JTIR00031

November 9, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 52-011-ESP
SOUTHERN NUCLEAR COMPANY	)	
	)	ASLBP No. 07-850-01-ESP-BD01
(Early Site Permit for Plant Vogtle Site)	)	
	)	

AFFIDAVIT OF BARRY W. SULKIN

County of Davidson)
)
State of Tennessee)

I, Barry W. Sulkin, declare as follows:

1. I am a citizen and resident of Davidson County, Tennessee, living at 4443 Pecan Valley Road, Nashville, Tennessee 37218. I am an environmental consultant and have been hired by the intervenors in this matter. This declaration is based on my personal knowledge, experience, and training and a review of documents related to this matter. My curriculum vitae is attached.

2. I received my Bachelor of Arts in Environmental Science in 1975 from the University of Virginia, where I received a Du Pont Scholarship. I received my Masters of Science in Environmental Engineering in 1987 from Vanderbilt University, as described below. My areas of study included chemistry, biology, limnology and hydrology of streams and lakes, including thermal pollution.

3. In 1976 I joined the staff of what is now called the Tennessee Department of

Environment and Conservation (TDEC) as a Water Quality Specialist, and continued to work for this agency for almost 14 years. I worked in the Chattanooga, Knoxville, and Nashville field offices and the central office of what is now called the Division of Water Pollution Control. I received on the job training in addition to formal education, in areas such as stream assessment. My duties included inspections and enforcement coordination for the water pollution programs, as well as work with the drinking water, dam safety, underground storage tank, and solid/hazardous waste programs. I also conducted investigations regarding fish kills, spills, and general complaints, including problems involving stream alterations and relocations. I was also involved in developing, implementing, and enforcing the state's Aquatic Resource Alteration Permit (ARAP) program, as well as activities related to the Corps of Engineers 404 permit program and the state's 401 certification component.

4. In 1985 I became State-wide manager of the Enforcement and Compliance Section for the Division of Water Pollution Control. In this capacity I was responsible for investigating and preparing enforcement cases, supervising the inspection programs and permit compliance monitoring, and special projects and field studies including water quality and assimilative capacity and permit modeling. While in this position I took an educational leave to obtain my Masters of Science in Environmental Engineering in 1987 from Vanderbilt University. I returned to my position as manager of the Enforcement and Compliance Section in 1987, where I remained until 1990.

5. Since 1990, I have engaged in a private consulting practice specializing in water quality problems and solutions, regulatory assistance, NPDES permits, stream surveys, and various environmental investigations related to water. I have worked for

many private clients over the past 17 years where I have been required to interact with state and federal environmental agencies. I have researched the matters for which I give opinion in this declaration.

6. I am familiar with the application of Southern Nuclear Company for an Early Site Permit (ESP) at the VEGP site. I have reviewed excerpts of the Environmental Report included with Southern's ESP Application, the NRC's Draft EIS, Southern's Motion for Summary Disposition, and related documents submitted in this matter.

7. The DEIS relies on estimates of the Savannah River flow at the Plant Vogtle site as the basis for calculating impacts associated with the cooling water intake system and waste discharge system. Table 5-1 the DEIS shows the magnitude of surface water withdrawals associated with proposed Units 3 and 4, as a percentage of river flow, under average and drought conditions. (DEIS at 5-7). To calculate the size of heated effluent discharge plume, the DEIS reports the results of CORMIX computer modeling at average and low-flow conditions. (DEIS at 5-13 – 5-16). The DEIS concludes that impacts to aquatic species due to entrainment will be minor in part because only a small percent of the total Savannah River flow will be withdrawn by the cooling water intake structure. (DEIS at 5-23 – 5-25). The DEIS also utilizes flow conditions as a basis for rejecting once-through and dry cooling system alternatives. (DEIS at 9-25 – 9-26). Thus, if the flow data used in the DEIS are inaccurate, then the conclusions regarding the magnitude of impacts associated with operation of proposed Units 3 and 4 are invalid.

8. The USGS collects Savannah River flow data from several locations upstream and downstream of the Plant Vogtle site. Gage number USGS 021973269, Savannah

River near Waynesboro, is located at the Plant Vogtle site. Unfortunately, the Waynesboro gage has only been operational since January of 2005 and does not have a sufficiently long period-of-record to support statistical analysis of the flows likely to occur at the Vogtle site.

