Exhibit No.:	
Issues:	Vegetation Management And Callaway Plant Life
Witness:	Warren T. Wood
Sponsoring Party:	MO PSC Staff
Type of Exhibit:	Direct Testimony
Case No.:	ER-2007-0002
Date Testimony Prepared:	December 15, 2006

MISSOURI PUBLIC SERVICE COMMISSION

UTILITY OPERATIONS DIVISION

DIRECT TESTIMONY

OF

WARREN T. WOOD

UNION ELECTRIC COMPANY d/b/a AMERENUE

CASE NO. ER-2007-0002

Jefferson City, Missouri
December 2006

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 WARREN T. WOOD

STATE OF MISSOURI)
) **ss**
COUNTY OF COLE)

Warren T. Wood, of lawful age, on his oath states: that he has participated in the preparation of the following Direct Testimony in question and answer form, consisting of 23 pages of Direct Testimony to be presented in the above case, that the answers in the following Direct Testimony were given by him; that he has knowledge of the matters set forth in such answers; and that such matters are true to the best of his knowledge and belief.

Warren T. Wood

Subscribed and sworn to before me this 12th day of December, 2006.

NOTARY PUBLIC NOTARY SEAL STATE OF MISSOURI

SUSAN L. SUNDERMEYER
My Commission Expires
September 21, 2010
Callaway County
Commission #06942086

Susan L. Sundermeyer
Notary Public

My commission expires 9-21-10

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UNION ELECTRIC COMPANY d/b/a AMERENUE

CASE NO. ER-2007-0002

Q. Please state your name and business address.

A. Warren T. Wood, P.O. Box 360, Jefferson City, Missouri 65102.

Q. By whom are you employed and in what capacity?

A. I am the Director of the Missouri Public Service Commission (Commission) Staff's Utility Operations Division.

Executive Summary

Q. Please give a brief summary of your direct testimony.

A. My direct testimony provides the Commission Staff's (Staff) position on the following two matters:

1) Appropriate changes to AmerenUE's vegetation management programs and the funding level for these programs. Based on its investigation in Case No. EO-2007-0037, Staff believes that AmerenUE should implement vegetation management programs that:

a) Target more substantial removal of vegetation along power lines throughout its system, including side clearances and overhangs, along feeders and sub-transmission systems;
b) Target removal of problem trees within the utility's easement and possible replacement with ornamental trees or other low-growing vegetation;
c) Target communications with landowners, who have trees off the right-of-way that represent a significant risk to sub-transmission and feeder lines, to find reasonable means to reduce the outage risk from these trees; and

d) Trim trees in areas with particularly high densities of vegetation on a more frequent basis. Currently urban areas are targeted for a four-year cycle; it may be appropriate to go to a three-year cycle in some areas.

Currently AmerenUE has committed, in its agreement in Case No. EW-2004-0583, to spend $30 million per year in order to address its vegetation management backlog by no later than December 31, 2008. Staff believes that the four additional programs identified above should be implemented and estimates that, based on availability of resources to do this work, AmerenUE's expenditures for these programs will be $15 million per year, in addition to the $30 million per year previously committed to by AmerenUE.

2) Appropriate assumptions in Case No. ER-2007-0002 regarding the remaining life of Callaway nuclear generating station unit 1 (Callaway). It is Staff's position that AmerenUE should seek a twenty-year license renewal from the Nuclear Regulatory Commission (NRC) for Callaway and that a sixty-year total plant life should be implemented in this case for Callaway.

Q. Please describe your educational and professional background.

A. In December 1987, I received a Bachelor of Science degree in Civil Engineering from the University of Missouri at Columbia, Missouri. Upon graduation, I accepted employment with Black & Veatch Engineers – Architects and worked in the Energy and Environmental divisions of this consulting firm for a little over ten years.

While at Black & Veatch I designed a wide range of power generation and water treatment associated facilities, acted as an engineering liaison between our design office and joint venture partner offices, developed specifications, drafted engineering drawings, designed mechanical equipment supports and wrote custom computer programs to assist in solving

many types of engineering problems. My work while at Black & Veatch focused on new and retrofit work on coal, combustion turbine, and nuclear power plant projects. I worked for Questec Engineering in Columbia, Missouri in 1997 and 1998. While at Questec I was a project manager in charge of site development and completion of numerous types of engineering projects for industrial, commercial and residential customers.

I have worked for the Commission for about eight years. Initially I was hired as a Regulatory Engineer in the Procurement Analysis Department of the Commission. While working in the Procurement Analysis Department, I investigated the natural gas purchasing practices of Missouri's natural gas utilities and filed testimony in procurement analysis and actual cost adjustment audit cases. Later, I was employed as the Natural Gas Department Manager, promoted to the newly created Energy Department Manager position and later promoted to Utility Operations Division Director. As the Natural Gas Department Manager, I oversaw the regular tariff filings at the Commission of the natural gas utilities in the state, the Commission's activities in interstate natural gas pipeline cases at that Federal Energy Regulatory Commission (FERC) and the activities of the Commission's natural gas safety section. As the Energy Department Manager, I oversaw the activities of the natural gas department sections listed above in addition to the activities of the engineering and economic analysis sections, which deal primarily with electric utilities in the state. In addition to overseeing the day-to-day activities of the Operations Division in my current position, I also regularly participate in presentations to stakeholder groups and legislative committees, conduct roundtables and facilitate rulemaking workshops.

