October 5, 2009

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
Tennessee Valley Authority	)	Docket No. 50-391
(Watts Bar Unit 2)	)	

PETITIONERS' REPLY TO RESPONSES OF NRC STAFF AND TENNESSEE VALLEY AUTHORITY TO PETITIONERS' AMENDED CONTENTION 7

I. INTRODUCTION

Pursuant to 10 C.F.R.§ 2.309(h)(2), Petitioners Southern Alliance for Clean Energy ("SACE"), Sierra Club, Blue Ridge Environmental Defense League ("BREDL"), Tennessee Environmental Council ("TEC"), and We the People, Inc. ("WTP") hereby submit their reply to NRC Staff's Answer to Petitioners' Amended Contention 7 Regarding TVA Aquatic Study ("NRC Staff Answer") and Tennessee Valley Authority's Response in Opposition to Petitioners' Amended Contention 7 Regarding TVA Aquatic Study ("TVA Response"), which were filed on September 28, 2009.[1]

II. DISCUSSION

A. Amended Contention 7 is Timely Because the Aquatic Study Was Not Previously Available to Petitioners.

TVA asserts that Amended Contention 7 is untimely under 10 C.F.R. § 2.309(f)(2) because Petitioners "overlooked" the 1998 Aquatic Study, which was "clearly identified" in the

[1] Petitioners' motion to admit the Sierra Club, BREDL, TEC and WTP as late-filed intervenors is pending with the Board. Petitioners' motion for leave to amend Contention 7 is also pending. This reply is conditional on the granting of that motion.

2007 Final Supplemental Environmental Impact Statement ("FSEIS"). TVA Response at 1-2. Petitioners neither overlooked the study, nor was it "clearly identified." Instead, TVA erroneously cited a completely different study in the "Aquatic Ecology" section of the FSEIS, a fact that TVA does not deny. *See* FSEIS at 54. While a thorough search of the entire FSEIS may have alerted Petitioners to the Aquatic Study's mere *existence*, nothing in the FSEIS establishes that the study in fact formed the basis for TVA's conclusions concerning aquatic impacts. TVA's suggestion that it was somehow the Petitioners' responsibility to recognize and decipher TVA's mistake is absurd.

B. Amended Contention 7 Raises Genuine Disputes Regarding Entrainment and Impingement Impacts.

1. Rate of Entrainment of Larval Fish

According to TVA, Dr. Young's comparison of the Aquatic Study's "total entrainment" estimates for 1997 with its 1997 estimates for "total transport of fish larvae and eggs" -- which showed an entrainment rate of 17.65% for that year -- is "inconsistent with the entrainment estimation equation and methodology used by TVA." TVA Response at 6. Therefore, TVA argues that Amended Contention 7 should be dismissed because Petitioners have "identified no significant material deficiency in TVA's analysis of entrainment-related impacts." *Id.* at 7.

But TVA never states that Dr. Young actually erred in his interpretation of the estimates presented in the Aquatic Study, or that an entrainment rate of 17.65% would be insignificant. To the contrary, TVA concedes that Dr. Young identified an "apparent discrepancy" in the data presented by the Aquatic Study for larval fish entrainment. *Id.* And while TVA criticizes Dr. Young for "ignor[ing] at least two of the four variables in the referenced entrainment equation," TVA never shows how Dr. Young should have applied those variables to the information presented in the Aquatic Study to yield a lower entrainment rate for 1997. Indeed, TVA's

Response makes it clear that it would not have been possible for Dr. Young to use TVA's entrainment equation to confirm the entrainment rate presented in the Aquatic Study without resorting to "original source data" not published in the Aquatic Study.

Finally, TVA fails entirely to support its claim that the "discrepancy" identified by Dr. Young is resolved by consulting the original source data. Neither TVA's Response nor Mr. Baxter's affidavit provides any of the data consulted by Mr. Baxter, or shows how it was used in the Aquatic Study's entrainment equation. And instead of providing an entrainment rate for 1997, the year in question, they lump 1997 with 1996. By raising more questions than it answers regarding its entrainment estimates, TVA demonstrates the admissibility of the contention.