(http://waterdata.usgs.gov/nwis/nwisman/?site_no=021973269&agency_cd=USGS)

9. USGS flow gage 02197320, Savannah River near Jackson, SC, was located approximately 6 miles upstream of the Plant Vogtle site. The Jackson gage was activated in October 1971 and discontinued in September 2002. During this 31-year period-of-record, the minimum recorded Savannah River discharge was 3220 cfs, on December 9, 1981. The NRC Staff used the period-of-record discharge dataset to calculate the average-daily discharge, which is reported in the DEIS as 8830 cfs. The NRC Staff did not calculate the 7Q10 flow using the Jackson gage dataset. The DEIS uses the average-daily discharge at the Jackson gage, 8830 cfs, as the basis for determining average-water-level impacts associated with proposed Units 3 and 4 intake and discharge systems. (*See* DEIS at 2-19). However, the DEIS does not utilize the minimum recorded flow at the Jackson gage to estimate the low-flow impacts of the proposed units.

10. USGS flow gage 219700, Savannah River near Augusta, is approximately 49 miles upstream of the Plant Vogtle site. In the ER, Southern reports the 7Q10 flow at Augusta for the period between April 1986 and March 2003 (8 years). (ER at 2.3.1-6). The 7Q10 calculated by Southern is 3,828 cfs. (*Id.*). Neither the ER nor the DEIS reports the minimum recorded Savannah River discharge at Augusta. However, ER Table 2.3.1-15 indicates the minimum flow (recurrence interval of 100%) between 1986 and 2003 was 3,369 cfs. (ER at 2.3.1-54). The ER utilizes the 7Q10 flow at Augusta for

1986-2003 (3,828 cfs) as the basis for estimating the low-flow impacts associated with proposed Units 3 and 4 intake and discharge systems.

11. The NRC Staff estimate of low-flow impacts of proposed Units 3 and 4 is based upon the release of water from J. Strom Thurmond Dam, approximately 71 miles upstream from the Plant Vogtle site. According to the DEIS, "the average discharge passing the VGEP site is directly proportional to the average quantity of flow released from J. Strom Thurmond Dam. (DEIS at 2-19). It may be that the river discharge is proportional to the release from Thurmond Dam, but it is incorrect to assume that the flow at the Vogtle site will equal the release from the reservoir. ~~The DEIS fails to account for municipal and industrial withdrawals and discharges, or the natural accretion of flow, occurring in the 71 river miles between Thurmond Dam and the Vogtle site.~~ The DEIS provides no reasoned basis to assume a one-to-one correlation between the release from Thurmond Dam and the river discharge at the Vogtle site.

~~12. It is extremely unlikely that flows at the Plant Vogtle site will be equal to the release from Thurmond Dam over the entire range of flows, as assumed by the NRC staff in the DEIS. In the absence of any surface water withdrawals or discharges, the flow at Plant Vogtle would be greater than the release from Thurmond Dam because the river drains a significantly larger area 71 miles downstream. In addition to this natural accretion, there are numerous withdrawals and discharges between Thurmond Dam and the Vogtle site.~~

13. The DEIS is inconsistent in its use of flow data. As mentioned previously, the DEIS estimates impacts of proposed Units 3 and 4 under average conditions with the

average-daily discharge from the Jackson gage, but estimates low-flow impacts using the releases from Thurmond Dam.

14. Leaving aside natural accretion, withdrawals, and discharges, the DEIS utilizes releases from Thurmond Dam under the Drought Contingency Plan for the Savannah River Basin promulgated by the U.S. Army Corps of Engineers as the basis for estimating low-flow impacts of the proposed new intake and discharge systems. Table 2-2 summarizes the Drought Contingency Plan rule curves, which include four drought levels. (DEIS at 2-20). Drought levels are based on the total volume of water stored behind the Hartwell and Thurmond dams. Drought Levels 1-3 prescribe specific discharges from Thurmond Dam to the Savannah River. (USACE 2006, *Drought Contingency Plan Update: Savannah River Basin, Draft Environmental Assessment*). Drought Level 4—the most severe drought conditions—results in discharges from Thurmond Dam equal to the inflow from upstream. Thus, there is no mandated minimum flow prescription for Drought Level 4 under the Drought Contingency Plan.

15. The DEIS estimates low-flow impacts at Drought Levels 1 – 3, but entirely disregards Drought Level 4 conditions. Thus, the DEIS calculates the maximum withdrawal for Units 3 and 4 (129 cfs) as 3.4 percent of the Drought Level 3 discharge (3,800 cfs). (DEIS at 5-7). Similarly, the DEIS uses Drought Level 3 flows as the basis for estimating impacts to aquatic species. (DEIS at 5-24 – 5-30). Likewise, the DEIS calculates the cumulative withdrawals of the existing Units 1 and 2 and the proposed Units 3 and 4 as "finally reaching 4.6 percent when the river discharge has declined to Drought Level 3." (DEIS at 7-3). However, under Drought Level 4 conditions the

Savannah River discharge will decline further, resulting in a greater percentage of total flow being withdrawn.

