubinsky, Environmental Report Manager
AREVA NP	Pedro Salas, Licensing Technical Consultant Brian McIntyre, U.S. EPR FSAR Project Manager

U.S. EPR DCWG Overview

The Callaway Plant Unit 2 COLA utilizes, to the extent practical, the standard construct and content contained and designated as such in the R-COLA.

U.S. EPR FSAR (Nuclear Island)

Reference (R) COLA:

Calvert Cliffs 3

Subsequent (S) COLAs:

Callaway Plant Unit 2
Nine Mile Point 3
Bell Bend 1

U.S. EPR DCWG Overview

Callaway Plant Unit 2 COL Application Overview
- **Dave Shafer, AmerenUE**
- **Melissa Dubinsky, Paul C. Rizzo Associates, Inc.**

- **Calvert Cliffs R-COLA**
  - **George Wrobel, UniStar**

- **U.S. EPR FSAR Application**
  - **Pedro Salas, AREVA NP**

- **Nine Mile Point and Bell Bend COL Applications**
  - **George Wrobel, UniStar**

Callaway Plant Unit 2 COL Application Overview

Callaway Plant Unit 2 COL Application Overview

- Part 1 - General, Administrative and Financial Information
- Part 2 - Final Safety Analysis Report
- Part 3 - Environmental Report
- Part 4 - Technical Specifications
- Part 5 - Emergency Plan
- Part 6 - *[Not Used - Reserved for applications requesting LWA]*
- Part 7 - Departures and Exemption Requests
- Part 8 - Safeguards/Security Plan (contains Safeguards Information, provided under separate cover letter)
- Part 9 - Proprietary and Sensitive Unclassified Non-Safeguards Information (SUNSI)
- Part 10 - Proposed License Conditions, including Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)
- Part 11 - COLA Enclosures (e.g., Quality Assurance Program Description)

Callaway Plant Unit 2 COL Application Overview

The Callaway Plant Unit 2 COLA utilizes, to the extent practical, the standard construct and content contained and designated as such in the R-COLA.

- Information that is specific to Callaway Plant Unit 2 is enclosed in braces/brackets "{ }".
- Information not enclosed in braces/brackets is generic for UniStar Nuclear Energy facilities.
- Tables and figures containing site specific information use the convention of braces/brackets around the table or figure title, not the entire table or figure contents. This convention indicates the entire table or figure is site specific.
  - If only a portion of a table is site specific, then braces/brackets surround only that portion.

Callaway Plant Unit 2 COL Application Overview

- **One file per COLA Part/Chapter where possible; e.g., FSAR Chapter 2 and ER Chapter 2 broken into multiple files due to file size limitations**
- **Tables follow text; Figures follow tables**
- **Hyperlinks exist for navigation to referenced sections from TOC, or from TOC or text body to tables and figures**

Callaway Plant Unit 2 COL Application Overview

- U.S. EPR FSAR and associated Appendix to 10 CFR 52 are incorporated by reference.
- Within each section, or subsection, only supplemental information or departures from the certified design are presented.
- If there are no departures or supplements from the U.S. EPR FSAR, it is so stated. Same as R-COLA.
- COLA applicant items in the U.S. EPR FSAR are re-stated in the COLA to aid review.

4.0 REACTOR

This chapter of the U.S. EPR Final Safety Analysis Report (FSAR) is incorporated by reference.

4.1 SUMMARY DESCRIPTION

This section of the U. S. EPR FSAR is incorporated by reference.

4.2 FUEL SYSTEM DESIGN

This section of the U. S. EPR FSAR is incorporated by reference.

4.3 NUCLEAR DESIGN

This section of the U. S. EPR FSAR is incorporated by reference.

4.4 THERMAL-HYDRAULIC DESIGN

This section of the U. S. EPR FSAR is incorporated by reference.

4.5 REACTOR MATERIALS

This section of the U. S. EPR FSAR is incorporated by reference.

4.6 FUNCTIONAL DESIGN OF REACTIVITY CONTROL SYSTEMS

This section of the U. S. EPR FSAR is incorporated by reference.