I am a registered Professional Engineer in the State of Missouri and hold a certificate of registration from the National Council of Examiners for Engineering and Surveying

(NCEES). I am a member of Tau Beta Pi, an honorary engineering society and Chi Epsilon, an honorary civil engineering society.

Q. Have you previously testified before this Commission?

A. Yes, I testified in Ozark Natural Gas Co., Inc., Case No. GA-96-264, Laclede Gas Company, Case No. GR-96-193, Missouri Gas Energy, Case No. GR-96-285, Empire District Electric Company, Case No. ER-97-81, Missouri Public Service, Case No. GR-95-273, Missouri Gas Energy, Case No. GO-97-409, Associated Natural Gas Company, Case No. GR-97-272, United Cities Gas Company, Case No. GO-97-410 and Aquila, Case No. EA-2006-0309. I have also recently provided oral testimony in Kansas City Power & Light Company (KCPL), Case No. EO-2005-0329, Aquila, Inc. electric divisions Aquila Networks-MPS and Aquila Networks-L&P, Case No. EO-2005-0293 and Empire District Electric Company, Case No. EO-2005-0263, on their generation plant resource planning, in the experimental regulatory plan cases they filed with the Commission associated with the construction and their joint ownership of Iatan II.

Q. What is the purpose of your direct testimony?

A. I provide the Staff's position on the following two matters:

1) Appropriate changes to AmerenUE's vegetation management programs and, in concert, appropriate changes in how much AmerenUE should spend on them.

2) To present and support the Staff's position that the Commission should assume AmerenUE's Callaway nuclear plant will continue to operate twenty years beyond its current NRC license of forty years and, therefore, the depreciation rates for Callaway used in setting rates in Case No. ER-2007-0002 should be based on a sixty-year life.

Q. Are there other Commission Staff, who are also testifying in this case, whose testimony directly relates to your testimony?

A. Yes.

Q. Who are they and how is their testimony related to your testimony?

A. Greg Meyer is filing testimony regarding funding of AmerenUE's vegetation management programs. Jolie Mathis is filing testimony regarding appropriate treatment of AmerenUE's depreciable plant in this case, including Callaway, *i.e.*, she is using the remaining life for Callaway I support in the Staff's depreciation study that supports the depreciation rates the Staff is recommending to the Commission in Case No. ER-2007-0002.

Vegetation Management Program Changes & Funding

Q. Does the Staff believe that changes are appropriate to AmerenUE's vegetation management programs?

A. Yes. On July 19 and 21, 2006, eastern Missouri experienced a series of extraordinary thunderstorms with sustained wind speeds in excess of 75 mph. Some evidence indicates that wind speeds in these storms may have exceeded 90 mph. As a result of these storms, almost 650,000 AmerenUE customers in Missouri lost service. Some of these customers were without service as long as nine days.

On July 27, 2006, the Commission issued an Order Directing Staff to Investigate Union Electric Company d/b/a Ameren UE and Setting Intervention Deadline. This Order created Case No. EO-2007-0037.

Staff conducted its investigation and on November 17, 2006, issued its Report on AmerenUE's Storm Outage Planning and Restoration Effort Following the Storms on July 19 and 21, 2006 (Report). Staff's observations regarding AmerenUE's Vegetation Management

practices are provided on pages 39 through 46 of the Report. Staff's report is attached to my direct testimony as **Schedule WW-1**. This Report is available on the Commission's website at: http://psc.mo.gov/publications/UE_Strm_06_Rpt_Final.pdf.

Associated with its investigation in Case No. EO-2007-0037, Staff also reviewed AmerenUE's service reliability. Staff's observations regarding AmerenUE's service reliability are provided in Appendix A of the Report. As a result of its investigation in Case No. EO-2007-0037, Staff believes that AmerenUE should implement four additional vegetation management programs if significant improvements in general service reliability and major storm outage restoration performance are to be achieved in the future. In the Report Staff recommended that AmerenUE implement vegetation management programs that:

a) Target more substantial removal of vegetation along power lines throughout its system, including side clearances and overhangs, along feeders and sub-transmission systems;
b) Target removal of problem trees within the utility's easement and possible replacement with ornamental trees or other low-growing vegetation;
c) Target communications with landowners, who have trees off the right-of-way that represent a significant risk to sub-transmission and feeder lines, to find reasonable means to reduce the outage risk from these trees; and
d) Trim trees in areas with particularly high densities of vegetation on a more frequent basis. Currently urban areas are targeted for a four-year cycle; it may be appropriate to go to a three-year cycle in some areas.