2. Duration of Entrainment and Impingement Sampling

TVA argues that Petitioners have not demonstrated a genuine issue with respect to the timing of TVA's operational entrainment sampling, which TVA conducted only for a few months in 1996 and 1997. TVA Response at 8-9.[2] Petitioners contend that TVA did not conduct entrainment monitoring for an adequate amount of time during each year, or for an adequate number of years, to provide a reasonably reliable or accurate portrait of WBN's aquatic impacts. Amended Contention 7 at 3; Second Young Decl. at ¶¶ II.A.5.a and II.A.5.c.

First, TVA claims Dr. Young has not supported his assertion that TVA may have missed the peak abundance of eggs and larvae of some fish species that may spawn outside the three-month window of TVA's sampling period. TVA Response at 8. According to TVA, Dr. Young offers only "speculation" that for example, TVA may miss peak populations of freshwater drum eggs and larvae – which occurs between May and early July -- if spawning is delayed by variations in water temperature. *Id.* (citing Second Young Decl.,¶ II.A.5.a). But TVA ignores the

[2] TVA incorporates the same arguments with respect to impingement impacts. TVA Response at 11.

fact that Dr. Young is expressing his expert opinion, which is supported by U.S. Environmental Protection Agency regulations calling for at least two years of monthly entrainment monitoring during operation of new facilities. Young Second Declaration,¶ II.A.5.c.; 40 C.F.R. § 125.87(a).[3] And TVA's own environmental documents show (a) that water temperature affects the timing of spawning (Aquatic Study at 9) and that (b) water temperatures at WBN vary over time. *See, e.g.,* Watts Bar Nuclear Plant Supplemental Condenser Cooling Water Project, Table 3.2-1 (attached as Exhibit 1), which shows significant monthly variations between average and maximum water temperatures between 1976 and 1993.

TVA also fails to explain how it conclusively established that the dates of peak density of fish eggs and larvae in 1996 and 1997 were in June. TVA could not have known the densities during the other nine months of the year because it only sampled in April through June. Thus, as Dr. Young asserts, it is entirely possible that the actual dates of peak abundance fell outside of TVA's small sampling window in either or both of those years. Second Young Decl., ¶ II.A.5.a.

With respect to Dr. Young's claim that TVA failed to perform adequate operational sampling in April and May 1996 because the plant was not yet operational, TVA argues that "normal operational aquatic sampling" was nevertheless possible during this period because TVA was conducting operational "testing," including operation of the condenser pumps. TVA Response at 9. But the Monthly Operating Reports for April and May 1996 that TVA cites clearly show that WBN was *never* operated at full capacity in April, and was only occasionally operated at full capacity in May. Monthly Operating Report to the Nuclear Regulatory Commission at 1-3 (Apr. 1996), ADAMS Accession No. ML073330942; Monthly Operating

[3] Petitioners recognize that 40 C.F.R. § 125.87 does not apply to WBN because it is not a "new facility," as defined at 40 C.F.R. § 125.83. Nevertheless, § 125.87 demonstrates the frequency and duration of impingement and entrainment sampling and monitoring that EPA considers appropriate when such sampling and monitoring are required.

Report to the Nuclear Regulatory Commission at 1-3 (May 1996), ADAMS Accession No. ML073330945).

3. Continuing Validity of the Aquatic Study

TVA and the NRC Staff both challenge Dr. Young's claim that the findings of the Aquatic Study are outdated due to changes in the aquatic environment at WBN. TVA Response at 9-10; NRC Staff Response at 3-5. TVA accuses Dr. Young of overlooking TVA's own data that show "good" ecological health ratings for the Chickamauga Reservoir. TVA Response at 10. As Dr. Young pointed out in his first Declaration, however, TVA's position that fish health is good is contradicted by data presented in TVA's own environmental impact statements in 1978 and 2008 that demonstrate the declining health of the native fish community in the Chickamauga Reservoir. Declaration of Shawn Paul Young, ¶ III.C.4 (July 11, 2009) ("First Young Decl."). TVA conveniently neglects to address this data.[4]