16. According to the DEIS, the NRC Staff ignored Drought Level 4 conditions because "they cannot be calculated because the river discharge is not specified." (DEIS at 5-6, 7-3, 7-5). Notably, the DEIS does not contend that there is no reasonable likelihood that Drought Level 4 conditions will occur, or discuss the frequency and duration of such events. In addition, it is not correct that the likely river discharge under Drought Level 4 conditions cannot be calculated. Although there is no specific minimum flow mandate, it is standard practice to use computer models to predict river discharge based on the drought-of-record. Indeed, the Corps of Engineers apparently conducted such modeling in conjunction with adopting the current Drought Contingency Plan. (*See* USACE 2006, *Drought Contingency Plan Update: Savannah River Basin, Draft Environmental Assessment* at 1.) The NRC Staff should consult with the Corps of Engineers, obtain its Drought Level 4 model results, and analyze them in the context of the proposed withdrawal and discharge systems.

17. The DEIS derived dry-year flows from the Corps' draft Environmental Assessment for the *Drought Contingency Plan Update: Savannah River Basin*, which addresses changed in the original Savannah River Basin Drought Contingency Plan adopted in March 1989. According to the Environmental Assessment, "reservoir modeling was conducted to ensure that outflows at Thurmond Dam and flows at Augusta did not fall below 3,600 cfs." (USACE 2006, *Drought Contingency Plan Update: Savannah River Basin, Draft Environmental Assessment* at 1.). This statement suggests that the Drought Level 4 minimum flow is expected to be above 3,600 cfs; however, the

Environmental Assessment is ambiguous in this regard. Again, this ambiguity could be clarified through consultation with the Corps of Engineers.

18. Assuming a Drought Level 4 minimum discharge of 3,600 cfs, normal withdrawals of proposed Units 3 and 4 (83 cfs) will divert 2.3 percent of the total river volume, and maximum withdrawals (129 cfs) will divert 3.6 percent. The maximum expected withdrawal for Units 3 and 4, in addition to the maximum observed withdrawal from existing Units 1 and 2 (129 cfs.), would result in a cumulative maximum withdrawal of 254 cfs, or 7.06 percent of the total river discharge. These results do not account for withdrawals or discharges occurring between Thurmond Dam and Plant Vogtle.

19. Assuming that the minimum flow at the Jackson gage under Drought Level 4 will be no less than the historical low flow of 3,220 cfs, then Units 3 and 4 will withdraw between 2.6 and 4.0 percent of the total river discharge. The maximum cumulative withdrawal of all four Units combined (254 cfs) would be 7.89 percent of the total discharge. As discussed previously, the Drought Contingency plan does not prescribe a minimum flow. Therefore, it is reasonable to assume that the minimum observed flow at the Jackson gage is indicative of the likely future minimum discharge. This method of estimating the minimum flow at the Plant Vogtle site, using observed data from the closest gage, accounts for upstream withdrawals and discharges.

20. Consumptive use of water, as a percentage of total river discharge, also increases under Drought Level 4 conditions. At a minimum flow of 3,600 cfs and normal consumptive use (62 cfs), proposed units 3 and 4 will consume 1.7 percent of the total river discharge, which increases to 1.9 percent if we assume a minimum flow of 3,220 cfs. At a normal withdrawal rate of 129 cfs, all four units combined will consume 3.6

percent of the total river discharge at a flow of 3600 cfs, and will consume 4.0 percent of total river discharge at a flow of 3220 cfs. (*See* DEIS at 7-4, Table 7-2). Table 7-2 of the DEIS only describes percentage of river flow consumed based on normal withdrawal. Table 5-2 does discuss consumptive use of units 3 and 4 at maximum withdrawal (64 cfs). (DEIS at 5-8). Maximum combined percentages cannot be determined because the maximum consumptive use for units 1 and 2 is not listed in Table 5-2 or 7-2 of the DEIS. If the maximum consumptive use numbers from Table 5-2 are applied, the percentage of river flow consumed by units 3 and 4 increases. At a minimum flow of 3600 cfs and maximum withdrawal of 64 cfs, units 3 and 4 will consume 1.8 percent of the river. At the historical minimum flow of 3220 cfs and maximum withdrawal of 64 cfs, units 3 and 4 will consume 2.0 percent of the river.

21. On page 7-5 of the DEIS, the NRC staff concludes the combined withdrawal of all four units would be small, and therefore mitigation would be unwarranted. The staff bases this conclusion on the belief that "the total the VEGP site withdrawals are expected to be less than 5 percent of the total river discharge," and that "the total VEGP site consumptive use is expected to be less than 3.5 percent of the total river discharge." DEIS at 7-5. The NRC Staff concedes that combined maximum withdrawal at a Drought Level of 3 is 6.7 percent of the river, and, as discussed above in paragraphs 18 and 19, I estimate that combined maximum withdrawals at a Drought Level of 4 will be between 7.06 to 7.89 percent. Also, the combined normal consumptive use at a Drought Level of 4 will be between 3.6 and 4.0 percent of the river, not less than 3.5 as reported in the DEIS. The maximum consumptive use would be higher still.