Callaway Plant Unit 2 COL Application Overview
Part 1 – General Information

- **Applicant, owner and operator is Union Electric Company doing business as AmerenUE (same as Callaway Plant Unit 1)**

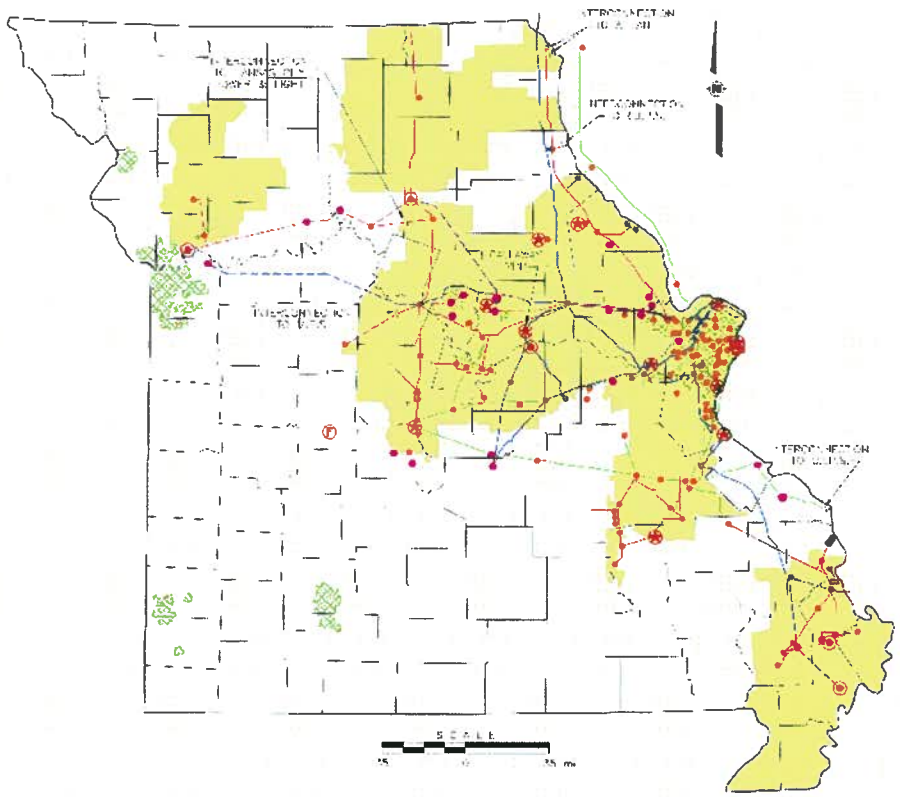
- **AmerenUE is subsidiary of Ameren Corporation**

- **Contacts for additional information:**
  - Dave Shafer for Callaway COLA specific information
  - George Wrobel for UniStar information

