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March 26, 2015
Comments to U.S. Nuclear Regulatory Commission
Region 2 NRC Representatives
by Gretel Johnston

Re: Licensing of a Second Reactor at Watts Bar Nuclear Plant
on the Tennessee River

We would like to raise a few issues in our request that the NRC slow down its rush to license operation of yet another reactor on the Tennessee River. We can only hope that the preemptive delivery of fuel for this unlicensed reactor is not influencing NRC licensing decisions, and we respectfully ask you to carefully reconsider some long-standing assumptions.

First, we think the Watts Bar Power Plant's location on a river already compromised by upstream radioactive and chemical industries, as well as the proximity to Oak Ridge and its historical radioactive releases to the biosphere, should have been enough reason for NRC to refuse to engage in the licensing process for Watts Bar's second reactor. In addition to proximity to other polluting sources, the DOE's decision to enlist Tennessee Valley Authority (TVA) for the Watts Bar Nuclear Plant's commercial reactor production of Tritium fuel for nuclear weapons has added a considerable burden to the radiological contamination of the river, four times the estimated amount in the first few years and soon to be escalated to as much as 10,000 to 50,000 curies a year of un-filterable radioactive Tritium added to the thousands of curies already flowing into the river from the six already licensed commercial reactors.

We must express concerns about the existing age of the plant, whose construction began in 1973. Although considerable effort has been made to ensure component replacements and repairs are safe, it is only logical to recognize the existing age of the plant as a serious safety hazard. The mid-20th century Watts Bar ice-condenser reactor design has many recognized flaws, but it also was simply not designed for the additional stress of weapons' grade Tritium production or the stress of high-burn-up fuel, adding even more factors to the aging structural and components degradation.

Even in the midst of highly technical and involved projects, we hope the reason for safety regulations and the NRC licensing process remains clear – to protect the workers and public from the inherent dangers of nuclear power. To be frank, it seems the licensing program has not achieved that goal, and we ask that you, as Regional Representatives, and the NRC Commissioners and Atomic Safety Licensing Board reconsider some basic assumptions in the light of current available scientific data.

Over 60 epidemiological studies worldwide have examined the incidence of childhood cancer near nuclear power plants, and "most of them indicate leukemia increases."[1] The most thorough of these, the 2008 KiKK Study commissioned by the German government, found a 1.6 fold increase in the relative risk of total cancers and a 2.2 fold increase in leukemias among children under 5 years of age living within 5 km of all 16 Nuclear Power Plants in Germany.[2]

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[1] Ian Fairlie, "A hypothesis to explain childhood cancers near nuclear power plants," *Journal of Environmental Radioactivity*, 133 (2014) 10-17, Abstract. http://dx.doi.org/10.1016/j.jenvrad.2013.07.024

[2] Peter Kaatsch, Claudia Spix, Irene Jung, Maria Blettner, "Childhood Leukemia in the Vicinity of Nuclear Power Plants in Germany," Deutsches Ärzteblatt International | Dtsch Arztebl Int 2008; 105(42): pg. 725.

Table 1
Studies of observed (O) and expected (E) leukemia cases within 5 km of NPPs.

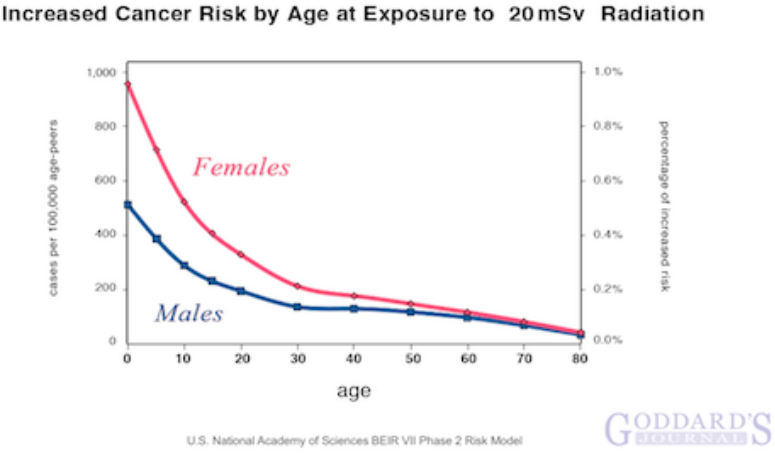
Dataset	O	E	SIR = O/E	90%CI	p-value
Germany	34	24.1	1.41	1.04–1.88	0.0328
Great Britain	20	15.4	1.30	0.86–1.89	0.1464
Switzerland	11	7.9[a]	1.40	0.78–2.31	0.1711
France[b]	14	10.2	1.37	0.83–2.15	0.1506
Pooled data	79	57.5	1.37	1.13–1.66	0.0042

[a] derived from data in Spycher et al. (2011).
[b] acute leukemia cases.