22. The NRC Staff's use of the term "cumulative impacts" is misleading because it only takes into account the impacts of Units 1, 2, 3 and 4, and does not take into account all significant withdrawals within the immediate vicinity of VEGP. The Savannah River Site withdraws 4.5 cfs on average, while the D-Area Powerhouse withdraws 68.4 cfs on average. (DEIS at 2-33 - 2-34). The true cumulative withdrawal for the area of the river at which VEGP is located is the combination of the four units (maximum of 254 cfs) plus SRS and the D-Area Powerhouse. At Drought Level 4, the true cumulative impacts of withdrawals in this area of the river means that 9.1 percent of the river is used when the flow is 3600 cfs, and 10.2 percent of the river is used when the flow is at the historical low of 3220 cfs.

23. The term "cumulative impacts" also does not include any upstream withdrawals not within the immediate vicinity of VEGP. The Urquhart Station, located on the Savannah River upstream from VEGP, withdraws 127.5 cfs on average. (DEIS at 2-34). The Augusta Canal withdraws a maximum amount of 50 mgd (77.3 cfs). (Vogtle Early Site Permit Environmental Report at 2.3.2-10). The City of Augusta withdraws a maximum amount of 21 mgd (32.5 cfs). (*Id.*). The International Paper plant at Augusta Mill withdraws a maximum of 79 mgd (122.2 cfs). (*Id.*). These upstream withdrawals will affect the flow of the river at the VEGP site.

24. The NRC Staff also does not consider known future increases of withdrawals from the Savannah River. South Carolina Electric and Gas Company together with Columbia County Water and Sewage System has recently applied to Federal Energy Regulatory Commission to increase its withdrawals from the Stevens Creek Reservoir, fed by the Savannah River and located upstream from VEGP, from 10 mgd (15.5 cfs) to

~~47.1 mgd (72.8 cfs). (Application to Increase Amount of Withdrawal of Project Waters by Columbia County Water and Sewage System, FERC Project No. 2353 GA and SC, October 26 2007, at 1). The Augusta Canal currently requires a flow of between 3480 and 3656 cfs. It is projected that by 2035, the Canal will require flows of between 4307 to 4353 cfs. (Final Environmental Assessment for Hydropower License, Augusta Canal Project, P-11810-0004, September 2006 at 8, Table 2). The City of Augusta is also planning on increasing its water use. The Augusta-Richmond County Water System currently uses a maximum flow of 3,656 cfs. (*Id.* at 35). Augusta plans to upgrade its pumping systems, requiring an increase of withdrawal from 1221 cfs to 1628 cfs by the year 2015. Consumptive use will increase in that time from 45 cfs to 60 cfs. (*Id.* at 36).~~

25. The NRC Staff's conclusion that the impact of thermal discharge at VEGP would be small and localized is based on the same erroneous premise discussed above. (DEIS at 5-17). Thermal discharge would have its greatest impact when "river discharge is the lowest (and) the outfall discharge is the largest." (DEIS at 5-14). However, the DEIS addresses only the impact of the thermal discharge under Drought Level 3 conditions (3,800 cfs) instead of a Drought Level of 4 (under 3,600 cfs), when river discharge is truly at its lowest. (DEIS at 5-16). At a Drought Level of 4, the thermal plume is greater, and therefore the impact on the river is greater. Similarly, the cumulative impact of all four units' thermal discharge will be greater at Drought Level 4 rather than Drought Level 3. (*See* DEIS at 7-7). Without correct river discharge input to the CORMIX model, the predicted thermal output from the model is unreliable. Similarly, at lower flows the river is narrower and, thus the size of the thermal plume relative to the entire river also changes.

26. The DEIS also dismisses dry ~~or hybrid wet/dry~~ cooling systems because "the Staff found that the impacts of the proposed natural draft, wet tower system water use, water quality, and water resources would be SMALL." (DEIS at 9-26). As a result, the Staff concludes that a Wet cooling system is preferable to ~~either~~ dry ~~or hybrid~~ cooling system for Units 3 and 4. Again, this conclusion is based on the unreasonable assumptions about water withdrawals and Savannah river flows, especially during periods of maximum withdrawal and minimum flows.

I declare under the penalty of perjury that the foregoing is true and correct to the best of my knowledge, information, and belief.

Executed this 9th day of November, 2007.

Executed in Accord with 10 C.F.R. § 2.304(d)

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Barry W. Sulkin

SWORN AND SUBSCRIBED BEFORE ME on this 9th day of November, 2007

_____
Notary Public

My Commission expires: