

**MINUTES
JOINT INTERIM COMMITTEE ON ENERGY
Arkansas Nuclear One Generation Support Building, Arkansas Highway 333
London, Arkansas**

**Tuesday, November 27, 2018
2:00 PM**

The Joint Interim Committee on Energy met at 2:00 p.m. Tuesday, November 27, 2018, at Entergy's Arkansas Nuclear One Generation Support Building, Arkansas Highway 333, London, Arkansas.

Committee members present: Senator Gary Stubblefield; Representatives Rick Beck, Co-Chair; Representative Ken Henderson, Vice Co-Chair; Kim Hendren, Bob Ballinger, Ken Bragg, Justin Gonzales, Jack Ladyman and James Sorvillo.

Alternate committee members present: Representatives Mark McElroy and Chris Ritchey.

Also attending: Senators Frank Glidewell and Breanne Davis; Representatives Stephen Meeks and Jim Dotson.

Representative Beck called the meeting to order.

CONSIDERATION TO APPROVE SEPTEMBER 27, 2018, MINUTES [EXHIBIT B]

Senator Stubblefield made a motion to approve the September 27, 2018, meeting minutes. The motion was seconded by Representative Ladyman, and the motion carried.

**INFORMATION ON ARKANSAS NUCLEAR ONE INCLUDING HOW SPENT FUEL IS HANDLED
PURSUANT TO FEDERAL REGULATIONS AND WORKINGS OF LIGHT WATER REACTORS**

Mr. Richard Anderson, Site Vice President, Arkansas Nuclear One, noted it is a two-unit site and Unit One was built in May 1974. The Nuclear Regulatory Commission (NRC) license was originally a 40-year license and has been extended for 20 years, to 2034. Unit Two went on line in 1978 and is licensed until 2038. Entergy will then need to look at the viability and feasibility. There are nuclear plants across the country applying for additional 20-year extensions beyond their 60 years.

Unit One produces about 834 MW electric and Unit Two produces about 995 MW electric. The two units produce about 56% of the power that Entergy Arkansas sells to Entergy customers. This is a base-load facility and generally runs at full load.

The facility is an asset to the community, employing 1,000 people year round full-time and during up-grades, an additional 1,000 craft workers from the local area and surrounding states. The payroll is approximately \$93 million/year which stays in the community. It contributes an additional \$10 million in purchases from other businesses in the Russellville area, and pays approximately \$8 million in state and local property taxes.

The plant is not looking to expand nuclear, but instead to run the units at levels of excellence and invest in them through operation and maintenance capital investments to ensure that equipment is maintained at levels of reliability. The state has allowed this by its support. The next refueling outage will be on Unit One in the fall of 2019, during which time upgrades, using laser peening, will be performed to extend its life past average. In the most recent outages the plant has been catching up with work that was not done in the previous six to ten years.

Disposing of spent fuel is not a cost issue, but where to take the waste and how best to use it. Outside the U.S., many countries re-process nuclear fuel and reuse it, but the U.S. does not re-process its waste going back to the strategic arms limitation treaties from years ago. The only option is to store the waste.

WHY THE UNIVERSITY OF ARKANSAS-STEP ONE IS EDUCATION

Dr. Donald R. Bobbitt, President, University of Arkansas System, noted he did undergraduate research in nuclear chemistry at the University of Arkansas, which at that time had a strong program. He has a Ph.D. in physical chemistry.

Dr. Bobbitt noted this is a significant problem, thinking about waste that could be active for hundreds of thousands of years, being immobilized and being stored someplace safely. How long does it need to be stored, at what cost, and why waste a potentially economically viable resource? There is potential, and risks are obviously a part of this, but payback could be substantial.

Dr. Bobbitt proceeded to answer, “Why Arkansas?”

Arkansas has “birthed” risk takers such as Sam Walton, J.B. Hunt, John and Don Tyson, and the Stephens family. This is a state that is willing to take risks if the payback is potentially large.

There is an inexpensive energy stream sitting in the parking lot, and if ways can be figured out how to use it, there are centuries of energy use at the current utilization rate.