The NRC Staff argues that Petitioners have not met their burden, under case law interpreting the National Environmental Policy Act, of establishing that the data from the 1998 Aquatic Study are invalid. NRC Response at 4 (citing *Northwest Envtl. Advocates v. Nat'l Marine Fisheries Serv.*, 460 F.3d 1125, 1143 (9th Cir. 2006) (holding that an agency is only required to update old data "when the continuing validity of that data is thrown into question.")). The Staff's argument is totally without merit. Throughout his Second Declaration, Dr. Young presents numerous reasons why the data in the 12-year-old Aquatic Study do not provide a

[4] TVA also attempts to dismiss Dr. Young's claims about the declining health of the reservoir on the basis that his first declaration references literature that pre-dates the operation of WBN and the Aquatic Study. TVA Response at 10 n.44. *See also* First Young Decl. at ¶ III.C.4. The data on declining fish populations in the Chickamauga Reservoir that Dr. Young relies on, however, were taken directly from TVA's 1978 FEIS and 2008 FSEIS for WBN. First Young Decl. at ¶ II.C.4. All other literature referenced by Dr. Young with respect to this point is clearly provided only as support for general assertions regarding fish biology and not for any specific claims about the ecological health of the Chickamauga. *Id.*

reliable basis for estimating current biological conditions in the vicinity of WBN. *See e.g.*, Second Young Decl. at ¶ II.A.4 (averaging of entrainment data collected in 1996 and 1997 was not appropriate); ¶ II.A.5.c ("Given the significant fish larvae entrainment rate observed in 1997, given the disparity between entrainment levels in 1996 and 1997, and given the brevity of the 1996 monitoring period, TVA should have continued entrainment monitoring after 1997 in order to have a reasonable sense of what constitutes a normal year"); ¶ II.A.5.d (numerous indicators suggest that the overall health of the Chickamauga Reservoir and Tennessee River is in decline and therefore further study is warranted).

The NRC Staff claims that Petitioners overstate the significance of the steady decline in the Reservoir Fish Assemblage Index (RFAI) scores for the Tennessee River in the WBN vicinity from 1993 to 2005, as documented in Table C-3 of the FSEIS. NRC Response at 5. According to NRC Staff, this data does not show a significant decline in the health of the river. *Id.* But the Staff completely ignores the fact that, although the river's RFAI score has declined only moderately in recent years, the four-point decline in downstream RFAI scores between 1995 and 2005 is part of a steady and significant decline in its downstream RFAI scores since 1993. *See* 2007 FSEIS at 151, Table C-3 (showing RFAI score of 52 in 1993 and only 42 in 2005). Additionally, the fact that the upstream score has increased in that time is of much less significance because impacts are much more likely to occur downstream from the plant than upstream.

C. Amended Contention 7 Raises a Genuine Dispute Regarding Impacts to Mussel Species.

TVA argues that Petitioners fail to raise a genuine dispute with respect to thermal impacts on mussel species in the vicinity of WBN because Dr. Young fails to explain how operation of the plant could have impacted these communities. TVA Response at 12-13. TVA accuses Dr.

Young of "selective reading" of the 1998 Aquatic Study in claiming that there was a 35 percent decline in mussel abundance just below WBN from 1996 to 1997. *Id.* at 12. According to TVA, Dr. Young's calculation focuses only on the middle and downstream mussel beds, while ignoring the upstream beds. *Id.* n.54. TVA also argues that the overall decline in mussel species was only 18 percent. *Id.* n.54. Lastly, TVA argues that, even if correct, Dr. Young's 35 percent value is nonetheless within the "typical year-to-year variations in sampling results."[5] *Id.* at 12.

