Exhibit No.: 047
Issues: Callaway Power Plant
Witness: Charles D. Naslund
Sponsoring Party: Union Electric Company
Type of Exhibit: Direct Testimony
Case No.: ER-2007-0002
Date Testimony Prepared: July 5, 2006

**MISSOURI PUBLIC SERVICE COMMISSION**

**CASE NO. ER-2007-0002**

# DIRECT TESTIMONY

**OF**

**CHARLES D. NASLUND**

**ON**

**BEHALF OF**

**UNION ELECTRIC COMPANY**
**d/b/a AmerenUE**

**St. Louis, Missouri**
**July, 2006**

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**DIRECT TESTIMONY**

**OF**

**CHARLES D. NASLUND**

**CASE NO. ER-2007-0002**

## I. INTRODUCTION

**Q. Please state your name and business address.**

A. Charles D. Naslund, Ameren Services Company ("Ameren Services"), One Ameren Plaza, 1901 Chouteau Avenue, St. Louis, Missouri 63103.

**Q. What is your position with Ameren Services?**

A. I am Senior Vice President and Chief Nuclear Officer.

**Q. What is Ameren Services?**

A. Ameren Services provides various corporate, administrative and technical support services for Ameren Corporation ("Ameren") and its affiliates, including Union Electric Company d/b/a AmerenUE ("Company" or "AmerenUE"). Because AmerenUE is the only Ameren company owning or operating a nuclear power plant, all of Ameren Services' activities relating to nuclear generation are provided to AmerenUE.

**Q. Please describe your educational background and employment experience.**

A. I earned a bachelor's degree in Electrical Engineering in 1974 from the University of Missouri-Rolla and have completed 27 of 30 hours toward a master's degree in Civil Engineering Construction Management at the University of Missouri – Columbia.

I began my career at Union Electric Company in December 1974 as an assistant engineer in substation design. In February 1976 I became Construction Supervisor

for the new Callaway Nuclear Power Plant ("Callaway Plant"), working at the Callaway Plant at the time of its groundbreaking. In 1980, I was promoted to Supervising Engineer--Start-up and I became Superintendent of Start-up in 1983. After the nuclear core of the Callaway Plant was loaded in June 1984, I became the Superintendent of Instrument & Controls. Over the next thirteen years, I held the following additional positions at the Callaway Plant: Manager of Operations Support, 1986 to 1991; Manager of Nuclear Engineering, 1991 to 1998; and Assistant Vice-President of Power Operations, July 1998 to January 1999. From 1999 to September 2004, I was in charge of the fossil and hydroelectric generating fleet for AmerenUE. In September 2004, I returned to Callaway Plant as Vice-President, Nuclear Operations, and in December 2004 I was promoted to Senior Vice-President and Chief Nuclear Officer.

## II. PURPOSE AND SUMMARY OF TESTIMONY

**Q. What is the purpose of your testimony in this proceeding?**

A. The purpose of my testimony is to: (a) provide a background of the Callaway Nuclear Plant's performance and its importance to Missouri; (b) discuss the substantial capital additions made to the Callaway Plant since the Company's last rate proceeding (Case No. EC-2002-1, initiated in July, 2001); (c) provide up-to-date information on several changes to the Callaway Plant's security infrastructure and the associated operation and maintenance ("O&M") cost increases, nearly all of which were driven by governmentally-mandated requirements following the September 11, 2001 terrorist attack; (d) discuss a key Callaway Plant operation, its regular (every 18 months) refueling outages; and (e) provide information related to a future decision that will have to be made regarding whether or not

the Company should seek to relicense the Callaway Plant. Attachment A is an Executive Summary of my testimony.

## III. BACKGROUND OF CALLAWAY'S PERFORMANCE

**Q. Please briefly describe the Callaway Plant.**

A. The Callaway Plant is a 1,292 megawatt ("MW") nuclear plant located in Callaway County, Missouri. In 2005, the Callaway Plant was the third largest power producer on the Ameren system, accounting for 10.3 percent of AmerenUE's total generation. Only the coal-fired Labadie and Rush Island plants produced more power than Callaway. Callaway's 2005 net generation of 8 million megawatt-hours ("MWh") was enough to supply all the electricity needs of more than 656,000 homes.

**Q. How has production from the Callaway Plant compared with production at other nuclear plants?**

A. Callaway's production has exceeded that of most other nuclear units. Since beginning operation in 1984, Callaway has achieved the sixth highest lifetime generation among the 103 nuclear power plants operating in the U.S. (188,831,745 MWh through 2005). Callaway's lifetime generation through 2005 also ranked 22$^{nd}$ in the world, out of 443 nuclear plants operating in 30 countries.