AmerenUE has started trimming some of its circuits to achieve greater side clearances and to remove more overhangs in areas with particularly bad outage histories. An example of this type of trimming is attached to my direct testimony as **Schedule WW-2**. The first picture labeled "BEFORE" shows a circuit that has simply been trimmed for incidental tree limb contact per current procedures which have been in place for years. The "AFTER" picture shows the same circuit after more aggressive trimming to provide for greater side clearances and reduced overhangs.

Staff believes that implementation of the four vegetation management programs recommended above will improve service reliability to customers in general and improve AmerenUE's major storm outage restoration performance. Implementation of these four vegetation management programs, in addition to AmerenUE's existing programs, will present a challenge in terms of resources available to AmerenUE.

Q. You've stated that implementation of these four vegetation management programs would create resource challenges, please describe these challenges.

A. Implementation of these four vegetation management programs will challenge the available labor force to do this work and AmerenUE's current funding level for vegetation management programs. In meetings with AmerenUE associated with Case No. EO-2007-0037, AmerenUE stated that implementation of these more aggressive vegetation management programs would require additional long-term increases in the labor force available to do this work. AmerenUE has stated that they are confident that this labor force can be developed over time but is not immediately available to do this work in addition to AmerenUE's existing ongoing vegetation management programs.

Q. What funding level challenges would implementation of these four vegetation management programs create?

A. Currently AmerenUE has committed, in its agreement in Case No. EW-2004-0583, to spend $30 million per year in order to address its vegetation management backlog by no later than December 31, 2008. Staff believes that implementation of the four additional programs identified above would require a significant increase in expenditures. In meetings relating to Case No. EO-2007-0037, AmerenUE representatives stated that AmerenUE could increase its labor force to implement these recommendations up to an increase in expenditures

of $7.5 million in 2007 and $15 million in 2008. Staff believes that it is appropriate in this rate case to increase funding for vegetation management in order to reach $45 million per year in 2008. The Staff's approach will preserve the $30 million per year commitment in Case No. EW-2004-0583 and provide $15 million per year of additional funding to fully utilize available labor to implement these recommendations beginning in 2008.

Q. On November 30 and December 1, 2006, a winter storm that deposited between one-quarter and one inch of ice in AmerenUE's service territory caused over 300,000 AmerenUE customers to loose power. Some of these customers were without power for up to seven days. Does Staff believe that implementation of the four additional vegetation management programs that it has proposed would lessen the severity of outages as a result of such major storms in the future?

A. Yes.

Q. Does Staff have any other recommendations on how to reduce the severity of outages due to major storms and improve reliability of service to AmerenUE's customers?

A. Yes. In its Report in Case No. EO-2007-0037, Staff recommended adoption of three rules regarding reliability, vegetation management and infrastructure inspection. The reporting requirements in these rules would help parties in future cases before the Commission assess the major factors causing customer outages and develop programs to improve service reliability and storm restoration performance.

The Staff would also like to discuss with AmerenUE the possibility of requiring all new urban development in the AmerenUE service territory be provided with underground distribution lines. By implementing this procedure now AmerenUE may be in a better position to limit their customers' future exposure to outages caused by major storms and

minimize the frequency of day-to-day interruptions of service. Several states have studied this approach and Staff believes this option should be explored by AmerenUE.

Callaway Plant Life

Q. What life is the Staff using for AmerenUE's Callaway nuclear plant for purposes of setting depreciation rates in Case No. ER-2007-0002?

A. The Staff is using a sixty-year life.

Q. Why?

A. According to the NRC, it issued AmerenUE (then doing business as Union Electric Corporation) a forty-year operating license for Callaway on October 18, 1984. Unless extended that license will expire on October 18, 2024. The NRC has granted twenty-year license extensions to many nuclear plants in the United States. The Staff believes AmerenUE should seek a twenty-year extension to it license to operate Callaway and, if it does, the NRC will eventually grant the extension; therefore, the Staff is using and recommends the Commission adopt a sixty-year life for setting the depreciation rate to be applied to AmerenUE's depreciable Callaway plant in AmerenUE's plant accounts.

Q. Why does the Staff not use the original license term of forty years for setting the depreciation rate for Callaway plant?

A. In part, it is because the forty-year life is set by statute which the NRC says was based on history with electric power plants. The Atomic Energy Act of 1954 specifies that nuclear power plants are licensed to operate for forty years. According to the NRC, Congress selected forty years for nuclear power plants because that was the time over which electric power plants were typically paid off in customer rates. In 1982, the NRC established a program for Nuclear Plant Aging Research (NPAR). According to the NRC, NPAR

concluded that many aging phenomena are manageable and should not preclude license renewal for nuclear power reactors. The NRC has stated that the forty-year license term was not based on safety, technical or environmental factors.