Arkansas has a central location and good transportation with water, and lastly he asked if there was the political will in the state for this project.

He continued that U of A offers education; they can train operators to run plants, and train and market to the community. Try to eliminate fears or perceptions people have about processing nuclear energy, and enable public policy makers to make informed decisions. U of A has 12 institutions that offer two-year degrees and certificates. It has management departments which can oversee the project or just parts of it, and two economic groups that can look at the project from an economic impact upon the state, seeing if nuclear reprocessing is worth taking the risk.

Dr. Bobbitt said he thinks it’s time for Arkansas and the feds to decide their direction. He noted that legislative business can be a “black box” (unfamiliar) to him. There are resources at the federal level accumulating. They have been designed to address this serious issue. The question comes down to if the state is willing to undertake a study to look at the feasibility of Arkansas being the center that could both develop and use this technology to process the fuel. “Would they release the money for us to do that particular study?”

U of A has the ability to develop the education materials for the citizens to understand the technology and risks and also the benefits to the state, so they could help the legislature make an informed decision. U of A has management experts to service the “umbrella management”, but the fact that Argonne, one of the leading places where the technology is being refined, is involved is an important aspect of the project. He noted if Argonne was not a part of it, it probably would not go.

CLOSING THE FUEL CYCLE

[POWERPOINT PRESENTATION]

Dr. Mark Williamson, Manager, Nuclear Engineering Division, Argonne National Lab, described the technology being developed at Argonne National Laboratory to take material that is discharged from reactors like the ones at this site, condition and extract components that can then produce additional energy.

Argonne Lab was founded in the 1940’s and every reactor has a tie back to Argonne. Its focus is on safety, security and management of nuclear materials. There are 99 operating plants in the U.S., and all are designed to have a water basin for used-fuel storage as it is discharged from the reactor. Many of those plants’ water basins are full. The fuel has then been taken from the water basin, dried, and put in very safe dry storage adjacent to the site. The U.S. is storing approximately 80,000 tons of used nuclear fuel.

The Yucca Mountain storage solution (designed for 70,000 tons of storage) stalled during the Obama administration and deemed no longer a viable storage option. The used fuel storage costs the federal government approximately \$800 million dollars per year. Reprocessing during Carter’s administration in the 1970s was disallowed. The reprocessing facilities

being built then were halted. President Regan's administration rescinded Carter's directive, so at this time, there is no legal ban on reprocessing.

Argonne Lab proposes different recycling than used by France, Great Britain, and Japan. The Argonne pyrochemical recycle process uses sodium chloride and potassium chloride (salt) at high temperatures with electro chemistry. They have been working in this area since 1990, and the system meets non-proliferation standards. Reactor characteristics lead to different fuel cycle strategies:

- Thermal Reactors (Generation III and III+) configured for once-through (open) fuel cycle
- Fast Reactors (Gen IV) intended for closed fuel cycle with uranium conversion and resource extension
- EBR II Experimental Breeder Reactor – 30 years of successful and safe operation, and designed as a research reactor for fuels

Gen IV fast reactors cannot have a meltdown as they self-correct. If the pyro-chemical process is coupled with the Generation IV fast reactor, the fuel-cycle can be closed, can deal with nuclear waste management, deal with energy generation and produce power at the same time.

Representative Beck noted, there is tremendous interest from other countries in the technologies just described, also the military is looking at these technologies as a possible option to be independent of the grid, both here at home and a deployment situation.

In answering questions, Dr. Williamson noted he may have miss-spoke earlier, and explained the \$800 million referenced are fines and fees to utilities because they are storing the spent fuel on their sites. The Nuclear Waste Fund is about \$40 billion, and that fund was generated by a megawatt hour tax to the government with the expectation of money being used to design, build, and operate a repository.

In addressing costs, Dr. Williamson said recycling the fuel adds approximately 10% to the cost of electricity. The cost of the recycling facility with construction and operating costs is approximately \$1 billion. The reactor that would accompany that is approximately \$1 billion. If the project moves forward to a demonstration phase, total costs would be \$2-3 billion. Representative Ladyman asked about the Nuclear Waste Fund. Dr. Williamson noted that is designated for a geologic repository. It is not designated for this work.

Representative Meeks noted the time frame for a light water reactor from planning, implementation, and construction is about 20-years. He asked about the time frame for this. Dr. Williamson stated it takes a tremendous amount of time and money, from eight to ten years including all the licensing. These reactors, the 350 MW electric systems, are designed to be fabricated in a factory and taken to the site which has its economies.

Representative Hendren asked:

- What is the economic impact of these systems on Arkansas?
- There is a Nuclear Waste Fund, so how does Arkansas get use of it?
- Is it economically feasible to store the spent fuel, or can the fund be used to get rid of the spent fuel?
- Does the Arkansas legislature have justification for a study to find these answers from experts?

Representative Beck explained the main reason there will not be a fast reactor out there in 10 years is licensing. It takes a tremendous amount of money. Many private companies are wanting to move the technology forward, and it takes a tremendous amount of time.

NEW NUCLEAR

Mr. Michael Grappe, Director of Special Projects, Arkansas Department of Environmental Quality (ADEQ), and Bernard R. Bevell, Arkansas Department of Health-Radiation Control Section. Mr. Bevell noted his department regulates radiation material within the state, however the nuclear reactor here in Russellville is regulated by the NRC, and

any future reactors and recycling facility would be regulated by the NRC. The Radiation Control Section's role is off-site emergency response and environmental monitoring.

Mr. Grappe noted his department's position is that more information is needed on the technology, and it cannot hurt to get smarter on these issues and would like to see that effort take place. The efforts of Dr. Bobbitt and the U of A System would provide education with accurate information on the issues. It would help to make intelligent decisions on how to deal with the issue of storing nuclear waste.

Mr. Bevell concluded the Health Department agrees with ADEQ and should pursue alternate measures of dealing with spent nuclear fuel issues in the U.S. and is supportive of the University in its efforts to pursue education and additional study in this area.

Ms. Rosanne Kemp, Arkansas Citizen, encouraged the legislature to get started today, because it takes years to complete the project. She stated Arkansas children will look back on the action or inaction taken by this committee.

Mr. John Warmack, Activist, noted there is a need for \$100 million to fund the U of A and the Argonne National Laboratory to do the work and report the findings to the committee. Mr. Warmack says the money is there and the legislature needs to pressure the governor to sign the application to "go get the money." Mr. Warmack supports Dr. Williamson's electrochemical process way of recycling nuclear fuel. He proposes a public/private partnership including the U of A and have a nuclear reactor factory based in Arkansas.

Mr. Warmack's proposed business plan notes:

- Money available (\$50+ billion) in the Spent Fuel Trust Fund and growing at a rate of \$2 billion/year
- Idea is to get rid of the waste and "we" will pay you to do that, so
- Nuclear fuel waste goes through reprocessing facility; and
- As nuclear fuel waste is consumed, it becomes an income item instead of an expense (He compares it to the tire and cement industries)
- An analysis must be done to determine if the plan is economical

He said there would be 5,000 jobs immediately and will grow to 10,000. The components are:

- Transportation
- Temporary storage
- Fuel reprocessing
- Build the factory that builds the modular reactors
- Build the modular reactors
- Sell and export them all over the country

Representative Hendren made a motion that the Energy Committee in the 92nd General Assembly researches the viability of this process and makes a recommendation to the governor based on its review. Senator Stubblefield seconded the motion.

Representative Ballenger proposed a substitute motion that this committee look at this issue, investigate the pros and cons and then make a recommendation in the form of a resolution from this committee as to what the state of Arkansas should do. Representative Ladyman seconded the substitute motion. The motion carried.

In clarifying this, Representative Ballinger explained that during the committee's investigation, it would be decided where the committee's resolution would go--the motion does not cover that.

ADJOURNMENT

With no further business, the meeting adjourned at 3:50 p.m.