**Q. How has the operation of the Callaway Plant impacted the economy in Central Missouri?**

A. Callaway is a major factor in both the state and local economy. More than 1,000 AmerenUE employees and contractors work there full time, with a total annual payroll of $81 million. During refueling outages which occur every 18 months, hundreds of additional workers are usually brought in for several weeks—providing a significant boost to

the local economy. The Callaway Plant is a major source of tax revenue to fund education and other critical services. In 2005, the plant accounted for $9.5 million of AmerenUE's property taxes paid to Callaway County, with $6.5 million of that amount going to local schools. In addition, assessed values based on AmerenUE's investment in the plant resulted in another $20.9 million in taxes shared by the remaining 68 counties in AmerenUE's Missouri service area.

## IV. MAJOR CAPITAL ADDITIONS

**Q. Please summarize the capital additions made to the Callaway Plant since 2001.**

A. Significant major component replacements have been made to the Callaway Plant since 2001, including the 2005 replacement of the plant's four steam generators--the giant boilers that produce steam for generating electricity. In addition, in 2005 AmerenUE replaced one high pressure and three low pressure turbines and their associated casings and diaphragms. Turbines are the components of the plant which spin with steam pressure to operate the generators. Finally, the Company replaced the main feedwater isolation valve actuators, and installed new distributed control systems. In the area of plant security infrastructure, the Company installed a number of new security barriers, devices and systems required to meet federal guidelines. In total, the Company made $449,677,723 in capital additions to the Callaway Plant over approximately the past 5 years. Schedule CDN-1 summarizes each of these additions and their associated costs.

**Q. Please explain some of the key drivers that necessitated the nearly $450 million of capital additions at the Callaway Plant over this period.**

A. From a general perspective, each of these additions to the Callaway Plant was necessary to ensure that Callaway remains a reliable source of power for AmerenUE and its Missouri ratepayers. The Callaway Plant has now been in operation for more than 20 years. Many of its components are at end of their useful lives and/or have become obsolete due to the unavailability of replacement parts necessary to perform proper maintenance on them.

**Q. Are there more specific drivers?**

A. Yes. Several components were fabricated almost 30 years ago from "alloy 600" materials. "Alloy 600" is a special type of stainless steel metal used to fabricate steam generator tubing, piping and as a weld filler metal for many of the welds made in Callaway's reactor coolant system. In the 1970's when Callaway was being designed and components fabricated, alloy 600 was the best alloy available for the required temperature and pressure operating conditions. It is now known that alloy 600 materials were not able to withstand the operating temperature and pressure they were subjected to in a nuclear power plant, over the periods for which they were designed. As a result, the alloy 600 materials have failed prematurely. Among other consequences, the premature failure of the alloy 600 materials necessitated the replacement of all four of the Callaway Plant's steam generators.

**Q. What materials were used to replace the alloy 600 materials?**

A. In designing the new components, including the new steam generators, AmerenUE selected state-of-the-art materials that we expect to last for the remaining life of the plant. For the new steam generator tubing, alloy 690, a more durable stainless steel alloy was utilized. In addition, AmerenUE utilized modern design technologies to increase the efficiency of the components. This allowed the Company to improve both durability and plant output.

**Q. What was involved in replacing the Callaway steam generators?**

A. Replacing the steam generators was no small task, because each one is about 70 feet tall and 17 feet in diameter, and weighs about 400 tons. The new steam generators were manufactured in France and contain tubing from Sweden. They feature improved technology that has proven to be more efficient and durable than the original units. The improved efficiency of the new steam generators, combined with turbine upgrades that were also performed during the 2005 outage, increased Callaway's net generating capacity by 60 MW. The cost of the steam generator replacement and turbine upgrade projects was approximately $200 million.

**Q. Please address the increase in plant output more specifically.**

A. As a byproduct of replacing the newly designed steam generators, turbines and actuators in 2005, the Company was able to increase the output of the Callaway Plant from 1,232 MW gross to 1,292 MW, or a 60 MW output increase. This increase in plant output further assists the Company in serving its growing loads with a low-cost supply of energy.

**Q. Was the Company successful in completing its replacement projects in 2005?**

A. Yes. In 2005, Callaway set a new world record for the shortest time it took to replace four steam generators. Callaway's replacement time of 63 days and 13 hours was more than a day shorter than the previous record of 64 days and 17 hours set by the South Texas Project in 2002.

The entire 2005 outage was completed on time, under budget, and with no lost-time accidents among either Ameren employees or contractors. This was the most

complex and challenging outage since construction, because it included replacement of all four steam generators as well as replacement of all four turbines. The plant shut down September 17 and returned to service on November 19.

As in past refueling outages, which occur approximately every 18 months, thousands of maintenance activities, modifications, inspections and tests were performed throughout the plant to ensure top safety and reliability until the next refueling. About 3,000 people worked on the project, including more than 2,000 contractors and Ameren employees from other locations who joined the plant's regular staff to help handle the large volume of work. They completed approximately 2.1 million work hours.

**Q. You previously mentioned post-9/11 upgrades in security infrastructure and related costs. Please elaborate.**

A. After September 11, 2001, the Nuclear Regulatory Commission ("NRC") issued a series of orders to all U.S. nuclear plants, requiring major changes in how nuclear power plant operators must provide security for and defense of their nuclear plants. These changes were primarily driven by a revised Design Basis Threat, or "DBT." A DBT is the set of threat assumptions imposed by the NRC for which each nuclear plant must be able to defend against and protect the safety of the nuclear core. In order to meet these new requirements, the Company implemented a number of capital modifications by October 2004. Schedule CDN-2 summarizes the capital costs incurred to meet this new DBT. In addition to the security/defense related capital additions to the plant itself, the new DBT required a substantial increase in staffing requirements and other O&M expenses. These security-related costs have added $5 million per year to the Callaway Plant's O&M cost structure. These costs increases are also shown in Schedule CDN-2.

**Q. What was the nature of these security changes?**

A. The security changes to the plant include a concrete barrier around the entire site perimeter to act as a vehicle barrier to defend against the design basis threat. A portal through this barrier system to allow the processing of materials in and out of the plant was constructed. Multiple new fences with detection and monitoring systems were installed. Elevated hardened defense positions that provide 100% oversight of the site's perimeter were also constructed. Finally a new training facility and firing range were constructed to meet the training requirements established for the security force.

## V. PERIODIC REFUELINGS

**Q. You mentioned in the purpose section of your testimony the subject of periodic refuelings of the Callaway Plant. Please explain the need for those refuelings and what a "refueling outage" entails.**

A. The Company completed the most recent refueling outage at the Callaway Plant in November of 2005. Like all nuclear power plants, the Callaway Plant's nuclear fuel must be replaced; i.e., the reactor must be "refueled" periodically. In the case of the Callaway Plant, refuelings must occur nominally every 18 months. During a refueling outage, the Company not only completes the necessary refueling, but also uses the outage as an opportunity to perform required maintenance of the plant and implement any capital/maintenance modifications required to meet regulatory requirements, address reliability issues or replace obsolete equipment. By combining scheduled maintenance and capital addition work with refuelings, the Company can minimize outage time and maximize the efficiency of the necessary operations. Schedule CDN-3 summarizes the duration and

costs of each outage since Callaway went online in December 1984. During this 21 year period and 14 outage cycles, Callaway has averaged 49.4 days per outage.

## VI. FUTURE DECISIONS REGARDING CALLAWAY

**Q. You indicated earlier that the Callaway Plant had been in operation for over 20 years and that the age of the plant required these rather major upgrades. What is the life of the Callaway Plant?**

A. When the Callaway Plant commenced operations in 1984, the NRC granted the Company a 40 year license for the plant. This license will expire approximately 18 years from now in 2024. The plant is thus just over one-half of the way through its licensing period. The NRC has established a process for extending the original licenses an additional 20 years. This process normally is started about 10 years before the license is scheduled to expire. Consequently, AmerenUE will not be deciding whether or not to commence the relicensing process until around 2014. As of now, AmerenUE has made no decision as to whether it should request an extension of the Callaway license. The Company continues to engage in extensive data gathering, including monitoring critical plant components for life impacts due to radiation exposure and high temperature environments. The single most critical consideration in determining whether or not relicensing may be feasible is the condition of the reactor vessel itself. Extensive monitoring is in place to measure neutron embrittlement of the vessel wall. The additional data gained over the next approximately eight years will be critical in assisting the Company in making a relicensure decision. While no decision can be made for a number of years, the Company continues to do all the things necessary to preserve this option.

**Q. Are there other factors that AmerenUE will consider in deciding whether to seek a license extension for the Callaway Plant?**

A. Yes. The overall cost of continuing to operate the plant will also be a consideration. The cost can be impacted by a number of factors including changing regulatory requirements, increases in the cost of purchasing fuel or disposing of spent fuel rods and increases in O&M costs. In addition, the relative costs of other power sources will have to be considered at the time the decision is made.

**Q. Does this conclude your testimony?**

A. Yes, it does.

**BEFORE THE PUBLIC SERVICE COMMISSION**
**OF THE STATE OF MISSOURI**

| | | |
|---|---|---|
| In the Matter of Union Electric Company d/b/a AmerenUE for Authority to File Tariffs Increasing Rates for Electric Service Provided to Customers in the Company's Missouri Service Area. | ) ) ) ) ) | Case No. ER-2007-0002 |

**AFFIDAVIT OF CHARLES D. NASLUND**

**STATE OF MISSOURI** )
) **ss**
**CITY OF ST. LOUIS** )

Charles D. Naslund, being first duly sworn on his oath, states:

1. My name is Charles D. Naslund. I work in the City of St. Louis, Missouri, and I am employed by Ameren Services Company as Senior Vice President and Chief Nuclear Officer.

2. Attached hereto and made a part hereof for all purposes is my Direct Testimony on behalf of Union Electric Company d/b/a AmerenUE consisting of 10 pages, Attachment A and Schedules CDN-1 through CDN-3, all of which have been prepared in written form for introduction into evidence in the above-referenced docket.

3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct.

Charles D. Naslund

Subscribed and sworn to before me this 5th day of July, 2006.

Notary Public

My commission expires: 8-3-2007

LORI L. TWILLMAN
Notary Public - Notary Seal
STATE OF MISSOURI
Callaway County
My Commission Expires: Aug. 3, 2007

# EXECUTIVE SUMMARY

**Charles D. Naslund**

***Senior Vice President and Chief Nuclear Officer***

* * * * * * * * * * *

The purpose of my testimony is to: (a) provide a background of the Callaway Nuclear Plant's performance and its importance to Missouri; (b) discuss the substantial capital additions made to the Callaway Plant since the Company's last rate proceeding (Case No. EC-2002-1); (c) provide up-to-date information on several changes to the Callaway Plant's security infrastructure and the associated operation and maintenance ("O&M") cost increases, nearly all of which were driven by governmentally-mandated requirements following the September 11, 2001 terrorist attack; (d) discuss a key Callaway Plant operation, its regular (every 18 months) refueling outages; and (e) provide information related to a future decision that will have to be made regarding whether or not the Company should seek to relicense the Callaway Plant.

Callaway's production has exceeded that of most other nuclear units. Callaway's lifetime generation was the sixth highest among the 103 operating U.S. nuclear power plants, and 22$^{nd}$ in the world, out of 443 nuclear plants operating in 30 countries. Callaway has over 1,000 full-time employees and contractors. In 2005, the plant accounted for $9.5 million of AmerenUE's property taxes paid to Callaway County, with $6.5 million of that amount going to local schools.

Significant major component replacements have been made to the Callaway Plant since 2001, including the 2005 replacement of the plant's four steam generators--the giant

boilers that produce steam for generating electricity. In total, the Company made $449,677,723 in capital additions to the plant over approximately the past 5 years.

In order to meet new security requirements imposed by the Nuclear Regulatory Commission ("NRC") after September 11, 2001, the Company implemented a number of capital modifications by October 2004 and substantially increased staffing and other O&M expenses. These security-related costs have added $5 million per year to the Callaway Plant's O&M cost structure.

The Company completed a regular refueling outage at the Callaway Plant in November of 2005. By combining scheduled maintenance and capital addition work with such refuelings, the Company minimizes outage time and maximizes the efficiency of these necessary operations.

The NRC license for the Callaway Plant will expire approximately 18 years from now in 2024. The NRC's process for extending licenses an additional 20 years normally is started about 10 years before the license is scheduled to expire. Consequently, AmerenUE will not be deciding whether or not to commence the relicensing process until around 2014. The single most critical consideration in determining whether or not relicensing may be feasible is the condition of the reactor vessel itself. The additional data gained over the next approximately eight years will be critical in assisting the Company in making a relicensure decision. During that time, the Company will continue to do all the things necessary to preserve this option.

Ameren Corporation
Project Based
Proj Sum - Cap
In-Budget Row Only

Escalated, Accountable Dollars

| Project | Grand Total | Opening Balance | Year 2001 | Year 2002 | Year 2003 | Year 2004 | Year 2005 | Closing Balance |
|---|---|---|---|---|---|---|---|---|
| 02000 - RADIATION DETECTION INSTRUMENTS | 109,782 | 14,831 | 13,926 | 81,025 | | | | |
| 02050 - UPGRADE LAB MATERIAL CONDITION | 105,909 | | | 4,683 | 28,918 | 71,096 | 1,211 | |
| 02069 - NIS COMPUTER ROOM HVAC | 143,380 | | | | 81,828 | 61,552 | | |
| 02233 - PERM PLTFRMS ON ISOPHASE STRUCTURE | 98,016 | | | 97,824 | 192 | | | |
| 02397 - LOAD INDICATORS FOR THE POLAR CRANE | 104,982 | | | | | 103,213 | 1,769 | |
| 02460 - LN CONTNMNT SUMPS WITH STNLS STEEL | 233,348 | | 111,185 | 110,847 | 7,575 | 3,741 | | |
| 02483 - STATOR COOLING WATER LEAK MONITORNG | 107,446 | 62,417 | 9,763 | 35,266 | | | | |
| 02485 - LAN CONNECTED TELEMETRY | 141,891 | | | 90,023 | 51,869 | | | |
| 0A015 - CAPITAL SP PART (UOP) & INITIAL PUR | 1,812,221 | | | 229,974 | 33,481 | 1,047,270 | 501,496 | |
| 0A173 - WORK CONTROL CAPITAL TOOL PURCHASE | 170,479 | | | | | | 170,479 | |
| 0A216 - OFFICE FURNITURE | 239,321 | | | | | | 239,321 | |
| 0A502 - MISC HP - OPERATIONS CAPITAL EQPMNT | 150,656 | | | | | | 150,656 | |
| 0A505 - MISC CHEMISTRY CAPITAL EQUIPMENT | 108,802 | | | | | | 108,802 | |
| 10376 - HP FEEDWATER HEATER DUMP VALVE RPLC | 386,902 | 250,894 | 133,887 | 2,120 | | | | |
| 10579 - UPGRD OF TERRY TURB CNTL-DIG CNTLR | 425,069 | 56,679 | 167,632 | 162,614 | 22,748 | 14,751 | 646 | |
| 10591 - RADIATION DETECTN INSTR CALIBRATOR | 108,888 | | 108,888 | | | | | |
| 10669 - COOLING TOWER FILL ADDITION | 559,211 | | 529,787 | 29,424 | | | | |
| 10704 - VOLTAGE CORRECTION EQUIPMENT | 4,767,032 | 2,524,589 | 1,783,411 | 439,117 | 11,406 | 8,509 | | |
| 10806 - TUBE BUNDLE REPLCMNT-FEEDWATER HTRS | 4,981,129 | 1,049,892 | 3,928,779 | 2,457 | | | | |
| 10878 - 98-1027 REPL 2 IN CS PIPE WITH SS | 653,619 | | | | | | 653,619 | |
| 11009 - STEAM GENERATOR REPLACEMENT | 1,625,542 | 267,225 | 1,119,597 | 203,394 | 35,327 | | | |
| 11013 - INSTALL SVC WATER BASKET STRAINERS | 673,443 | 17,352 | 656,091 | | | | | |
| 11028 - RENOVATE THE HP ACCESS AREA | 373,012 | 217,155 | 155,857 | | | | | |
| 11030 - RPLC MN STEAM ISOLATION VLV ACTUATR | 12,614,905 | | 763,999 | 2,545,407 | 1,181,731 | 4,597,524 | 1,089,149 | 2,437,095 |
| 11031 - REMOVE & DISPOSE OF FILTER ABSORBER | 156,472 | | 11,219 | 141,156 | 4,098 | | | |
| 11040 - CARBON STEEL PIPING REPLACEMENT | 1,608,381 | 4,510 | 476,630 | 266,207 | 206,316 | 541,392 | 113,326 | |
| 11041 - INFRASTRUCTURE FOR DIGITAL CNTL SYS | 2,852,759 | 8,301 | 838,021 | 1,199,831 | 696,814 | 109,686 | 105 | |
| 11042 - DIESEL GEN EXCITOR CONTROLS RPLCMNT | 4,688,685 | | 6,797 | 49,948 | 140,215 | 957,574 | 792,450 | 2,741,701 |
| 11043 - DIGITL FDWATER HEATER LVL CNTLS RPL | 3,217,289 | | | | 330,920 | 1,346,864 | 237,050 | 1,302,456 |
| 11044 - UPGRD CNTLS-POLSHR WASTE WATER PROC | 5,239,302 | 934,002 | 1,500,659 | 1,328,473 | 1,371,704 | 113,743 | (9,280) | |
| 11045 - INSTALL MN STEPUP XFRMR GAS MONITRS | 364,939 | 100,779 | 51,127 | 164,207 | 48,584 | 242 | | |
| 11064 - ADD 10 ESW ISOLATION VLVS FOR 5 RM | 739,897 | 15,863 | 186,087 | 198,866 | 105,356 | 233,725 | | |
| 11123 - RPLC ATMOSPHERIC STEAM DUMP SILENCR | 157,733 | | 157,733 | | | | | |
| 11140 - REPLACE CONTAINMENT COOLER COILS | 4,818,198 | 84,131 | 3,053,096 | 1,651,924 | 29,048 | | | |
| 11151 - CONDENSER TUBE REPLACEMENT | 32,785,662 | | | | 9,223,586 | 23,530,703 | 31,373 | |
| 11183 - RPLC FIRE PROTECTION SYSTEM EQPMNT | 1,158,538 | | 18,795 | 228,154 | 338,683 | 582,956 | (10,051) | |
| 11185 - RPLCMNT OF PK11&PK12 BATTERY BANKS | 339,547 | | | 317,458 | 22,089 | | | |
| 11189 - UPGRD RDWSTE BLDG DRUM STORAGE AREA | 477,937 | | 107,464 | 120,387 | 97,425 | 130,197 | 251 | 22,214 |

Ameren Corporation
Project Based
Proj Sum - Cap
In-Budget Row Only

Escalated, Accountable Dollars

| Project | Grand Total | Opening Balance | Year 2001 | Year 2002 | Year 2003 | Year 2004 | Year 2005 | Closing Balance |
|---|---|---|---|---|---|---|---|---|
| 11218 - OFFICE FURN. FOR CALLAWAY FOR 2001 | 216,528 | | 200,165 | | | 16,362 | | |
| 11219 - FURNITIRE 2002 | 283,097 | | | 282,958 | 140 | | | |
| 11220 - FURNITURE 2003 | 232,378 | | | | 232,318 | 60 | | |
| 11221 - FURNITURE 2004 | 196,788 | | | | | 198,786 | (1,998) | |
| 11234 - LOW PRESSURE ROTOR ELEMENT RPLCMNT | 60,861,174 | | | 71,961 | 594,748 | 23,653,560 | 35,435,564 | 1,105,341 |
| 11283 - REPLACEMENT HEALTH PHYSICS SOFTWARE | 510,803 | | 65,417 | 445,386 | | | | |
| 11286 - TRAINING CENTER HVAC UNITS | 323,865 | | 26,800 | 1,338 | 253,331 | 42,396 | | |
| 11289 - MAIN FEED PUMP EHC UPGRADE | 4,579,005 | | | | 348,328 | 862,162 | | 3,368,516 |
| 11293 - MN TURBINE GENERATOR GOVERNOR CNTLS | 3,431,636 | | | | 315,827 | 1,075,640 | 671,157 | 1,369,011 |
| 11298 - BOP NON-1E ANALOG CONTROLS REPLCMNT | 424,344 | | | | 265,409 | 147,427 | 11,507 | |
| 11307 - MAIN CONTROL BOARD UPGRADE | 759,695 | | | | 269,256 | 532,612 | (82,297) | 40,124 |
| 11308 - LSELS, ESFAS, MSFIS UPGRADE | 14,572,038 | | | 1,502,355 | 1,181,269 | 7,525,779 | (583,964) | 4,946,601 |
| 11309 - DCS ACTIVITIES | 282,136 | | | 139,519 | 467,817 | | (325,200) | |
| 11311 - BCMS UPGRADE | 366,225 | | 20,628 | 162,180 | 130,465 | 50,258 | 2,694 | |
| 11312 - FLUX MAPPING SYSTEM UPGRADE | 1,957,632 | | | 235,215 | 1,088,372 | 632,251 | 1,794 | |
| 11316 - WASTE GAS H2 ANALYZER REPLACEMENT | 964,262 | | 4,226 | 806,402 | 76,623 | 89,012 | (35,405) | 23,404 |
| 11339 - CONTROL ROOM SIMULATOR UPGRADE | 4,660,514 | | | 846,186 | 1,456,573 | 1,257,880 | 1,099,875 | |
| 11342 - PLANT COMPUTER UPGRADE | 9,813,035 | | 248,917 | 1,009,430 | 1,034,148 | 2,570,478 | 1,533,043 | 3,417,018 |
| 11470 - 2004 WALKUP COPIER REPLACEMENT | 145,737 | | | | | 145,737 | | |
| 11472 - 2003 HIGH VOLUME COPIER REPLACEMENT | 226,101 | | | | 205,917 | 20,184 | | |
| 11683 - REPLACE HVAC UNITS - 2 FL SERV BLDG | 295,278 | | 269,855 | 25,129 | 294 | | | |
| 11692 - MOLD REMOVAL IN CENTRAL PROCESS FAC | 105,276 | | 105,276 | | | | | |
| 11806 - RETIRE PASS | 158,370 | | 49,624 | 104,625 | 4,121 | | | |
| 12077 - INSTLL DIVERSION VLV:NEW HELPER TWR | 492,679 | | 492,679 | | | | | |
| 12319 - VIDEO CAPTURE & IRIS SCAN DOOR COMP | 116,988 | | | | 29,827 | 87,161 | | |
| 12636 - STEAM GENERATOR REPLACEMENT | 188,629,606 | | 1,279,111 | 20,271,228 | 34,151,787 | 23,786,892 | 105,606,430 | 3,534,158 |
| 12748 - GAMMA 10 UPGRADE/REPLACEMENT | 254,696 | | | | 254,696 | | | |
| 12774 - REPLACE AUX BUILDING ROOF | 628,792 | | | | | 394,176 | 228,381 | 6,235 |
| 12780 - CYCLE 12 SEC SIDE EROSION PIPE RPLC | 1,762,403 | | | 1,750,157 | | 12,246 | | |
| 12817 - X-RAY MACHINE REPLACEMENTS | 102,390 | | | 51,504 | 50,885 | | | |
| 12821 - BACKFILL UNIT 2 EXCAVATION | 884,821 | | 5,896 | 870,672 | 8,252 | | | |
| 12825 - REFUEL 13 NON SGR ACTIVITIES | 2,142,469 | | | | 121,314 | 2,594,090 | (572,935) | |
| 12828 - SGRP SUPPORT FACILITY | 2,574,195 | | | | 49,762 | 2,522,447 | 1,986 | |
| 12829 - DOCKING FACILITY | 3,718,106 | | 115 | 6,827 | 301,238 | 1,664,241 | 1,745,685 | |
| 12830 - SECURITY UPGRADE | 1,461,152 | | | 8,534 | 265,195 | 1,177,339 | 10,084 | |
| 12866 - 01-1001 RPLC LIQUID RADWASTE SYSTEM | 242,461 | | | | 93,626 | 139,811 | 9,023 | |
| 12940 - UPGRADE MN GSU TRANSFORMER COOLERS | 1,083,233 | | | | 27,230 | 907,941 | 54,915 | 93,147 |
| 12970 - REPLACE MAIN FEEDWATER PIPING | 2,959,407 | | | 2,959,407 | | | | |
| 13128 - INSTALL VNDR SUPPLIED CHEM ADD EQPT | 3,083,837 | | 9,646 | 1,688,779 | 395,864 | 894,270 | 95,278 | |
| 13129 - RPLC ACID ADDTN EQPT FOR COOLNG TWR | 554,080 | | | 360,914 | 40,601 | 66,389 | 40,773 | 45,403 |

Ameren Corporation
Project Based
Proj Sum - Cap
In-Budget Row Only

Escalated, Accountable Dollars

| Project | Grand Total | Opening Balance | Year 2001 | Year 2002 | Year 2003 | Year 2004 | Year 2005 | Closing Balance |
|---|---|---|---|---|---|---|---|---|
| 13143 - REPLACE PK13 AND PK14 BATTERY BANKS | 326,000 | | | | 310,589 | 15,411 | | |
| 13144 - REPLACE PJ11 BATTERY BANK | 228,890 | | | | | 228,890 | | |
| 13169 - RCP MOTOR CHANGEOUT SPPT COSTS RF13 | 331,826 | | | | | 331,826 | | |
| 13201 - A LOOP FEEDWATER PIPING REPLACEMENT | 127,221 | | 125,543 | 1,678 | | | | |
| 13254 - PLANT SECURITY UPGRADE | 3,256,405 | | | 3,051,592 | 120,803 | 62,306 | 21,704 | |
| 13297 - CAPITAL SHOP TOOLS OVER $1,000 | 868,614 | | | | 29,312 | 104,487 | 19 | 734,796 |
| 13342 - 02-1013 VIDEO MONITORING FOR HP ACC | 563,156 | | | | 231,219 | 331,764 | 173 | |
| 13411 - 02-1017 INSTALL SIRENS AROUND SITE | 201,150 | | | | 148,325 | 52,825 | | |
| 13412 - AUTOMATIC RECIRCULATION VALVE SYS | 783,945 | | | | 169,137 | 604,875 | 9,933 | |
| 13417 - SF6 GAS RECLAIMER | 124,292 | | | | | 124,292 | | |
| 13457 - 2 RELIEF VLV TEST MACHINES PURCHASE | 252,255 | | | | 230,082 | 22,174 | | |
| 13509 - 2003 SECURITY UPGRADES | 22,315,170 | | | | 1,340,781 | 19,673,838 | 1,300,551 | |
| 13673 - 1E FOXBORO CABINETS UPGRADE | 398,011 | | | | 206,130 | 181,088 | 10,793 | |
| 13731 - REPLACE EP8818 VALVES | 1,302,607 | | | | 1,720 | 85,264 | 1,182,432 | 33,191 |
| 13908 - TRAINING FACILITIES IMPROVEMENTS | 204,974 | | | | 56,775 | 23,458 | 124,741 | |
| 13925 - REPLACE WHOLE BODY COUNTERS | 257,659 | | | | 257,659 | | | |
| 14150 - REPLACE 2 CIRCULATING PUMPS | 988,386 | | | | 973,336 | 15,050 | | |
| 14187 - RPLC MN GEN HYDROGEN COOLER BUNDLES | 330,300 | | | | 127,902 | 206,593 | (4,195) | |
| 14207 - C13&R13 SEC SIDE EROSION PIPE RPLC | 3,532,836 | | | | 318,173 | 3,307,047 | (92,384) | |
| 14754 - DOSE ASSESSMENT SOFTWARE | 183,161 | | | | 50,708 | 132,759 | (306) | |
| 14838 - C14&R14 ESW CARBON STEEL PIPE RPLC | 1,430,902 | | | | | 2,919 | 1,427,983 | |
| 14842 - REPLACE PN01 AND PN02 INVERTERS | 114,630 | | | | | 11,464 | 103,165 | |
| 14998 - REPLACE-RETIRE FEF02A AND FEF02B | 1,291,262 | | | | | 10,071 | 1,281,191 | |
| 15127 - PORTLAND RIVER SAMPLER CNTRLS UPGRD | 174,626 | | | | | 121,849 | 3,775 | 49,002 |
| 15203 - PRCHS 120 TON HYDRLIC TELESCPNG CRN | 949,459 | | | | | 976,892 | (27,433) | |
| 15210 - REPLC SENE0061 POST ACCIDENT DETECT | 144,514 | | | | | 144,514 | | |
| 15889 - MILES GEAR, GUNS AND OPTICS | 227,808 | | | | | | 227,808 | |
| 15954 - REACTOR VESSEL HEAD MTCE EQUIPMENT | 1,684,604 | | | | | | 136,496 | 1,548,108 |
| 16155 - MET TOWER REPLACEMENT | 362,115 | | | | | 6,322 | 93,525 | 262,268 |
| 16169 - CALLAWAY DIRECTOR SYSTEM | 768,434 | | | | | | 768,434 | |
| 16229 - REPLACE SWITCHYARD BATTERIES | 168,172 | | | | | | 168,172 | |
| 16265 - X-RAY MACHINE REPLACEMENTS | 162,937 | | | | | | 162,937 | |
| 19271 - REPLACE LOWER TURBINE BLDG ROOF | 263,848 | | | | | | 92,327 | 171,522 |
| | 449,677,723 | 5,608,620 | 18,794,331 | 46,354,763 | 62,357,798 | 133,300,302 | 156,010,601 | 27,251,308 |

## Capital Costs Relating to NRC Orders

| | |
|---|---|
| 2002 Interim Compensatory Measures Order | $3.3 million |

- Supplemental Vehicle Barrier System
- New Owner Controlled Access Facility
- Pavement of construction parking lot and roads
- Lighting of construction parking lot

| | |
|---|---|
| 2003 Orders<br>Design Basis Threat<br>Security Training<br>Security Working Hours | $25.3 million |

- New permanent Vehicle Barrier System
- New active Vehicle Barrier System (sally port)
- New hardened fixed security response positions
- New delay fences
- Modifications to our Secondary Alarm Station due to Design Basis Threat
- Movement of security multiplexer
- New intrusion detection system
- New camera system
- Electrical upgrades to security equipment
- Upgrades to the Security Firing Range

| | |
|---|---|
| Total Orders | $28.6 million |

## O&M Increases in Costs 2001-2005

Total O&M Security Budget (By Year):

2001 $4.8 million

2002 $6.9 million

- Implementation of the Interim Compensatory Measures Order
- Additional security personnel to accommodate Order requirements
- Additional searches of vehicles and personnel
- Additional training requirements

2003 $6.8 million

2004 $9 million

- Implementation of the Design Basis Threat Order, the Security Training Order, and the Security Working Hours Order.
- Change in security strategy required additional staffing
- Additional security weapons
- Moving security presence out to OCA required additional staffing
- Security Training Order required additional training with required us to move to a 5-crew schedule
- Security working hours limits required less scheduled overtime therefore more people to cover the shifts

2005 $9.8 million

- NRC evaluated Force on Force Exercise
- Support of RF14

Increase from 2001 to 2004: $5 million

## CALLAWAY REFUEL OUTAGE MAINTENANCE COSTS

| | Refuel 1 Spring 1986 | Refuel 2 Fall 1987 | Refuel 3 Spring 1989 | Refuel 4 Fall 1990 | Refuel 5 Spring 1992 | Refuel 6 Fall 1993 | Refuel 7 Spring 1995 |
|---|---|---|---|---|---|---|---|
| **Maintenance Projects Excluding AmerenUE Wages** | | | $14.0 | $16.1 | $23.0 | $19.8 | $20.7 |
| **Incremental AmerenUE Overtime Wages** | | | $4.0 | $5.7 | $5.1 | $5.0 | $4.5 |
| **Replacement Energy** | | | $8.3 | $7.2 | $7.7 | $13.6 | $8.6 |
| **TOTAL** | Not Available | Not Available | $26.3 | $29.0 | $35.8 | $38.4 | $33.8 |
| **Duration** | 49 days | 65 days | 53 days | 60 days | 60 days | 52 days | 48 days |

| | Refuel 8 Fall 1996 | Refuel 9 Spring 1998 | Refuel 10 Fall 1999 | Refuel 11 Spring 2001 | Refuel 12 Fall 2002 | Refuel 13 Spring 2004 | Refuel 14 Fall 2005 |
|---|---|---|---|---|---|---|---|
| **Maintenance Projects Excluding AmerenUE Wages** | $16.8 | $16.3 | $22.0 | $23.1 | $22.6 | $40.1 | $21.5 |
| **Incremental AmerenUE Overtime Wages** | $3.5 | $5.1 | $5.0 | $8.0 | $4.9 | $9.7 | $9.3 |
| **Replacement Energy** | $10.0 | $7.7 | $12.7 | $18.1 | $10.2 | $24.3 | $25.4 |
| **TOTAL** | $30.0 | $29.1 | $39.7 | $49.2 | $37.7 | $74.1 | $56.2 |
| **Duration** | 31 days | 31 days | 35 days | 45 days | 34 days | 65 days | 63D 13H |