

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before the Licensing Board:

G. Paul Bollwerk, III, Chairman  
Nicholas G. Trikouros  
Dr. James Jackson

In the Matter of

SOUTHERN NUCLEAR OPERATING CO.

(Early Site Permit for Vogtle ESP Site)

Docket No. 52-011-ESP

ASLBP No. 07-850-01-ESP-BD01

**PREFILED REBUTTAL TESTIMONY OF BARRY W. SULKIN CONCERNING  
CONTENTION EC 1.2**

**Q1. Do you agree with the Staff in answer 28 of their prefiled direct testimony that the two new Units would withdraw between 0.9 and 2.2% of the total flow of the Savannah River depending on the river stage?**

A1. No, not exactly. As discussed in answer 18 of my direct testimony, I obtained a different result using the revised withdrawal figures from the DCD revision 16.

**Q2. In your opinion, is the staff correct, in answer 28 of their prefiled direct testimony, that the normal withdrawal rate of 83 cfs represents 1.2% of the annual mean flow of 6991 cfs at the Waynesboro gage?**

A2. I have no reason to doubt the stance calculation and that 83 cfs is 1.2% of 6,991 cfs. However, the testimony is somewhat misleading. First, as I stated in answer 17 of my prefiled direct testified, the DCD revision 16 withdrawal rate is 86.5 cfs. Second, and of much greater importance, is the fact that the Waynesboro gage includes only four years of data. This is the

reason why the Staff chose to use the discharge from Thurmond dam to estimate the flow in the first place. Third, flows on the Savannah River are controlled by the Corps' reservoir management, except during flood control operations. As a result, the annual mean since construction of the reservoirs does not reflect the natural conditions. So, while the Staff calculation may be correct, it is still not very meaningful.

**Q3. Did you calculate the annual mean discharge from Thurmond Dam in 2008?**

A3. Yes, approximately. I obtained the daily and monthly average discharge from the U.S. Army Corps of Engineers website (<http://water.sas.usace.army.mil/cf/AvgDaily/Z.cfm>) and then averaged the monthly means. The mean of the monthly means is 3,262 cfs, which is several hundred cfs lower than the Drought Level 3 flow. JTI000047

**Q4. Did you calculate the annual mean discharge from Thurmond Dam in 2008?**

A4. Yes, I did. The U.S.G.S. website has a tool that performs calculations on gage data. I navigated to the page for the Waynesboro gage ([http://waterdata.usgs.gov/ga/nwis/annual/?search\\_site\\_no=021973269&agency\\_cd=USGS&referred\\_module=sw&format=sites\\_selection\\_links](http://waterdata.usgs.gov/ga/nwis/annual/?search_site_no=021973269&agency_cd=USGS&referred_module=sw&format=sites_selection_links)) and calculated the annual mean for 2005 – 2008. The annual mean in 2008 was 5,682 cfs. JTI000048.

**Q5. Did you calculate the normal withdrawal, using the DCD Revision 16 rate, as a percentage of the mean Thurmond Dam discharge and mean Waynesboro flow in 2008?**

A5. Yes, normal withdrawal (86.5 cfs) is 2.7% of the 2008 mean discharge from Thurmond Dam and the 1.5% of the 2008 mean flow at Waynesboro.

**Q6. What is the significance of these calculations, in your opinion?**

A6. This is an example of the inherently flawed nature of the Staff analysis. Throughout the FEIS, the Staff uses the Thurmond Dam discharge as a surrogate for the actual river flow at

Plant Vogtle. This presumption is inaccurate, as the data clearly shows. Once the Staff, however, decided to use the Thurmond discharge as the standard for making calculations, it should have done so consistently. It is misleading to base all of the calculations in the FEIS on the Thurmond discharge and then switch to the Waynesboro gage in the testimony.

**Q7. Are there other methods to estimate the flow at the Vogtle site that would be more accurate?**

A7. Yes, the Corps has a Hydrologic Engineering Center (“HEC”) computer model of the Savannah Basin, which could be easily adapted for this use. The computer model accounts for the operational rules of the upstream reservoirs, as well as major withdrawals and discharges on the river. The HEC program can be used to accurately predict flows at the Plant Vogtle site. Even more importantly, it can be used to model different weather and water use scenarios to predict conditions under different scenarios.

**Q8. Do you agree with the Staff’s conclusion in answer 33 of their prefiled direct testimony that the timing of the striped bass and American shad spawn relates to seasonal periods of higher river flow, when the fraction of water used by the proposed Units 3 and 4 is smaller?**

A8. No, this not the case when the Corps’ Drought Contingency Plan is in effect. The Drought Contingency Plan does not provide for higher discharge during spawning season. Last year provides a good example. As you can see from the Corps’ data in JTI000047, the monthly average discharge in 2008 never exceeded 3,700 cfs in any month. During the March-April spawning season, the daily maximum discharge was never greater than 3,900 cfs.

**Q9. Do you agree with the Staff conclusion that SNC's calculation of the entrainment rate at Units 1 and 2 (and therefore proposed Units 3 and 4) is minor when compared to the estimates by Specht of entrainment at SRS in 1984 and 1985.**

A9. The rate of entrainment calculated by SNC is 1,302 organisms per day, while Specht's figures are 64,000 per day and 71,000 per day. So, SRS likely had a greater impact when all of the SRS reactors were running than Vogtle Units 1 and 2 have today. However, this does not necessarily mean that doubling the Vogtle impact by adding two additional Units will have only minor impacts. That claim requires information about the current baseline conditions.

Specht found that SRS entrained approximately 25 million organisms per year. Over the decades of operation, SRS entrained billions of organisms. The first question that needs to be answered is whether the chronic loss of millions of organisms had any impact on species composition or population numbers. Then, the next question is whether populations have stabilized, or recovered, since SRS stopped most of its withdrawals. While 1,302 (or 2,600) organisms per day may seem small, especially in comparison to the huge SRS impacts, this is not necessarily the case if the current baseline is severely depressed as a result of past withdrawals at SRS.

In addition, it is impossible to say anything definitive about the cumulative impacts of entrainment without knowing something about the current withdrawal rates at the SRS D-area Powerhouse, as well as other major withdrawals in the Savannah River Basin. Without doubt, SNC's results are encouraging, but they are insufficient to support a conclusion regarding the potential cumulative impacts of the additional Units.

**Q10. In answer 35 of their prefiled direct testimony, the Staff testifies that it did not base its low-flow analysis on Drought Level 4 flows because the Drought Contingency Plan**

**does not contain explicit flows and because of the likelihood that such flows will change in the future. In your opinion, is the Staff's approach reasonable?**

A10. No, in my opinion it is not reasonable to wholly discount the possibility of flows lower than Drought Level 3. As I testified on direct examination, the theoretical minimum flow, which is equivalent to the Drought Level 4 flow, is well known.

In addition, it is not reasonable for the Staff to presume that Drought Level 4 will change in the future. In answer 35 of its pre-filed direct testimony for E.C. 1.2, the Staff testifies that it used the release policies described in the Drought Contingency Plan "because it represented the most current understanding of future operations and releases by the Corps." In the case of Drought Level 3, the Staff bases its calculations on the Drought Contingency Plan, in spite of the fact that the discharge from Thurmond Dam has in fact been lower than the prescribed flow of 3,800 cfs during the ongoing drought. In my opinion, it is unreasonable for the Staff to adhere strictly to the Drought Contingency Plan on the Drought Level 3 flows in one case, and then throw out the Drought Contingency Plan entirely in the other case.

**Q11. Do you agree with the Staff testimony in answer 37 of their pre-filed direct testimony for E.C. 1.2 concerning the appropriateness of using the discharge from Thurmond Dam as the basis for the Staff's analysis of impacts at the site, given the withdrawals and releases upstream between Thurmond Dam and the Vogtle site?**

A11. Overall, my opinion is that the release from Thurmond Dam is a poor surrogate for estimating the potential impacts, especially cumulative impacts, of two additional Units at Plant Vogtle. In answer 24 of my pre-filed direct testimony for E.C. 1.2, I address the inherent weakness of the Staff's methodology. Also, as noted in my answer to questions 3-6 above, the

flow at the Vogtle site (at the Waynesboro gage) was significantly higher than the Thurmond discharge in 2008.

