Blue Ridge Environmental Defense League

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Chief, Rulemakings and Directives Branch
Division of Administrative Services
Office of Administration
Mailstop TWB-05B01
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Watts Bar Nuclear Station, Unit 2, Docket No. 50-391, NRC-2008-0369

On behalf of the Blue Ridge Environmental Defense League and our members in Tennessee, I submit the following comments on the supplemental environmental impact statement for Watts Bar 2. We favor the proposed action alternative which would deny an operating license.

Background

Watts Bar is located in Rhea County, Tennessee approximately 50 miles from Chattanooga and 8 miles from Spring City on the west shore of the Chickamauga Reservoir, the west branch of the Tennessee River. The scoping process centers on issuance of a license that would authorize the Tennessee Valley Authority to operate the yet unfinished second light water nuclear reactor designated Watts Bar Nuclear Plant Unit 2. Scoping identifies the significant issues to be analyzed in depth.

According to the Nuclear Regulatory Commission: "The matters to be addressed in the supplement include evaluation of new and significant circumstances or information, relevant to environmental concerns, that developed after the 1978 FES."[1] The FES, or Final Environmental Statement, is now three decades old. Below are three relevant subjects for the supplemental EIS.

Watts Bar's Reactor Design Utilizes Eggshell-type Containment

TVA's construction plan for Watts Bar Unit 2 states, "The unit will be completed as originally designed, incorporating additional modifications made to its sister unit, WBN Unit 1."[2] Therefore, the Unit 2 reactor containment type would be the same as its twin: a wet, "ice condenser" design. The ice condenser system uses baskets of ice to reduce heat and pressure in the event of an accident inside the containment building.

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[1] Federal Register / Vol. 74, No. 175 / Friday, September 11, 2009 / Notices, page 46799
[2] "Watts Bar Nuclear Plant Unit 2 Completion and Operation," TVA website statement posted at http://www.tva.gov/environment/reports/wattsbar2/index.htm

> Containments buildings are critical in preventing catastrophic releases of radioactive materials during an accident. Ice condenser plants are equipped with channels filled with blocks of ice that are supposed to cool any steam blasted into them during a core- melt accident and condense it to water, thus reducing the threat of containment rupture.[3]

The problems with ice condenser reactors were identified a decade ago but the NRC has failed to require and TVA has failed to take the steps necessary to protect the public. David Lochbaum, a nuclear engineer now working with the Union of Concerned Scientists, detailed the history of inaction following a nuclear plant worker's warning:

> Amazingly little was done by the NRC and the industry in response to the ice condenser containment problems at DC Cook. These problems surfaced when a worker at the Watts Bar nuclear power plant in Tennessee found the problems and contacted colleagues at other ice condenser plants, including DC Cook. Watts Bar's problems were reported to the NRC by the whistleblower who noted that, by the way, DC Cook had similar problems. Very little was done to determine whether the ice condenser containments at Watts Bar, Sequoyah Units 1 and 2, McGuire Units 1 and 2, and Catawba Units 1 and 2 had the problems or not. [4]

Ice condenser reactors are more vulnerable to build-ups of hydrogen gas than dry containment structures. Following the near melt down at Three Mile Island, NRC required ice condenser plants to install hydrogen igniters, electric devices designed to burn hydrogen at a controlled rate during an accident. Sandia National Laboratories evaluated the reactor containment structures of ice condenser reactors and found that if an accident involving hydrogen ignition occurs, the concrete containment will almost certainly fail.[5]

The inherent weakness of ice condenser reactors is the containment structure which has only half the volume and failure pressure of larger, heavier dry containment structures. This is done as a cost-cutting measure: less concrete and steel reduces construction costs. But the back-fitting of hydrogen igniters still leaves them vulnerable to hydrogen gas explosions. Dr. Edwin Lyman of the Nuclear Control Institute made extensive studies of the problem and found the following:

> However, even if the ice condensers do work as they are supposed to (which in itself is a questionable proposition), containment failure can still occur as a result of the combustion of hydrogen gas, which would be generated in large

[3] Paul Leventhal, President, Nuclear Control Institute, Keynote Address Nuclear Insecurity Conference sponsored by Blue Ridge Environmental Defense League, Charlotte, N.C., February 8-9, 2002, http://www.bredl.org/pdf/NIC_keynote.pdf

[4] 09/18/2006 The Union of Concerned Scientists documented the factors leading to the year-plus reactor outage that began in September 1997 in this case study for their report: *Walking a Nuclear Tightrope* available at http://www.ucsusa.org/assets/documents/nuclear_power/d-c-cook-2.pdf

[5] *Assessment of the Direct Containment Heating Issue for Plants With Ice Condenser Containments*, NUREG/CR-6427, April 2000

> quantities during severe accidents when the metal cladding on fuel rods reacts with coolant water. During the Three Mile Island 2 (TMI-2) accident in 1979, a large amount of hydrogen was released to the containment and burned, although the pressure increase did not lead to rupture of TMI-2's large dry containment. The ice condensers not only cannot reduce the risk of hydrogen combustion but also can actually increase it, because they divide the containment volume into small compartments where hydrogen gas can more readily reach explosive concentrations.
>
> The seriousness of this issue is clear from the following data on the strength of containment buildings. The pressure that can be generated in the containment from hydrogen combustion can typically reach a value of about 110 pounds per square inch (psi). The average failure pressure of U.S. large dry containments is around 113 psi, whereas for ice condenser containments it is around 63 psi. Therefore, hydrogen burns can easily overpressurize and rupture ice condenser containments.[6]