Q. Why else does the Staff not use the forty-year license period for the life of Callaway?

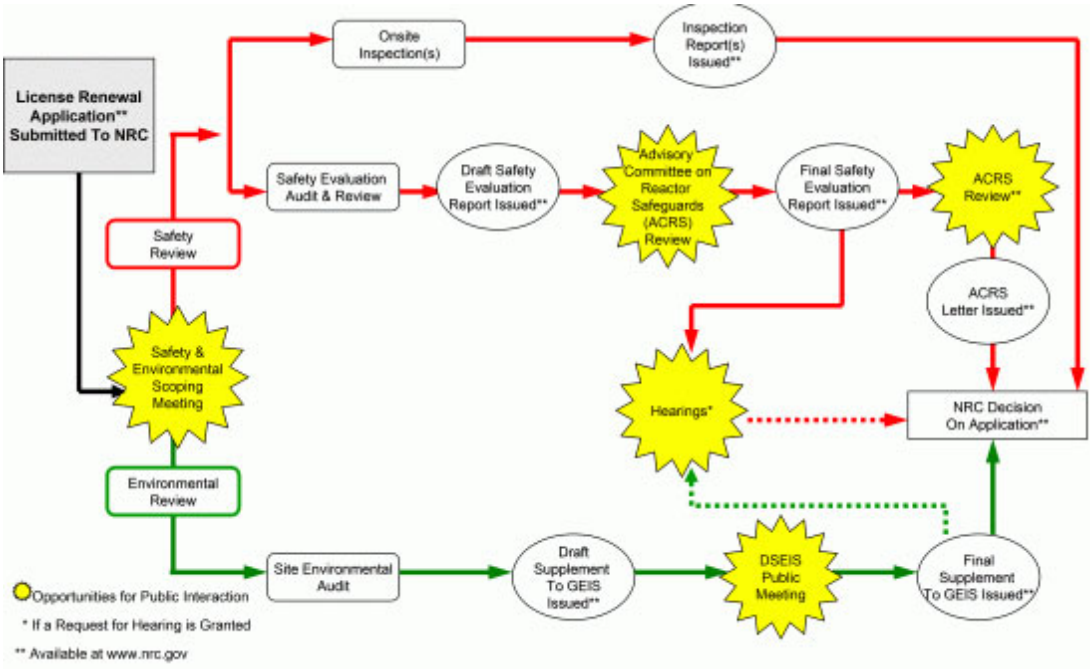
A. Because AmerenUE should seek a twenty-year license renewal from the NRC, which it almost certainly will apply for and eventually receive.

Q. What is a twenty-year license renewal?

A. It is an extension of twenty years to an existing license. For Callaway it would be an extension of AmerenUE's license to operate Callaway for forty years to allow AmerenUE to operate Callaway for a total of sixty years, *i.e.*, an additional twenty years.

Q. How does one get a twenty-year extension to an existing license to operate a nuclear plant such as Callaway?

A. According to the NRC, the following flow chart illustrates the license renewal process:

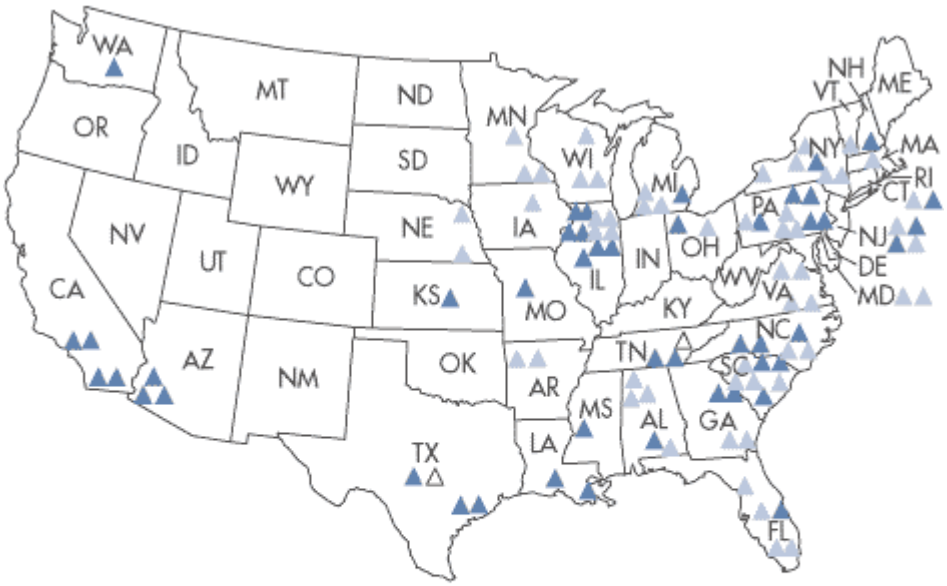


The license renewal process basically provides a means for the NRC to determine if the reactor operator understands the effects of aging on the plant's critical systems, determine if the reactor operator has taken action(s) to assure continued safe operation of the plant, and assess any environmental effects if the license is renewed.