If we were just concerned with consumptive use of water, then I would agree with the Staff that the Thurmond discharge is a conservative estimate of the actual flow at the site. However, this method is not conservative or appropriate to analyze potential impacts to aquatic resources resulting from the intake and discharge structure. The Staff reasons that groundwater discharges to the river are roughly equivalent to the consumptive loss from upstream users and, therefore, it is appropriate to disregard upstream withdrawals and discharges in the analysis. This logic is flawed because it focuses on total consumptive loss instead of the cumulative impacts of withdrawals and discharges on aquatic species. Every withdrawal has the potential for impingement and entrainment, regardless of whether the water is subsequently consumed or returned to the river.

The Staff testifies, in answer 37 of its pre-filed direct testimony for E.C. 1.2, that the flow at the Vogtle site will exceed the Thurmond discharge “as long as the inflow from tributaries and groundwater exceed the consumptive water losses by users between Thurmond reservoir and the VEGP site.” This statement is undoubtedly true, but almost entirely beside the point. The FEIS identifies impingement and entrainment as potential impacts of the new Units. To determine the cumulative impacts of the additional Units, it is necessary to know something about impingement and entrainment associated with upstream withdrawals.

**Q12. In answer 50 of its pre-filed direct testimony for E.C. 1.2, the Staff testifies that water withdrawal percentages are 5.8% at 3,000 cfs and 8.7% at 2,000 cfs. Do you agree with the Staff conclusion it is inappropriate to heavily weight these percentage withdrawals under very low conditions?**

A12. No, this is an example of the Staff disregarding its stated methodology when the results are inconvenient. The Staff relies on the 5% threshold as long as it is not exceeded, but when withdrawal percentage is greater than 5% the Staff concludes that the result is unimportant. In my opinion, the percentage withdrawals under very low conditions deserve added weight, not less, because the drift community is more concentrated, the zone of influence of the intake is greater, the through-screen velocity is higher, and the biota are generally more stressed because of the dry conditions. These impacts resulting from very low conditions potentially amount to more than the “minor” impacts asserted by SNC on page 23 of the SNC Position Statement.

The Staff claims, in answer 50 of its pre-filed direct testimony for E.C. 1.2, that it is appropriate to discount very low flows because “they are expected to be temporary, on the order of days or weeks, rather than months.” This statement is misleading, at best. At Drought Level 3 (3,800 cfs), the combined normal withdrawal percentage is 4.6%, which approaches the 5% threshold of significance. Exhibit JTI000021. Except during and immediately after rain, discharge from Thurmond Dam has been consistently below 3,800 cfs since December 2006. On December 1, 2008, the Corps reduced the Thurmond discharge to 3,100 cfs. At that flow, the normal withdrawal percentage is 5.7%. If four Units were currently operating at Plant Vogtle, combined withdrawals would have exceeded the 5% threshold for more than two years, with no end in sight.

**Q13. Do you agree with Dr. Coutant’s assertion in answer 64 of his pre-filed direct testimony for E.C. 1.2 that the approach in the EIS of selecting an extreme low flow is more reliable than the 7Q10 flow under the regulated flow regime of the Savannah River?**

A13. Yes, I agree with Dr. Coutant that 7Q10 flows are “rather meaningless” on a dam-controlled river like the Savannah. Today’s Savannah River flows are a function of long- and

short-term precipitation, as well as Corps management and operation of the upstream reservoir projects. As I discuss above in answer 2, the same logic applies to the annual mean flow calculation on dam-controlled rivers.

**Q14. Do you agree with Dr. Coutant, in answer 71 and 72 of his pre-filed direct testimony for E.C. 1.2, that discrepancies between the discharge from Thurmond Dam and the actual flow at the Vogtle site are not a reason for concern with this analysis?**

A14. As I explained in answer 11 above, using the Thurmond discharge fails to capture cumulative impacts of upstream withdrawals and discharges. The Thurmond discharge is totally inadequate for cumulative impacts analysis of the two proposed Units in combination with other past, present, and reasonably foreseeable future withdrawals and discharges on the Savannah River.

In accordance with 28 U.S.C. § 1746, I state under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on February 6, 2009.

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