**PUBLIC**

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

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| In Re: Union Electric Company's 2005 Utility Resource Filing Pursuant to 4 CSR 240—Chapter 22 | ) ) ) | Case No. EO-2007-0409 |

**REPORT OF INTERVENORS SIERRA CLUB et al. ON AMERENUE'S IRP COMPLIANCE WITH 4 CSR 240, CHAPTER 22**

Come now Sierra Club, Missouri Coalition for the Environment, Mid-Missouri Peaceworks and ACORN (the Association of Community Organizations for Reform Now), and submit their report on the IRP pursuant to 4 CSR 240-22.080(6)..

AmerenUE's IRP, taken as a whole and in the particular respects detailed below, is not in substantial compliance with 4 CSR 240, Chapter 22.

**Load Analysis**

**4 CSR 22.030(7)** Under both the rule and its waiver request, AmerenUE is to bracket the base case with high and low forecasts. Instead, the procedure it adopted was to assume a BAU case and a transformed demand case and to eliminate the latter as improbable. Thus there are only two cases, base and low.

The IRP, "Load Analysis and Forecasting," vol. 1, p. 275, says that "in developing the scenario tree, AmerenUE cultivated a world view with demand growing at rates slower than BAU forecasts over the IRP modeling horizon." Nevertheless, AmerenUE adopts BAU as its high case with the rationale that this assures reliability. This artificially maximizes load growth and contradicts the purported assumption of lower growth rates. If it is necessary, or permitted under the rule or waiver requests, to factor in reliability, then this should be done for all cases, low, base and high.

## Supply Side Resource Analysis

**22.040(1)(F, G, J) and 22.040(8)(C), O&M costs and operational constraints of significance.** The IRP does not deal with the disposal stage of the nuclear fuel cycle. The US-EPR's design capacity for on-site storage of irradiated fuel rods and the associated costs need to be considered, as does the possibility of dry cask storage and its associated costs.

As of July 1, 2008, the Barnwell, S.C. site for storage of LLW will no longer be available. It is possible that no national storage depository for high-level waste will become available; Yucca Mountain, NV, will probably not be available before 2021 if ever. By 2020 the volume of accumulated waste would exceed the mandated capacity of Yucca Mountain. Reprocessing, not presently allowed in the US, would reuse some of the irradiated fuel and reduce the volume of waste that would have to be stored, but at a greatly increased cost. (Testimony of Peter R. Orszag, Director of the Congressional Budget Office,. before the Senate Energy and Natural Resources Committee, Nov. 14, 2007.)

Stricter laws and regulations to prevent terrorist attacks are a risk that requires consideration.

**22.040(1)H**, p. 87, notes the role enrichment plays in the fuel cycle. Neither here nor at pp. 222–4 does the IRP mention what level of enrichment is required for the US-EPR.

**22.040(1)(K), Environmental impacts, nuclear.** Table 53 on p. 91 does not give the curie content of low-level radioactive waste. Volume of LLW alone is not an adequate indicator of the hazard posed by this waste.

Tritium (radioactive hydrogen) is generated in all nuclear reactors as a fission, corrosion and activation byproduct. It is becoming increasingly recognized, worldwide, as a health hazard. No economically feasible technology currently exists to filter tritium from a nuclear reactor's

liquid or gaseous emissions to the environment during the routine operation of the plant or during and after an accident.

Equipment does not yet exist to extract tritium from a nuclear reactor's emissions or to monitor the amounts released within the continuous flow of cooling water and the periodic venting and purging of gases to the environment. If such equipment is developed and a disposal site becomes available for its storage (during its 120-year hazardous life), and if the Nuclear Regulatory Commission were to require processing and isolation of tritium , what are the expected costs? The same questions apply to noble gases (krypton and xenon) generated as fission products that decay into other radioactive byproducts.

**22.040(1)(K)3, Environmental impacts, water**. Water pollution is not addressed because "raw water quality and wastewater treatment processes could not be identified to any credible degree that allowed for valid assumptions." Supply Side Resource Analysis, vol. 1, pp. 30 and 63 (fossil fuel and renewables). Surely the effects of these technologies, including thermal water pollution, are generally well known.

The discussion of nuclear considers only US-EPR, which prejudges the outcome of the evaluation by ignoring all other technologies. Thermal pollution is not discussed in violation of the rule's requirement to consider thermal discharges. *Id.*, pp.92–97.