Multiple major studies followed in the wake of the KiKK Study and this chart of subsequent findings[3] should provide sufficient evidence to persuade the NRC that the threat to our children is real, and that basing any decisions on predicted, rather than observed, data can no longer be supported.

The U.S. National Academy of Sciences/National Research Council report, *Health Risks from Exposures to Low Level Ionizing Radiation: BEIR VII, Phase 2*, found some disturbing evidence for damage to unborn children at extremely low exposure rates, given that the report defines a a low dose of ionizing radiation as 100 mSv. "In the case of *in utero* exposure (exposure of the fetus during pregnancy), excess cancers can be detected at doses as low as 10 mSv."[4] The report also found, "as the level of exposure to radiation increased, so did the occurrence of solid cancers." [5] Perhaps even more disturbing in the long run was the Estimation of Heritable Genetic Effects of Radiation in Human Populations, which the report summarized, "In addition to the induction of cancers in humans by radiation, there is evidence for the heritable genetic effects of radiation from animal experiments." The report confirmed the linear, no-threshold theory that there is no safe radiation dose.[6]

The report also revealed a distressing radionuclide health issue –"Women and Children First." As you can see from the graph compiled by Ian Goddard from BEIR VII report data,[7] the young are the most vulnerable to cancer from radiation exposure and women have a far higher risk than men. Nuclear power plants, old or new, pose a risk to the health of the American people.



[3] Ibid, Ian Fairlie,, 133 (2014)

[4] National Research Council, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII, Phase 2*, The National Academies Press, 2006, pg. 6. http://www.nap.edu/catalog/11340.html

[5] Ibid, National Research Council, 2006, pgs. 6 and 15.

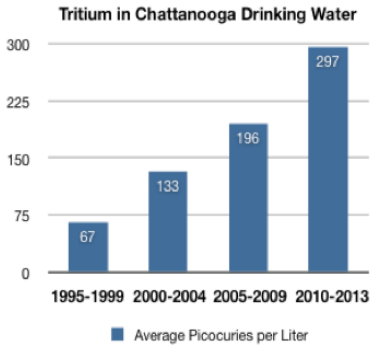
[6] Ibid, Nationa Research Council, 2006, pg. 12.

[7] Ibid, National Research Council, 2006, pg. 311.

When the NRC accepts environmental reports stating there is no impact on the public health procedures you follow, we simply must ask you to reconsider your perspective. Nearly all environmental reports submitted for nuclear power plants indicate levels of radioactive contaminants capable of causing health damage to human beings in their neighborhoods. The nuclear industry and the NRC are understandably focused on engineering and physics; however, **the biological effects of man-made radiation are distinct from natural radiation – because we have no evolutionarily developed defense mechanisms to identify the unnatural isotopes, and our bodies mistakenly absorb them as the mineral nutrients they most closely resemble.**

We suggest that the calculations for acceptable exposures and the records of releases are flawed, and until the NRC requires 21st century technology for real-time radionuclide release measurements, you are not protecting U.S. citizens and are not providing them accurate information about the public health dangers. The antiquated system of quarterly averaged effluent releases provides false data, and should be immediately replaced with real-time radionuclide monitoring available online.

According to renowned English radiation biologist, Dr. Ian Fairlie, **about half of our annual doses are released during refueling activities, which means we may be subjected to highly concentrated doses, which may not appear alarming when averaged**. He cites scientific studies showing ". . . spikes in radionuclide emissions may result in a 20-fold (NDAWG, 2011) to 100-fold (Hinrichsen, 2001) increases in doses to people downwind of NPPs compared to annual averaged doses." [8]



While Watts Bar 2 will add yet another Tritium production facility to our river, we note the increasing levels in our drinking water. [9] Also, as the enclosed NRC 2014 chart shows, there are ongoing toxic leaks into our environment at 45 of the 63 U.S. Nuclear Power Plant sites.[10] Over 70% of the plants exhibit unplanned leaks or spills of toxic radioactive materials. As you can see, Watts Bar (the last alphabetical entry in the list), adds considerably to the pollution of the biosphere that sustains us. Water always finds a path to a low point – in this terrain that means to the aquifers and the river.

