1224 Louisiana
Lawrence, KS 66044
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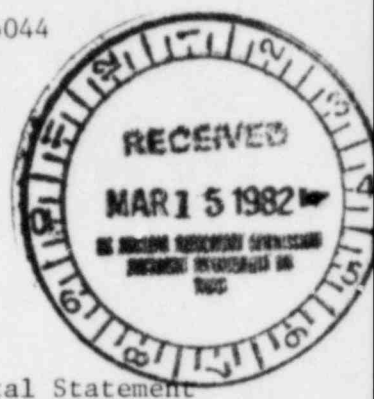

Mr. Jon Hopkins, Licensing Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

The following comments with respect to the recent Draft Environmental Statement for the Wolf Creek Nuclear Generating Station (Unit 1) are submitted for your careful consideration.

Reactor vessel cracking or "thermal shock" has recently become a topic of much discussion among those concerned about the safe operation and longevity of nuclear power plants. The following excerpt from "Reactor Safety and the Research Budget" (Science. Vol. 214, 13 November 1981) delimits the nature of the problem in a reasonably succinct and easily understood manner.

> "At the heart of the problem is the steel vessel which holds the radioactive fuel and the water that cools the fuel. As time goes by it is weakened by neutron radiation from the core. Gradually the steel loses resilience. After a decade, the most heavily irradiated section of the vessel (the midline) becomes quite brittle, even at relatively high temperatures. Flaws in this section of the vessel may expand into cracks and, under certain circumstances, the cracks may burst, spilling the water needed to cool the fuel core. This could happen, for example, if the hot (550°F), brittle area at the middle of the vessel were suddenly doused with cold (40°F) water at very high pressure (2200 pounds per square inch). The scenario is not implausible. It is precisely what would happen if there were a break in the main steam line outside the pressure vessel, followed by a deliberate attempt to cool the reactor while maintaining high pressure in the vessel. The heat shock and the pressure would put tremendous stress on the fragile section of steel. A crack might develop, burst, dump highly radioactive water on the floor faster than the emergency cooling system could make up the loss, and lead to an accident not unlike the one at Three Mile Island in which a partial melting of the core occurred."

Richard Johnson, an NRC licensing official, metallurgist and task manager for the thermal shock program, says that he and other NRC staff tried to get the NRC to pay attention to this aspect of safety for at least ten years. Just one year ago in February Thomas Murley, the NRC's chief of safety technology, examined data from Rancho Seco 1 in Clay Station, California, and found that during an unplanned shutdown all of the requirements for a thermal shock

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scenerio were present--except for a brittle vessel (it was only three years old). In an October 1981 report, the Oak Ridge National Laboratory (upon request by the NRC) concluded that "pressurized thermal shock must be regarded as a serious potential threat and merits a great deal more study using refined techniques." The NRC now considers this problem to be one of extremely high priority.

However, the draft environmental statement for Wolf Creek fails to directly address this serious issue--an omission that can only be adequately dealt with, as I see it, in one of two ways:

A) A vessel must be designed and tested which shows no significant loss in strength after 30-40 years (the expected life span of a nuclear plant) of neutron bombardment.

B) The licensing of the plant will be limited to a maximum of ten years and the strength of the steel vessel regularly tested during that time. Needless to say this would require a reanalysis of the cost/benefit calculations for the plant which were based on an expected life span of three to four times this value.

This "new" problem of reactor vessel embrittlement also necessitates a recalculation of the probability for a serious accident to occur, especially as the vessel ages. Unfortunately, the analyses of data based on hundreds of hours of reactor operation have provided virtually no reliable information about how much the radiation risks to workers and the likelihood of radiation-releasing accidents increase as a plant gets older.

These probabilities most certainly do not remain constant over time for a given plant, and neglecting to include current, available information about the possible effects of something that occurs as frequently as a break in a steam line (which, as has been illustrated, can trigger a melting of the core) in the final draft of the environmental statement for the licensing of Unit 1 at Wolf Creek can not be thought of as anything less than a serious omission.

The Wolf Creek draft also neglected to contain updated information pertinent to the adverse environmental effects associated with nickel-59 and niobium-94 which have half-lives of 80,000 and 20,300 years, respectively. An environmental impact statement on reactor decommissioning published in 1981 by the NRC indicates that the dose rate from niobium-94 in reactor components will be about 17,000 rems per year if the reactor is operated for 30 to 40 years; that from nickel-59 will be about 800 rems per year. The statement admits that these dose levels are substantially above acceptable residual radioactivity levels and concludes that entombing a shut-down reactor in concrete would thus be acceptable only if these long-lived isotopes were removed or if the integrity of the entombing structure could be maintained for thousands of years.