Nuclear power plants using the ice condenser system are more dangerous than reactors which rely on more robust containment. Such systems are particularly vulnerable to reactor sump clogging and numerous problems have been identified during the last two decades of operation. Sandia's findings concluded: "Ice condenser plants are at least two orders of magnitude more vulnerable to early containment failure than other types of PWRs."[7]

> The most complete and recent probabilistic risk assessments suggest core melt frequencies in the range of [one in one thousand] per reactor year to [one in ten thousand] per reactor year. A typical value is [three in ten thousand]. Were this the industry average, then in a population of 100 reactors operating over a period of 20 years, the crude cumulative probability of [a severe reactor] accident would be 45%.[8]

Combining their two orders of magnitude—100 times—greater vulnerability with the standard risk inherent in nuclear reactors leads to an unacceptable chance of accident.

Nuclear Power in Hot Water

If permitted, Unit 2 would operate at a power level of 3,411 megawatts-thermal, or 1,170 MWe. Unit 2, like Unit 1, would be cooled by cooling towers drawing makeup water

[6] "Plutonium Fuel and Ice Condenser Reactors: A Dangerous Combination," Edwin S. Lyman, PhD, Scientific Director, Nuclear Control Institute, October 19, 2000
[7] *Assessment of the Direct Containment Heating Issue for Plants With Ice Condenser Containments*, NUREG/CR-6427, April 2000
[8] "Nuclear Plant Safety: Will the Luck Run Out?" Lochbaum D, monograph quoting the Nuclear Regulatory Commission's statement to the US Congress in April 1985, Union of Concerned Scientists, December 15, 1998, http://www.ucsusa.org/assets/documents/nuclear_power/d-c-cook-2.pdf

from Chickamauga Reservoir. The 1978 FES states:

> At full power, cooling tower blowdown water could be heated to as high as 95^{o}F and will be discharged at a rate of up to 85 cfs. The maximum expected mixed temperature rise at the edge of the diffuser mixing zone is 2.3^{o}F above ambient. The heated water will mix with the cooler water of Chickamauqa Reservoir where the heat will ultimately be dissipated to the atmosphere. Approximately 64 cfs of water will be lost to the atmosphere as a result of the cooling towers. (Sect. 3.2.2) The maximum blowdown is estimated as 4.8 cubic meters sec, 70 cfs for both units operating and the holding pond discharging 2.4 cubic meter sec (85 cfs). The area of the diffuser-induced mixing is 1.32 acres. (Sect 5.3.1)[9]

TVA's Watts Bar Unit 1 water discharge permit (NPDES Permit No. TN0020168) expired 4 November 2006. NRC guidance on water availability states, "Where required by law, demonstration of a request for certification of the rights to withdraw or consume water and an indication that the request is consistent with appropriate State and regional programs and policies is to be provided as part of the application for a construction permit or operating license." [10] TVA has not submitted this information to NRC.

In 2007 drought forced a partial shutdown of TVA's nuclear plant at Browns Ferry, Alabama because of overheated water in the Tennessee River. Unit 2 was shut down completely, and Units 1 and 3 were reduced to 75 percent capacity. Four years ago TVA itself predicted that operations at Browns Ferry would have to be scaled back and could be completely shut down because of overheated discharge water

The dedication of water supply to Watts Bar 2 would be imprudent, wasteful and contrary to the principal purposes for which the Tennessee Valley Authority was created in 1933: that is, river navigability, flood control and agricultural and industrial development (16 USC 831).

TVA's Application Lacks Required Environmental Report

The relevant permitting regulations for operating licenses require the applicant, here TVA, to submit an environmental report. "Each applicant for a license to operate a production or utilization facility covered by § 51.20 shall submit with its application a separate document entitled 'Supplement to Applicant's Environmental Report--Operating License Stage'"[11] TVA must discuss the issues specified in 10 CFR §§ 51.45, 51.51, and 51.52, including uranium fuel cycle impacts and fuel and radioactive waste transportation risks.

[9] *Final Environmental Statement by the Nuclear Regulatory Commission for Watts Bar Nuclear Plant Units 1 and 2 proposed by Tennessee Valley Authority*, Docket Nos. 50-390 and 50-391, NUREG-0498, December 1978
[10] Regulatory Guide 4.7 - General Site Suitability Criteria for Nuclear Power, (Draft issued as DG-4004) Revision 2, April 1998
[11] 10 CFR § 51.53 Postconstruction environmental reports

Federal regulations under 10 CFR §§ 51.45 require that “The environmental report shall also include a discussion of the status of compliance with applicable environmental quality standards and requirements….” Also, “The information submitted pursuant to paragraphs (b) through (d) of this section should not be confined to information supporting the proposed action but should also include adverse information.”

The environmental impact statements submitted by TVA thus far do not fulfill the requirements under 10 CFR 51.

I plan to submit further remarks before the end of the comment period.

Respectfully submitted,

Louis A. Zeller, Science Director
Blue Ridge Environmental Defense League