Code of Federal Regulations (CFR) 10 CFR Part 54, which relates to safety reviews, allows a new license to be issued for up to twenty years of plant operation beyond the expiration date of the current operating license. Environmental reviews are also required and are conducted per 10 CFR Part 51. Since the adoption of 10 CFR Part 54, the NRC has developed additional license renewal guidance documents including, but not limited to, NUREG-1437, NUREG-1555, NUREG-1800, NUREG-1801, RG 1.188 and RG 4.2. The NRC provides opportunities for public participation in the license renewal process. According to the NRC, the renewal process schedule goal is twenty-two months if no hearing is required and thirty months if a hearing is scheduled.

Q. How many nuclear power plants are operating in the U.S. and how many of them have been granted or are seeking a twenty-year license renewal?

A. According to the NRC, 104 commercial nuclear power plants are currently licensed to operate in the U.S. These 104 nuclear power plant sites are located as shown below (source: NRC):



YEARS OF COMMERCIAL OPERATION	NUMBER OF REACTORS	AVERAGE CAPACITY (MDC)
△ 0–9	2	1134
▲ 10–19	47	1092
▲ 20–29	55	779

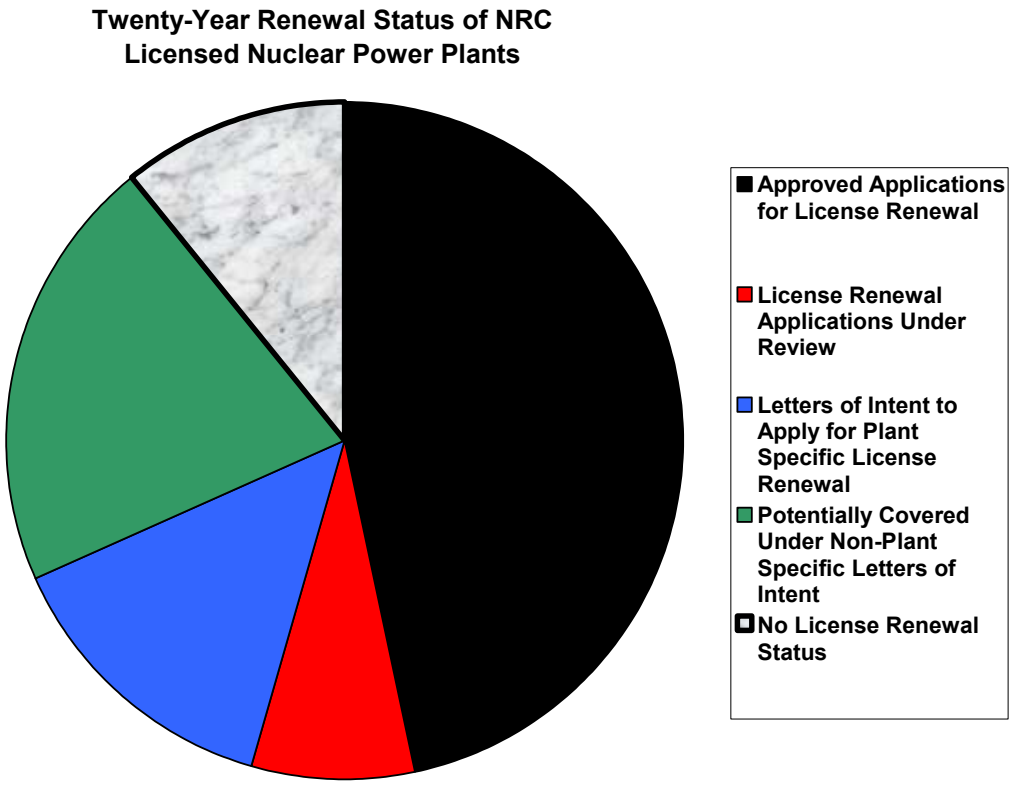
Note: There are no commercial reactors in Alaska or Hawaii. Calculated data as of 12/00.

Of the 104 nuclear power plants with operating licenses in the U.S., as of November 28, 2006; forty-seven have approved applications for license renewal, eight have license renewal applications under review, and fourteen have submitted plant specific letters of intent to apply for license renewal. Additionally, three organizations (two companies operating nuclear plants and one alliance of operating nuclear plants) have submitted letters of intent to apply for license renewal but have not named the specific plants that will be associated with

the applications. These letters are basically place-holders in the NRC license renewal application queue. These place-holder letters represent the possibility of a minimum of nineteen plants and a maximum of twenty-one plants. The exact number of plants covered in these place-holder letters is not known since some of these letters do not specify if the application letter covers one plant or several plants at a site. The summation of all these plants, at various positions within the license renewal process, is equal to a minimum of eighty-eight plants and a maximum of ninety plants.

The remaining fourteen to sixteen plants include one plant that has publicly initiated license renewal activity but has not filed an application or letter of intent. Another three plants in this group of fourteen to sixteen have not completed twenty years of commercial operation and are therefore not yet eligible for license renewal. Taking these four plants into account, there are ten to twelve remaining plants that have not publicly initiated license renewal activity. Callaway is one of these plants.

Stated another way, approximately eighty-nine percent of the commercial nuclear power plants in the U.S. that are eligible to apply for license renewal have either sought, or indicated they will seek, license renewal and eleven percent have not. The pie chart below illustrates the breakdown of license renewal applications in the U.S.



Q. Does it appear likely that the nuclear power plants that have not sought a twenty-year license renewal from the NRC will do so?

A. Yes. Staff reviewed numerous documents in assessing the current status of U.S. nuclear plants seeking a twenty-year license renewal from the NRC. The following article and newsletter excerpts summarize these findings.

In the October 2006 edition of Insight magazine, an article titled The Power Industry's Latest Encore: Third Act of Generation Set to Infuse a New Vitality to Nuclear by Russell J. Stepp and R. W. Beck, Inc. included the following:

> In fact, by September 2005, license renewals for 35 nuclear units had been approved by the Nuclear Regulatory Commission (NRC) and 14 other applications were being reviewed. As many as 28 additional applicants have since announced intentions to pursue license renewals in the next seven years –

> indicating a strong interest in maintaining the existing nuclear fleet of power plants.

On November 13, 2006, the Chairman of the NRC, Dr. Dale E. Klein, while giving a presentation to the American Nuclear Society, stated the following regarding nuclear plants seeking twenty-year license renewals:

> Furthermore, half of the 104 nuclear power plants in the U.S. have either had their operating licenses extended for 20 years, or have applied for NRC approval. Most of the rest are expected to apply in the future.

In a November 2000 newsletter of the Japan Atomic Industrial Forum, an article titled Conquering Deregulation: How the U.S. Nuclear Industry is Doing it, by Robert D. MacDougall and Neil J. Numark, included the following:

> As the economics of existing nuclear plants have improved, and the U.S. Nuclear Regulatory Commission (NRC) has granted timely life extensions, many more plant owners are preparing to seek renewal of their operating licenses for up to 20 years beyond their original 40-year terms. The U.S. Department of Energy recently told Congress that "the overwhelming majority" of the country's 103 currently operating reactors will continue operation under extended licenses "well past 2030."

A November 2002 Status Report on Nuclear Power Plant License Renewal by the Nuclear Energy Institute (NEI), included the following:

> The license renewal process, expected to take between three and five years, costs between $10 million and $15 million to prepare the necessary regulatory filings and negotiate the NRC's license renewal process. This cost does not include any major capital expenditures necessary to upgrade the plant (steam generator replacement, for example) to ensure safe, reliable operation during the 20 years after the 40-year license term expires. Even with such capital expenditures, however, analysis shows that license renewal of an existing nuclear plant is easily the least costly source of new electricity supply.

An August 2006 Status Report on Status and Outlook for Nuclear Energy in the United States by NEI, included the following:

> Virtually all U.S. nuclear plants are expected to renew their 40-year operating licenses for an additional 20 years.

A November 2006 article titled Nuclear Power Plant License Renewal by NEI, included the following:

> Most of the remaining 23 reactors are expected to renew their operating licenses as well.

This article also includes the following:

> Any incremental cost incurred over the original license period could be amortized over a longer period of time because of license renewal, further reducing the cost of electricity. For many nuclear power plants, license renewal represents the most inexpensive option for future electricity generation.

According to NEI, it "is the policy organization of the nuclear energy and technologies industry and participates in both the national and global policy-making process. NEI's objective is to ensure the formation of policies that promote the beneficial uses of nuclear energy and technologies in the United States and around the world."

NEI is composed of over 280 corporate members in 15 countries. These corporate members include companies that operate nuclear power plants, universities and engineering design firms. NEI is headquartered in Washington D.C. and its board includes representatives from twenty-seven nuclear utilities, engineering firms, plant designers and fuel cycle companies. According to the October 2006 Member Roster, AmerenUE is a member of NEI.

On March 27, 2001, the Director of the Department of Energy's Office of Nuclear Energy, Science and Technology, William D. Magwood, testifying to The House Committee

on Energy and Commerce, stated the following regarding nuclear plants seeking twenty-year license renewals:

> Thirty-three nuclear power plants are entering the renewal process now and informal contacts with utility executives now indicate that the overwhelming majority – if not all – of U.S. nuclear power plant owners are planning to apply for license renewals for their nuclear units.

According to a December 2, 2005 article in the Columbia Daily Tribune, Ameren's Chief Executive Officer, Gary Rainwater, at an economic outlook conference in Columbia, Missouri, was attributed with saying "on paper, nuclear is clearly the right choice," regarding building a second nuclear power plant at the Callaway site. If building a new nuclear power plant at the Callaway site is clearly the right choice, Staff expects that renewing the license of an operating plant, that has already had extensive upgrades and/or retrofits made to it, should be the right choice.

Q. Will AmerenUE seek a twenty-year license renewal for Callaway?

A. I do not know; however, there are indications it will. AmerenUE is continuing to see load growth within its service territory and the cost of alternative baseload energy resources such as coal has increased.