The NRC's manager of decommissioning programs, Donald Calkins, is acutely aware that these two long-lived isotopes create problems in decommissioning that are neither simple nor insignificant. Yet, page 5-68 of the Wolf Creek draft simply states that "the technology for decommissioning nuclear facilities is well in hand, and, although technical improvements in decommissioning are to be expected, at the present time decommissioning can be performed safely and at a reasonable cost."

However, the statement that a nuclear facility (in the context of this draft) can be safely decommissioned is not a statement of fact; it is simply a conjecture since no large commercial reactor has ever been dismantled, much less decommissioned. We do have experience in taking apart and burying the pieces of two small reactors which were shut down after only a few years of operation--the Elk River plant in Minnesota (22 megawatts) and the Sodium Reactor Experiment in California (see: "A Long-Term Problem for the Nuclear Industry." Science. Vol. 215, 22 January 1982). But it is premature to say that we have the technology to even dismantle something on the scale of the Wolf Creek plant before we get experience with a large reactor that has been in operation for at least a decade (our first opportunity will probably be the Shippingport plant in western Pennsylvania).

That a nuclear facility can be decommissioned at a reasonable cost is not a matter of conjecture: it is a matter of how you interpret the word "reasonable". The small plants in Minnesota and California cost $6.15 million and $10 million, respectively, to take apart and bury. According to estimates published by the DOE (owner of the Shippingport plant) it will cost more than $40 million (at 1982 prices) to dismantle the plant and remove radioactive debris from the site. The process will take about five years to complete, and it will generate some 11,700 cubic meters of radioactive waste. All of this will come from a reactor that is only one-tenth the capacity of the large reactors being built today.

Recent estimates (see above reference) indicate that decommissioning a 1200 megawatt reactor will cost between $50 million and $100 million. Although this represents less than ten percent of the cost of building one of these plants, this figure is certainly not insignificant and therefore needs to be included in the cost/benefit calculations for Unit 1 at Wolf Creek. Furthermore, the sentence on page 5-68 of the draft is overstated and requires rewording for accuracy: "Decommissioning costs for reactors are a small fraction of the present-worth commissioning costs."

In summary, the final draft of the Wolf Creek Environmental Statement must include a satisfactory solution to the following problems associated with decommissioning:

A) Since a worn-out reactor is highly radioactive, how can we guarantee that the extremely expensive process of safely decommissioning this plant will be funded?

B) If the experience we gain from Shippingport does prove that the technology exists for dealing with the dismantling of a large power reactor, how can we be sure that the highly radioactive debris resulting from such dismantlings will be adequately guarded for the thousands of years necessary for niobium-94 and nickel-59 to decay to insignificance, and that none of the radiation from the remains leaks into the groundwater?

"A" requires an explicit assurance of ability to pay for the decommissioning, and according to Donald Calkins, two proposals are being considered for this assurance. One sets up a special decommissioning fund and the other allows for the utility to have sufficient insurance to cover such clean-up costs. It is imperative that these costs and these assurances, currently missing, are clearly specified in the final draft of the environmental statement .

"B" initially requires waiting to see whether Shippingport can be safely dismantled. Then it requires, I far as I can see, nothing less than faith that we will be able to guard these wastes for thousands of years, either at some designated burial site or at a federal high-level waste repository which will most certainly not be ready for operation before the year 2000 (see: "Radwaste: Choosing a Burial Site. Science News. Vol 121, No.1. 2 January 1982). Finally, it appears that we must rely on faith again to keep these long-lived, highly radioactive wastes from contaminating our groundwater, since no radioactive container has yet proven to be leak-proof for more than several decades.

I wish to thank the persons in the Office of Nuclear Reactor Regulation and the members of the Nuclear Regulatory Commission for carefully and completely reading and responding to these comments on the Draft of the Environmental Statement for Unit 1 of the Wolf Creek Nuclear Generating Station. It is my intention that these comments, through your actions, will help to make the final draft of this important statement more complete, more up-to-date, and more accurate.

Yours very truly,

Scott H. Jamieson

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