**22.040(1)(K)1–4.** For pumped storage, "The evaluated project has not been developed to the point where the noted environmental impacts [22.040(1)(K)1–4] can be determined at this time." *Id.* p. 103. AmerenUE's experience with Taum Sauk should provide an adequate basis for an assessment. Air emissions from pumped storage should take account of the generation technology used for the pump back

**22.040(1)(K)4, Siting impacts.** The conclusion, repeatedly stated (22.040, vol 1, pp. 30,

65, 98, 103), that no siting impacts were identified that would affect the screening results, provides no basis for a decision that the rule has been complied with. Generating facilities and associated transmission lines can have local environmental impacts on air, water, soil quality, wildlife, noise and aesthetic values. The IRP does not reveal that these were considered.

**22.040(6), Transmission**. The description of MISO procedures at 22.040, vol 1, pp. 187-88, does not answer the question posed by the rule: will additional transmission be required under the preferred plan to remedy generation-related system inadequacies over the planning horizon?

**22.040(7), Transmission and distribution**. In this section AmerenUE has not assessed the age, condition and efficiency of T&D facilities or analyzed loss-reduction measures as a supply side resource as required by the rule. It merely describes a process for doing so.

**22.040(8)(A), nuclear fuel forecast.**

22.040(8)(A)1.A, p. 225. There is no explanation why reserves, discovery and usage rates aren't applicable. This information is available; the report itself notes on p. 223 a world supply gap looming after 2013. Uranium in concentrations high enough to mine is in finite supply. This is an important issue given the preferred resource plan. The IAEA's Analysis of Uranium Supply to 2050 included in the work papers shows known resources falling short of high and medium demand cases (see, e.g., pp. 3–4 and Table 60).

"There is enough uranium in the world for the conceivable future as ore in the ground." (IRP, p. 222) But the supply of high-quality uranium ore is finite. When lower quality uranium will have to be used, the costs of mining, milling, conversion, and enrichment will increase. More energy will have to be expended at each of these stages of the uranium fuel cycle, causing the increased release of carbon dioxide.

There has been an increasing reluctance on the part of some nations, communities and tribes with uranium ore on their lands to allow a resumption of mining because of health and environmental concerns, for example within the Navajo Nation and in the Democratic Republic of the Congo. How would that affect the cost and reliable supply of uranium?

Since "no alternative fuel" exists besides high-grade uranium fuel for the operation of a nuclear power plant (IRP, p. 225), no contingency option would be available to Ameren UE once Callaway 2 was built.

22.040(8)(A)1.C, p. 226. The IRP says environmental factors are not applicable, but the mining, processing and transport of nuclear fuel have environmental effects which the rule requires that AmerenUE consider.

22.040(8)(A)1.d and E, p. 226. The IRP ignores the transport phase of the nuclear fuel cycle. Some local and state governments have demanded greater control over routes within their jurisdictions. Some train, truck and/or barge routes could be closed, thereby increasing transport costs. The U.S. Department of Transportation or Nuclear Regulatory Commission could require more local emergency responders along transport routes, and more local police escorts to protect against terrorists or for accident response. The nuclear industry could be required to provide protective personnel clothing and monitors.

22.040(8)(A)1.F, p. 226. The IRP fails to address future costs of cleanup at production facilities as required by the rule.

The discussion at pp. 223-4 underestimates the effects of uncertainty in the enrichment process. "Because the same process used to enrich uranium for nuclear fuel can also produce weapons-grade nuclear material, the only way to reduce the risk of proliferation of this material is to dissuade states [nations] from building new enrichment facilities . . . ." (American Nuclear Society: Nuclear News, March 2008, p. 96.)

**22.040(8)(A)1, Coal price forecasts.** The IRP's modeling does not appear to take into account the recent run-ups in coal prices or the increase in exports from the US.

**22.040(8)(B) and (C), capital and O&M costs**. If the estimates for non-nuclear resources are located elsewhere in the body of the IRP or in the appendices, cross-references should be supplied.

The overnight costs of US-EPR given at Table 67, p. 246, are unrealistic. Overnight cost, not including interest and financing costs or the likelihood of cost overruns, is not an appropriate measure of capital cost. While some of the risks are mentioned at pp. 246–7, we do not see where in the IRP these costs are quantified or their probability properly assessed. Costs of materials, labor and project management are rising sharply due to world demand for nuclear and non-nuclear power plants. A June 2, 2008 report by Moody's Investors Service says nuclear costs could reach $7,000 per installed kW.