We also want to note our support of the SACE and NIRS contention that the licensing of Watts Bar 2 should not proceed until the lessons for Fukushima seismic and flooding are incorporated into the pre-operational design of the reactor and plant structures. There is no immediate demand for the energy (nor future demand, if TVA follows the GAO and IOG suggestions to invest in efficiency), so we also wonder why this project is being expedited after more than 40 years.

Enclosed you will find the fact sheet we presented to Chairman MacFarlane, Commissioner Ostendorff, Comm. Magwood, and Commissioner Apostalakis in January of 2014 (MakeRadiationVisible.pdf), and our white paper on the importance of monitoring (Monitoring Matters.pdf).

We thank you for all your efforts to ensure the safety and health of Tennessee Valley residents, and hope that we can continue to support and augment your extremely important work.

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[8] Ian Fairlie, "A hypothesis to explain childhood cancers near nuclear power plants," *Journal of Environmental Radioactivity*, 133 (2014) 10-17, pg. 15. http://dx.doi.org/10.1016/j.jenvrad.2013.07.024

[9] Gretel Johnston, chart for a forthcoming BEST/MATRR publication, *Radioactive Pollution and Health Risks from Nuclear Plants in East Tennessee* by Joseph Mangano, Garry Morgan, and Gretel Johnston.

[10] NRC, "List of Historical Leaks and Spills at U.S. Nuclear Power Plants," December 2014. http://www.nrc.gov/reactors/operating/ops-experience/tritium/list-leaks-spills.pdf

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List of Historical Leaks and Spills At U.S. Commercial Nuclear Power Plants

It is imperative that the preceding paragraphs accompany any reproduction of this list so that the information is communicated in the proper context.

Plant	Historical Maximum Tritium Concentration, pCi/l	Date of Historical Maximum Tritium	Current Concentration of Tritium, pCi/l
Beaver Valley	25,583	September, 2010	19,200
Braidwood	247,000	1998	2,430
Browns Ferry	2,050,000	April, 2010	1,013
Brunswick	19,000,000	December, 2010	3,539,000
Byron	82,000	February, 2006	911
Callaway	1,600,000	July, 2014	1,600,000
Catawba	47,500	October, 2007	11,300
Columbia	270,000	March, 1993	1,300
Crystal River	360,000	April, 1998	Not detectable
Davis-Besse	37,500	October, 2008	1,893
Dresden	10,312,000	July, 2004	40,600
Duane Arnold	2,150,000	October, 2012	2,138
Fitzpatrick, J.A.	105,000	April, 2010	2,573
Ginna, R.E.	20,000	1995	Not detectable
Grand Gulf	2,240,000	March, 2014	2,240,000
Hatch, E.I.	6,840,000	September, 2011	5,000,000
Indian Point	600,000	2005	575,000
Limerick	3,950,000	February, 2009	249
LaSalle	1,180,000	July, 2010	97,400
Millstone	4,000,000	November, 2007	10,600
Monticello	21,300	September, 2009	1,117
Nine Mile Point	44,000	August, 2012	Not detectable
North Anna	53,300	December, 2011	53,300
Oconee	45,000	December, 2011	8,530
Oyster Creek	10,000,000	2009	73,000
Palisades	217,351	December, 2009	13,693
Palo Verde	4,200,000	March, 1993	Not detectable
Peach Bottom	196,000	March, 2010	5,830
Perry	59,900	2006	200
Pilgrim	69,000	December, 2013	6,000
Quad Cities	7,500,000	2008	150,000
River Bend	1,135,000	February, 2013	677,000
Salem	15,000,000	April, 2003	40,100
San Onofre	330,000	August, 2006	3,700
Seabrook	750,000	1999	5,520
St. Lucie	161,000	2000	6,270
Summer	23,000	July, 2011	Not detectable
Surry	31,900	2007	13,400
Susquehanna	>20,000	1995	Not detected
Three Mile Island	900,000	1981	5,400
Turkey Point	>20,000	1979	5,320
Vermont Yankee	2,500,000	February, 2010	19,000
Vogtle	>20,000	1990s	1,100
Waterford	22,000	1997	Not detectable
Watts Bar	550,000	February, 2005	13,363

Encls: MakeRadiationVisible-Facts.pdf, MONITORING MATTERS v.4.pdf