TVA's argument is with its own study, not Dr. Young. Dr. Young based his assertions entirely on TVA's own assertions, which clearly state that "[s]ubstantially more live mussels were found on the downstream and middle beds in 1996 than in 1997 (35 and 34 percent, respectively, more than in 1997), but only slightly more (8 percent) live mussels than were found on the upstream bed in 1996 than in 1997." Aquatic Study at 58. Thus, it is TVA that makes the distinction between the upstream mussel beds and the middle and downstream ones, not Dr. Young. Moreover, it is simply common sense that mussels in upstream beds would not be subjected to the same thermal impacts as those that are downstream or adjacent to the plant because discharges flow downstream, not upstream.

TVA's attempted explanation as to why a 35 percent annual sampling variation is "typical" further demonstrates the existence of a genuine factual dispute between the parties. TVA asserts that such variation "*may*" be influenced by several factors, such as differences in diver harvest speed and the manner in which divers return the mussels to their beds. TVA Response at 12 n.54. However, TVA offers nothing to show that, in this case, such variation was *actually* caused by these factors and *not* by operation of the plant. Petitioners should therefore

[5] "Yearly variations in the data may be influenced by 'differences in diver harvest speed and the relatively short time (22 minutes) involved in each timed dive' for mussel collection. The observed variations also may be related to the manner in which mussels are returned to the beds following sampling." TVA Response at 12 n. 55 (quoting Aquatic Study at 54-55).

be allowed to present evidence to this Board regarding whether operation of WBN has indeed impacted local mussel communities.

III. CONCLUSION

The responses of TVA and the NRC Staff make it abundantly clear that genuine factual and legal disputes exist with respect to entrainment, impingement and thermal impacts from WBN on the aquatic environment. Therefore, the Board should admit Petitioners' Amended Contention 7 and grant Petitioners a hearing on these issues.

Respectfully submitted,

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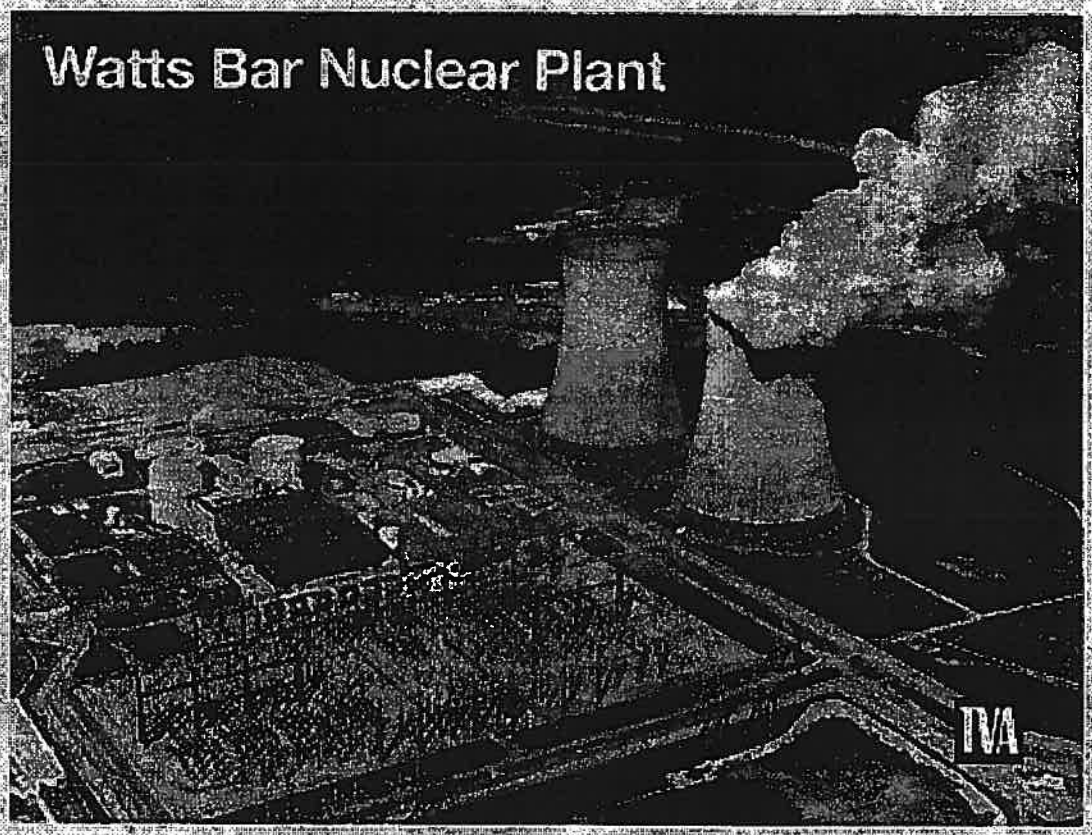
Exhibit 1