The first Areva EPR reactor, currently under construction in Finland, is already vastly over budget and more than two years behind schedule because of construction errors and technical flaws. For example, honeycombing was found in the Reactor Building concrete and steel base mat and substandard welds, two defects similar to those discovered during construction of the Callaway 1 plant. AmerenUE needs to determine whether or not the problems encountered at Olkiluoto 3 are all "first of its kind" problems.

Mr. George Vanderheyden, President and Chief Executive Officer of UniStar Nuclear, testified as follows at an NRC public meeting on the Calvert Cliffs Nuclear Plant in Maryland on March 19, 2008: "I guarantee when the information becomes public, you will find out we have picked the most expensive design of all the new designs because we feel that it provides the safest, most secure, most reliable electricity from nuclear power that we can get." (Official

Transcript, p. 97)

Personnel costs: Because of the aging staff of trained nuclear workers, a critical uncertain factor is the declining pool of trained engineers, welders and others. Ameren may have to pay higher salaries, better benefits and invest more in training programs. The radiation dose limits for nuclear workers may become more stringent, requiring a larger staff for the operation and maintenance of damaged components or parts, or when the NRC decrees that a part must be replaced if found to be unsafe or obsolete, or in the event of an accident.

Another uncertainty is the risk of an airplane crashing into the reactor. The following is admittedly hearsay, but the Areva EPR design has recently been challenged in Europe with respect to its providing inadequate protection against the impact of commercial aircraft, as distinguished from military aircraft. An internal, confidential report was recently leaked from Electricite de France that discusses the problem. The EDF document was analyzed by Large and Associates that found severe flaws in the safety analysis. Large and Associates concluded: "The fact is that if a commercial airliner was deliberately flown into one of these reactors it would cause a total calamity with the release of large amounts of radioactivity."

## Demand Side Resource Analysis

**22.050(1)(D)**, **Energy sources that substitute for electricity at point of use**. AmerenUE screens out all but one DG application (anaerobic digesters) at this, the measure identification, stage. The screening shown in Appendix C by AESC does not follow the Chapter 22 methodology. It compares LCOE for the customer as the levelized cost of AmerenUE's grid electricity on the assumption that customer-generators are all rational cost-minimizers, contrary to the examples of solar PV owners who are motivated by other values as well and who rely

partly on utility bill credits due to net metering. (Appen. C, pp. 24–7). The analysis of incentives (Appen. C, pp. 31–4) takes no account of the availability of net metering, which lowers customer costs by offsetting the customer-generator's bills.

**22.050(4), "Aggressive" DSM and achievable potential.** The waiver request requires at least one portfolio that "represents a very aggressive approach to encouraging program partipation." AmerenUE agreed in the Joint Stipulation and Agreement on the 2005 IRP to model moderate and aggressive portfolios. AmerenUE's goal of a 25% reduction in demand growth doesn't qualify as either very aggressive or aggressive in light of developments in other states. Illinois Public Act 095-0481 (20007) requires utilities to achieve a reduction of 2% in delivered energy in 2015. Ohio followed suit in SB 221 (2008). Minnesota set a goal of 1.5% reduction in gross annual retail sale. Minn. Stats. § 216B.241.1c.

At stakeholder meetings on July 30 and October 16, 2007, ICF and AmerenUE discussed the difficulty, if not the impossibility, of accurately estimating achievable potential. The difficulty of estimating participation levels is borne out by the discussion in 22.050(7)(A), pp. 32–3, concerning ICF's EEPM and the lack of published data.

It seems reasonable to forecast rising achievable potential since rising energy costs are straining customer budgets, a trend unlikely to be reversed unless there is significant demand reduction. What is "aggressive" must be seen in this new context.

**22.050(5) and 11(E).** AmerenUE acknowledges that it did no primary research such as the customer surveys, pilot programs or marketing studies required by the rule.

**Risk Analysis and Strategy Selection**

**22.070(5), Cumulative probability distributions of performance measures.** The IRP, as modified by waiver, performs this computation only for PVRR, not for the other performance measures listed in 22.060(2) as required by the rule: probable environmental costs (except as this includes CO2), present worth of out-of-pocket costs to DSM participants, levelized annual average rates and maximum single-year increase in annual average rates.

WHEREFORE, Intervenors respectfully request the Public Service Commission to find that AmerenUE's compliance with Chapter 22 is fatally deficient.

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**CERTIFICATE OF SERVICE**

I hereby certify that a true and correct PDF version of the foregoing was sent by email on this 18th day of June, 2008, to the parties on the EFIS service list.

/s/Henry B. Robertson
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