In a September 18, 2005 article in the St. Louis Post-Dispatch, William Miller, a professor of nuclear science and engineering at the University of Missouri at Columbia, who was serving on Callaway's safety review board, was attributed with saying "We're seeing a majority of plants in the U.S. go for relicensing, and there's no reason to believe that Callaway won't."

In a July 13, 2005 article in the Jefferson City News Tribune titled Nuclear Power Energized for Revival, regarding completion of the major outage and retrofits to the Callaway

plant in the fall of 2005, the article states: "At that point, company officials expect Ameren will ask the NRC to extend the life of the plant, as many other facilities have done."

Of the non-plant specific letters of intent to apply for license renewal previously noted in my testimony, five are from the Strategic Teaming and Resource Sharing (STARS) plant alliance. These five letters of intent from STARS do not specify a particular plant and act like placeholders for these STARS plants in the license renewal queue. Six nuclear power plant operators make up the STARS alliance. The current STARS plants include Callaway, Comanche Peak 1 & 2, Diablo Canyon 1 & 2, Palo Verde 1, 2 & 3, South Texas Project 1 & 2, and Wolf Creek (eleven plants). The STARS plant group formed in the U.S. on the basis that the initial members were all Westinghouse four-loop plants, and could therefore achieve some economies of scale in a number of procurement, licensing and technical areas.

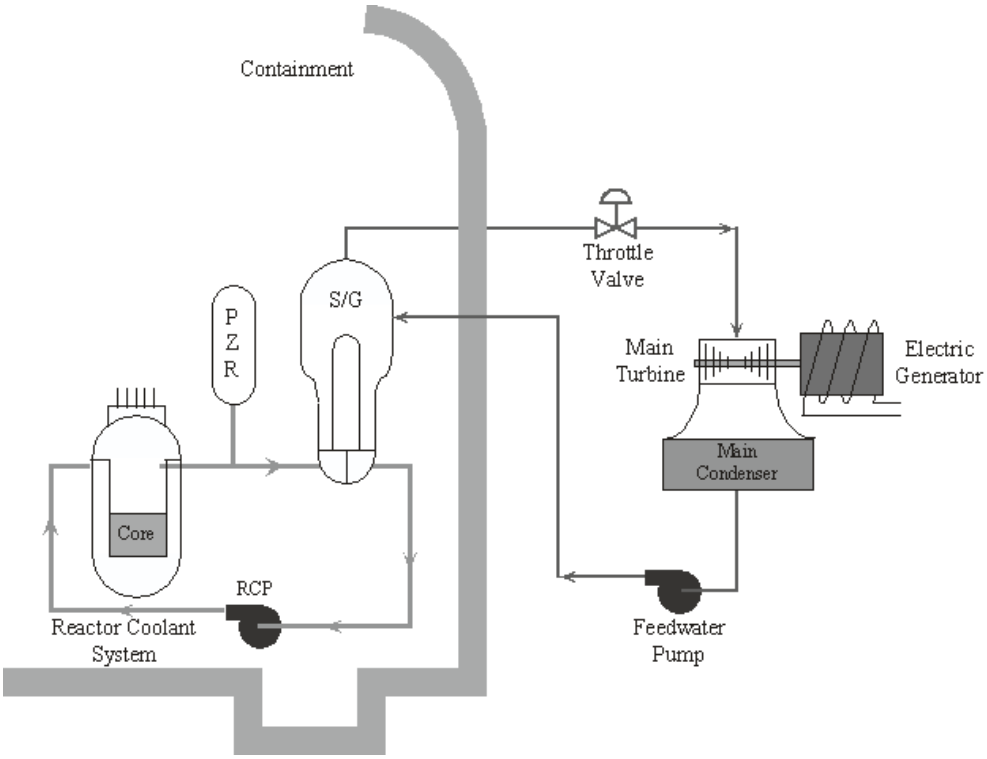
Wolf Creek, operated by one of the six STARS plant operators, currently has a license renewal application before the NRC (filed October 4, 2006). In addition, Wolf Creek's life extension has already been reflected in proposed consumer rates in the KCPL rate case decision that is currently pending before the Commission (Case No. ER-2006-0314). With the five other letters of intent for STARS plant operators, all STARS plant operators have a placeholder for a license renewal application in queue at the NRC. AmerenUE is the only STARS plant operator that has made a point to clarify that they have not decided if they will seek a license renewal for Callaway.

In addition to the reasons noted above, Staff believes that the recent upgrades and/or retrofits to Callaway suggest that AmerenUE will seek a twenty-year license renewal for Callaway. In fact, in a November 16, 2005 KOMU 8 news story titled Plant Receives Upgrade, Ameren's Chief Nuclear Officer, Chuck Naslund, is attributed with stating: "After

the first 20 years of operation we have rejuvenated the plant. It's basically ready for the next 20 and the 20 beyond that."