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

AmerenUE Service Territory

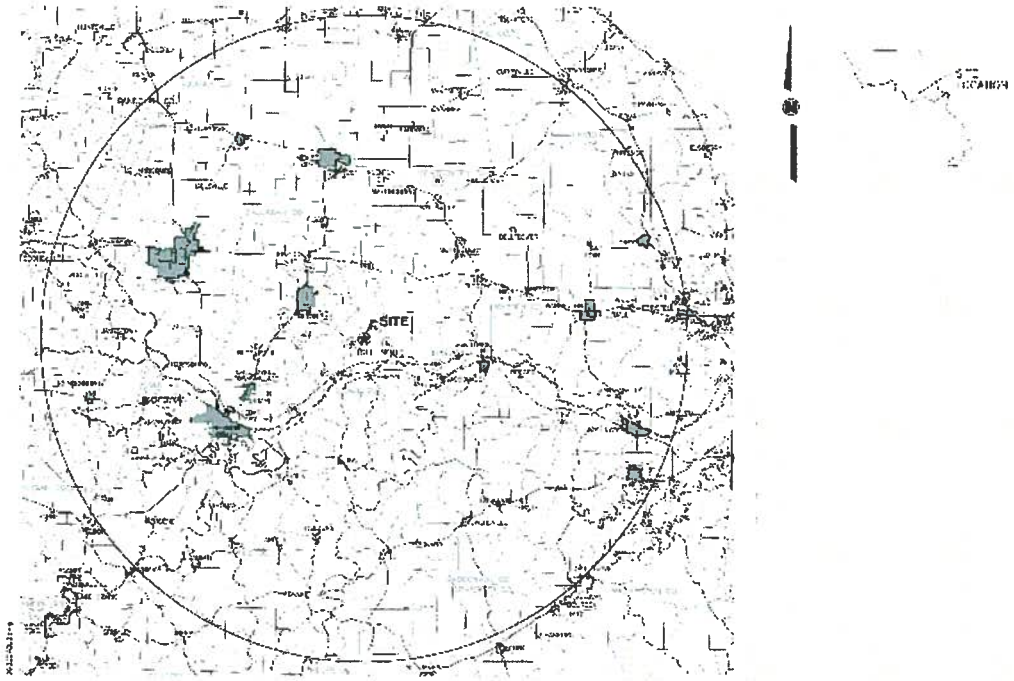
ER Figure 8.1-1



Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Callaway Plant Location

50 mile radius

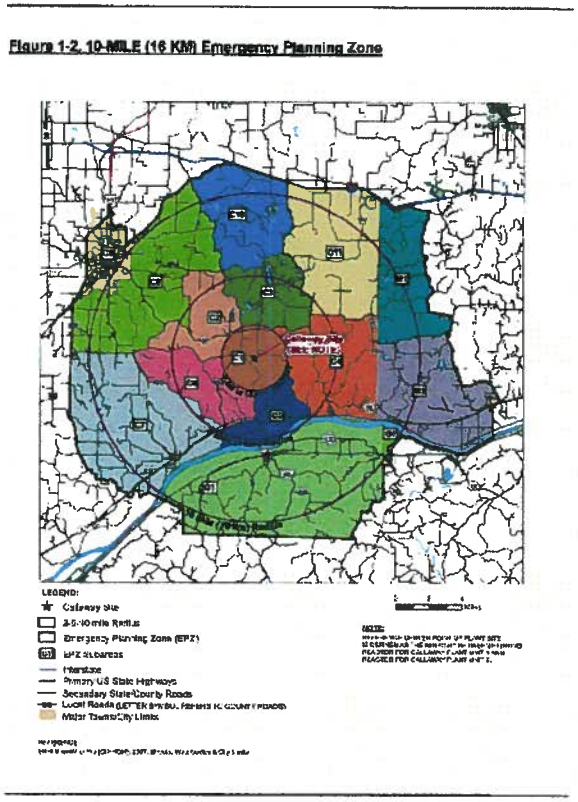


Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Callaway Plant 10 mile Emergency Planning Zone (EPZ)

Same as Unit 1

Shared Security Plan and Emergency Facilities



Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Description of Property

- Plant Site is 7,354 acres
- Callaway Plant Unit 2 occupies 530 acres
- 80 mi west of St. Louis; 10 mi SE of Fulton
- Missouri River is 5 mi south
- Plant site is on plateau ~340 ft above river plain

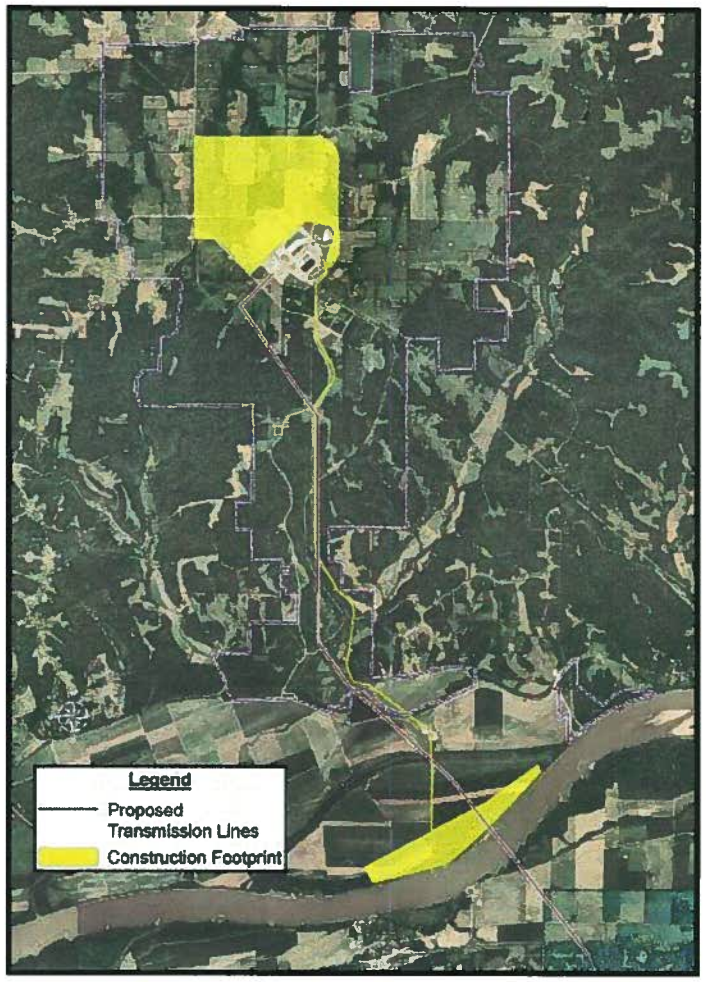
Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Property Boundaries

Construction Impact Zone

Transmission Corridor

Discharge/Intake Piping



Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Exclusion Area Boundary

- Measured from midpoint of both reactors
- Includes entire EAB for Unit 1 plus EAB for Unit 2, increased to make uniform circle
- Resulting radius 0.83 mi
- At least 0.5 mi from all release points

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Population

- Region of Influence (ROI)
  - **Three counties: Callaway (Fulton), Cole (Jefferson City), Boone (Columbia)**
  - **87% of Callaway Plant Unit 1 workforce resides in the ROI**
- 50 mile radius
  - **Contains all or part of 22 counties in Missouri**
  - **Rural, Agricultural**
  - **Projected density in 2060 = 71 persons/sq. mi.**
- No socioeconomic/environmental justice concerns identified
- No tribal concerns identified

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

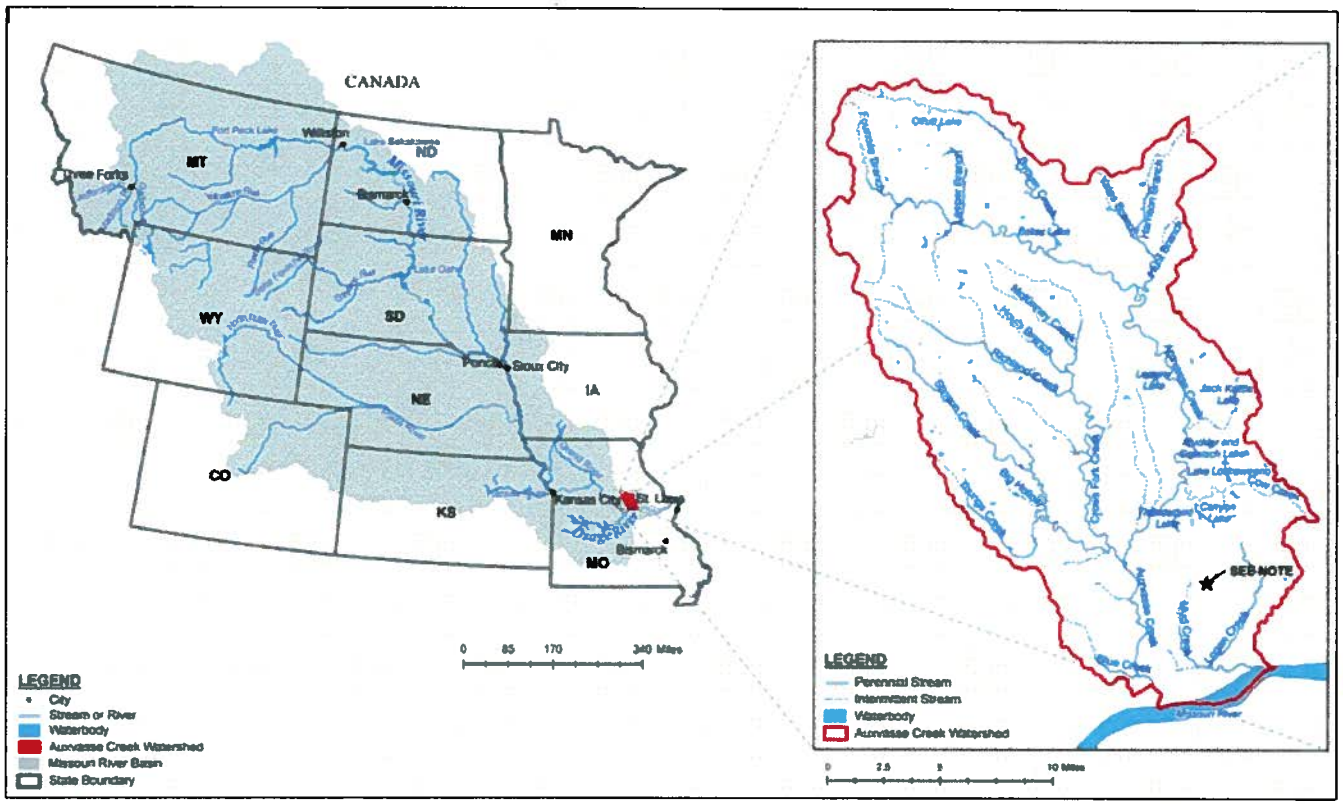
Climate and Meteorology

- Local climate data: Existing on-site tower
- Compared site data with St. Louis & Columbia NWS records
- X/Q values for design basis accidents based on 5 years of on-site met data (2003-2007)

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Hydrology

- Plant located on plateau ~340 feet above Missouri River
- Missouri River ~5 miles south of plant site



Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Groundwater Field Activities

- Study extends across nearly 50 square miles from site plateau to surface water boundaries
- 26 monitoring wells in shallow and deep aquifers and 10 monitoring wells in alluvial aquifer along Missouri River
- 28 staff gauges on streams, ponds, lakes and the Missouri River

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Surface Water Field Activities

- Quarterly surface water sampling and monitoring for each tributary and water body near Callaway Plant Unit 2 (Logan Creek, Auxvasse Creek, Mud Creek, Thunderbird and Canyon Lakes, Missouri River)
- Four quarters of data collected
- Chemical and physical parameters and flow

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Aquatic – Site

- USGS 7.5 minute quad topo maps and FEMA maps
- Aerial photography
- County/USDA soil surveys
- Wetlands mapping

Terrestrial - Site

- Land cover mapping
- Pedestrian search - (5 transects: veg, herps, birds, mammals)
- Anuran listening surveys
- Live turtle trapping
- Sherman live traps
- Waterfowl spot survey
- Roadside bird survey
- Forest pathology study

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Fisheries

- 13 Locations – 6 on Missouri River; 7 on Logan, Mud, and Auxvasse Creek watersheds
- Methodology – Electrofishing, hoop netting, gill netting, seining
- Seasonal sampling for one year

Benthic Macroinvertebrates

- 9 Locations – 2 on Missouri River; 7 on Logan, Mud, and Auxvasse Creek watersheds
- Methodology – Ponar dredge and towed plankton nets (MO River); kick nets (streams)
- Seasonal sampling

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Cultural Resources Studies

- Database survey – 10 mile radius
- Plateau Area – previously surveyed to SHPO satisfaction
- Real-time monitoring during deep borings near river (nothing found)
- Phase I investigation along proposed route for collector well haul road and pipeline
- Transmission corridor investigation pending decision on location of towers (per SHPO agreement)

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Anticipated New Transmission Line

- 6.7 mi, adjacent to existing corridor
- Predominantly Deciduous Forest, Deciduous Woody/Herbaceous, and Cropland
- Common fauna present
- No rare, threatened, or endangered species (flora or fauna)

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Need for Power

- AmerenUE operates as a regulated, franchised utility
- Integrated Resource Plan updated every three years
- Includes:
  - Aggressive demand-side programs
  - Use of renewable resource power supply
  - Existing plant upgrades
- Need identified for new base-load power in 2018-2020

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Alternatives (ER Chapter 9)

- No Action Alternative leads to insufficient power in 2018-2020 time frame

- Energy Alternatives
  - Alternatives not requiring new sources already accounted for
  - Viable new sources include coal, natural gas, and nuclear

- Alternative Plant and Transmission Systems
  - Heat dissipation systems – closed loop, natural draft cooling tower is preferable
  - Circulating water systems – operated as wet cooling towers
  - Intake and discharge systems – using Callaway Plant systems, sized for new unit

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Alternative Sites

- Region of Interest is AmerenUE service territory and expanded to areas with access to Missouri and Mississippi Rivers
- Purpose of plant – dedicated baseload plant for service territory
- Exclusionary criteria –
  - Water – Missouri and Mississippi rivers only sources of sufficient water
  - Seismic – avoid proximity to New Madrid fault
  - Population – St. Louis, Columbia and Jefferson City MSAs and environs, etc.
- After extensive review of available properties, the following were identified:
  - Two brownfield sites
  - Two greenfield sites
  - Callaway site
- None was obviously superior to Callaway site

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 1 & 2) and Part 3 (ER)

Probabilistic Seismic Hazard Analysis

- Performance Based Approach (Regulatory Guide 1.208 with NUREG/CR-6728 and NUREG/CR-6729)
- EPRI SOG (1986) as starting point for seismic sources catalog
- New Madrid Fault Zone Characteristic Earthquake (Controlling Event for Uniform Hazard)

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR)

Chapter 3 – Design of Structures, Components, Equipment and Systems

- **Site specific information**
  - **Shared systems with Unit 1**
    - **electrical transmission lines**
    - **cooling water (condenser cooling water makeup)**
    - **potable, sanitary, demineralized water**
    - **meteorological tower**
    - **Technical Support Center & Emergency Operations Facility**
  - **Essential Service Water Emergency Makeup System**
  - **Ground Motion Response Spectra**
  - **Soil Profiles**
  - **Design of Category 1 Structures**

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR)

Chapter 4 – Reactor
Chapter 5 – Reactor Coolant System and Connected Systems
Chapter 6 – Engineered Safety Features
Chapter 7 – Instrumentation and Controls

Minimal supplemental information

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapter 8)

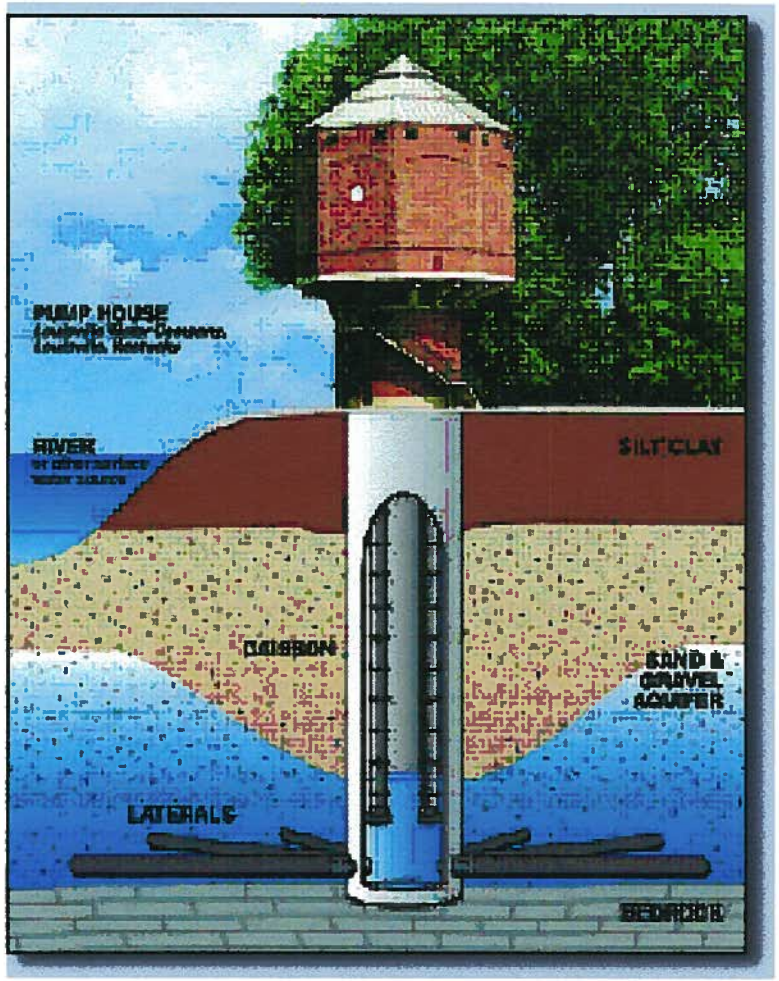
- **One new 345 kV switchyard to transmit power from Callaway Plant Unit 2**
- **Two new 345 kV circuits connect the new Callaway Plant Unit 2 switchyard to the existing Callaway Plant Unit 1 switchyard**
- **A new transmission line runs approximately 6.7 miles south of Callaway Plant Unit 1 parallel to existing line within expanded corridor**

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapter 9)

- **Two notable plant specific systems –**
  - Essential Service Water Emergency Makeup System (to UHS Cooling Towers) (safety related)
  - Raw Water Supply (collector well) System at river side (non-safety related)

- **Two (~550' high x ~414' diameter at base) hyperbolic cooling towers for main condenser Circulating Cooling Water System**

Callaway Plant Unit 2 COL Application Overview



Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 11 and 12)

- **Radioactive Waste Management & Radiation Protection (no departures from U.S. EPR FSAR)**
- **NEI templates relied upon**
  - **NEI 07-03,** Generic FSAR Template Guidance for Radiation Protection Description
  - **NEI 07-08,** Generic FSAR Template Guidance for Ensuring that Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA)
  - **NEI 07-09,** Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description
  - **NEI 07-10,** Generic FSAR Template Guidance for Process Control Program (PCP) Description

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 13 and 14)

- **13 - Conduct of Operations**
  - Reflects AmerenUE organization as operator/licensee
  - Operational Programs implementation contained in FSAR Table 13.4-1

- **14 - Verification Programs**
  - Includes ITAAC screening criteria and pre-operational testing requirements

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapters 15 and 16)

- **15 - Transient and Accident Analysis**
  - No departures from reference COLA or U.S. EPR FSAR

- **16 - Technical Specifications**
  - Technical Specifications included as Part 4

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapter 17)

QAPD

- AmerenUE retains responsibility for QA Program
- The AmerenUE QAPD incorporates the UniStar Nuclear QAPD with the exception of changes to reflect AmerenUE and the AmerenUE organization
- The AmerenUE QAPD incorporates Revision 1 of the UniStar Nuclear Energy QAPD

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapter 18)

Human Factors Engineering

- **Consistent with U.S. EPR FSAR and R-COLA**
- **Includes EOF changes to accommodate Unit 2**

Callaway Plant Unit 2 COL Application Overview Part 2 (FSAR Chapter 19)

Level 1, Level 2 and Level 3 (SAMDA - Severe Accident Mitigation Design Alternatives) PRA conclude no departures or supplements from U.S. EPR FSAR PRA conclusions.

Callaway Plant Unit 2 COL Application Overview
Part 4 – Technical Specifications

- **Consistent with R-COLA including departures**
- **Site specific ESWEMS Technical Specifications included**

Callaway Plant Unit 2 COL Application Overview Parts 5 and 6

Part 5 – Emergency Plan

- **Shared TSC and EOF**
- **Letters of commitment**

Part 6 – Limited Work Authorization

- **No LWA requested**

Callaway Plant Unit 2 COL Application Overview
Part 7 – Departures and Exemptions

Departures

- Idealized Site Soil Profile
- In-structure Response Spectra (ISRS)
- TSC/OSC Location

Departures and Exemptions

- Safe Shutdown Earthquake (SSE)
- Generic Technical Specifications and Bases

Exemptions (same as R-COLA)

- Fitness for Duty Program
- Use of M5™ Advanced Zirconium Alloy Fuel Rod Cladding
- Dedicated Containment Penetrations
- Use of 2004 Edition of the ASME Code

Callaway Plant Unit 2 COL Application Overview
Part 8 – Physical Security Plan

- **Submitted by separate cover letter**
- **Integrated with Unit 1**
- **Includes transition plan**
- **Includes site specific security assessment**

Callaway Plant Unit 2 COL Application Overview
Part 9 – Proprietary and SUNSI

- **Proprietary**
  - Project cost information (Part 1)

- **Sensitive Unclassified Non-Safeguards Information**
  - General arrangement drawings

Callaway Plant Unit 2 COL Application Overview
Part 10 – ITAAC

Inspections, Tests, Analyses & Acceptance Criteria

- Proposed License Conditions in Appendix A
- Design Certification ITAAC (refer to U.S. EPR FSAR)
- Physical Security ITAAC
- Emergency Planning ITAAC
- Site-Specific ITAAC

Callaway Plant Unit 2 COL Application Overview
Part 11 – Supporting Documents

- **QAPD**
- **Cited references**
  - **AREVA U.S. EPR FSAR and Supplements**
  - **NEI References**
  - **Fuel Racks Supplement**

Break

Changes to Calvert Cliffs Application based Upon Completion of Callaway Plant Unit 2 S-COLA

Changes to R-COLA

- The COLA change process utilizes Licensing Basis Document Change Requests (LBDCRs) to manage and control changes to the COLA
- The Callaway S-COLA generated LBDCRs for various R-COLA elements
- The majority of LBDCRs are related to changing brackets that expand site specific information details within the ER and FSAR

Changes to Calvert Cliffs Application based Upon Completion of Callaway Plant Unit 2 S-COLA

Changes to R-COLA

- The remainder of LBDCRs are related to "outside-the-bracket" text changes to:
  - improve technical accuracy
  - identify operational differences between U.S EPR utilities
  - improve readability and grammar

- LBDCRs generated by Callaway S-COLA submittal were included in recent Calvert R-COLA Revision 3 submittal to maintain COLA consistency

Schedule for Submitting Future Supplements and Revisions

Schedule for Future R-COLA Submittals

- Revision 3 for the Calvert Cliffs COLA (R-COLA) was submitted on August 1, 2008
- Included information on ownership change, responses to Requests for Additional Information (RAIs) for Environmental Report, incorporation of LBDCRs and Certificate of Public Convenience and Necessity (CPCN) alignment
- Revision 4 to the R-COLA forecast to be submitted in late fourth quarter 2008 after revision to U.S. EPR FSAR

Schedule for Submitting Future Supplements and Revisions

Process for Future R-COLA and S-COLA Submittals

- **UniStar and U.S. EPR utilities are working on an integrated process for future R-COLA, S-COLA and U.S. EPR FSAR revisions to:**
  - **Ensure COLAs remain consistent**
  - **Support NRC review process**

Status of U.S. EPR FSAR Application Review

Expected Nature of Changes and Schedule for U.S. EPR FSAR, Revision 1

- **Scheduled submittal date: October 17, 2008**

- **Expected nature of changes**
  - **Result of RAI responses**
  - **Editorial corrections**
  - **Error corrections**

Status of U.S. EPR FSAR Application Review

Expected Nature of Changes and Schedule for U.S. EPR FSAR, Revision 1

- Change package contents
  - Complete set of Revision 1 files (with change bars)
  - More user friendly
  - Redline/strikeout version review aid

Status of Nine Mile Point and Bell Bend COL Applications

- **Technical Input being drafted, reviewed and incorporated into draft documents**
- **Multi-functional teams working on COLAs at plant sites and remote locations**
- **Submittal dates:**
  - **Nine Mile Point: September 30, 2008**
  - **Bell Bend: October 14, 2008**