Q. What major upgrades and/or retrofits has AmerenUE recently made to Callaway?

A. In order to explain the recent major upgrades and/or retrofits to Callaway, it is necessary to briefly step through the hot water and steam generation cycles in a pressurized water reactor (PWR). The following diagram shows some of the major equipment and piping in a PWR (source: NRC):



In a PWR, the hot water cycle, also called the coolant or primary loop, is kept at high pressure so that the water passing through the reactor core ("Core" in the diagram above) does not vaporize to steam as it passes through the core. After the core heats the water, it goes to the steam generators ("S/G" in the diagram above). In the steam generators the hot water from the core transfers its heat to the cooler water on the other side of the tubes in the steam

generators. As the hot water from the core cools it is pumped back (by the "RCP" pump in the diagram) to the core to be reheated before returning to the steam generators.

The steam generation cycle, also called the power generating or secondary loop, is at a lower pressure than the hot water cycle and water vaporizes to steam in the steam generators. Steam from the steam generators goes to the turbine ("Main Turbine" in the diagram), which is actually a series of turbines that are spun by steam at differing pressure levels. The main shaft that connects all these turbines also spins the components in the generator ("Electric Generator" in the diagram) that finally creates the electricity we use. The steam that exits the turbines is converted to liquid water in the condenser ("Main Condenser" in the diagram). The condenser is basically a large box with many tubes in it that quickly cool the steam passing through the turbines to liquid water. The condenser operates at a pressure well below atmospheric and this improves the overall power output from the plant. Callaway has three condensers, one for each of the three low-pressure turbines. The heat picked up in the tubes that run through the condenser to cool the steam from the turbines is taken to the cooling tower where it is dumped into the atmosphere. Liquid water created from steam in the condenser is pumped (by the "Feedwater Pump" in the diagram) back to the steam generators to be converted back to steam.

Refuel outage number thirteen took place in the spring of 2004 and refuel outage number fourteen took place in the fall of 2005. Refueling outages at Callaway generally take place every eighteen months. The refuel outage number refers to the number of refueling outages since Callaway started operating in 1984.

In refuel outage number thirteen Callaway's condensers were replaced. Replacement of Callaway's condensers involved bringing in six "super modules" that were each

approximately fifty-six feet long, thirty feet high and thirty-five feet wide and weighed approximately 500 tons. These super modules were then positioned and connected together below the turbines.

In refuel outage number fourteen Callaway's four steam generators and four turbine rotors were all replaced. Each of the four new steam generators at Callaway weighs over 400 tons and is seventy feet tall. Each of the four turbine rotors is thirty-five feet in length. Three of the turbines are fifteen feet in diameter and weigh 164 tons each and the remaining turbine is eight feet in diameter and weighs seventy tons.

In total, the upgrades and/or retrofits to Callaway in refuel outages thirteen and fourteen cost hundreds of millions of dollars, which AmerenUE is now seeking to include in customer rates. While these upgrades do not guarantee that AmerenUE will seek a twenty-year license renewal for Callaway, they certainly place Callaway in a better position to seek a twenty-year license renewal than a plant that had not performed these upgrades and/or retrofits. Given the recent upgrades at Callaway, Staff believes that it is prudent of AmerenUE to seek a twenty-year license renewal.

Q. What are some of the major factors to consider in determining if seeking a twenty-year license renewal for operating Callaway is appropriate?

A. First and foremost, as required by the current NRC twenty-year license renewal process, AmerenUE must demonstrate it has a clear understanding of the effects of aging on Callaway's critical systems, AmerenUE must take action(s) to assure continued safe operation of the plant, and any environmental effects if the license is renewed must be assessed. After these threshold issues are addressed, the remaining factors are basically economic.

According to the NRC, so long as there are effective inspection and maintenance practices, the plant life is simply limited by economics – the cost of repair or replacement of any components that do not meet specified acceptance criteria.

A November 2006 article titled Nuclear Power Plant License Renewal by NEI, included the following:

> A Company's decision to renew a plant's license is fundamentally an economic one. It involves estimates of future electricity demand, the cost of other electricity supply options and the cost of continued operation of the nuclear plant.

Staff believes these criteria, as given by the NRC and NEI, adequately describe the major factors that AmerenUE must consider in making a decision on whether to seek a twenty-year license renewal for Callaway from the NRC. Staff is confident that an assessment of a twenty-year license renewal for Callaway, versus other potential energy and capacity resources, will show that a twenty-year license renewal for Callaway is the preferred option.

Q. Given the length of your testimony on why the Staff used a sixty-year life for Callaway plant for depreciation rate purposes, would you briefly summarize the Staff's reasons for choosing that life?

A. Yes. The Staff used a sixty-year life for AmerenUE's Callaway nuclear plant for depreciation rate purposes because the forty-year license under which AmerenUE currently operates Callaway was legislatively fixed based on experience with the term over which electric power plants typically were paid off in rates and not on safety, technical or environmental factors; Callaway is one of AmerenUE's cheapest (cost-effective) power plants to run; AmerenUE has recently made significant upgrades and/or retrofits to Callaway; and

there is every indication that if AmerenUE requests a twenty-year extension to its current forty-year license from the NRC to operate Callaway, it will eventually be granted.

Q. Does this conclude your direct testimony?

A. Yes, it does.