WATTS BAR NUCLEAR PLANT
SUPPLEMENTAL
CONDENSER COOLING WATER PROJECT



Environmental Assessment
August 1998

Table 3.2-1 Computed Temperatures Based On 1976-1993 Meteorology and Dam Releases
24 hour averaging, 1230 MWe generation, <u>without</u> supplemental cooling water

		Intake	River Temperature				Discharge Temperature				Total
		Temperature	ambient	downstream	rise	rate	WBN diffuser		SCCW		heat
		24-Hr Avg (F)	24-Hr Avg (F)	24-Hr Avg (F)	24-Hr Avg (F)	Hourly (F/hr)	1-Hr Avg (F)	24-Hr Avg (F)	1-Hr Avg (F)	24-Hr Avg (F)	(BTU/hr)
January	Max	51.7	51.7	51.7	0.4	1.2	79.2	78	0	0	2.18E+08
	Avg	42	42	42.1	0.1	N/A	62.8	62.8	0	0	1.01E+08
February	Max	51	51	51.1	0.4	1.5	82.2	79.3	0	0	2.72E+08
	Avg	41.9	41.9	41.9	0.1	N/A	65.1	65.1	0	0	1.13E+08
March	Max	56.1	56.1	56.1	0.4	1.4	85.7	81.9	0	0	1.83E+08
	Avg	47.7	47.7	47.7	0.1	N/A	69.4	69.3	0	0	1.06E+08
April	Max	65.1	65.1	65.2	0.5	1.4	86.8	83.2	0	0	1.64E+08
	Avg	56.7	56.7	56.7	0.1	N/A	73.8	73.7	0	0	8.32E+07
May	Max	71.9	71.9	71.9	0.4	1.4	90.1	87.2	0	0	1.30E+08
	Avg	64.5	64.5	64.5	0.1	N/A	78.8	78.7	0	0	7.13E+07
June	Max	78.8	78.8	78.8	0.2	1.1	92.7	89.4	0	0	1.30E+08
	Avg	70.7	70.7	70.7	0	N/A	83.4	83.3	0	0	6.55E+07
July	Max	82.5	82.5	82.5	0.2	1.1	96	91.1	0	0	1.19E+08
	Avg	74.9	74.9	74.9	0	N/A	85.7	85.7	0	0	5.71E+07
August	Max	81.7	81.7	81.9	0.1	0.7	94.4	89.5	0	0	8.26E+07
	Avg	76.5	76.5	76.5	0	N/A	85	85	0	0	4.43E+07
September	Max	81.1	81.1	81.1	0.2	0.6	91.7	88.1	0	0	8.78E+07
	Avg	75	75	75.1	0	N/A	81.4	81.5	0	0	3.40E+07
October	Max	76.7	76.7	76.7	0.1	0.5	89	86.2	0	0	9.45E+07
	Avg	68	68	68.2	0	N/A	74.2	74.3	0	0	3.04E+07
November	Max	67.9	67.9	68.1	0.2	1	84.6	82.7	0	0	1.37E+08
	Avg	58.8	58.8	59	0	N/A	69.5	69.7	0	0	5.18E+07
December	Max	59.2	59.2	59.5	0.3	1.1	84.1	80.9	0	0	1.80E+08
	Avg	48.7	48.7	48.9	0	N/A	64.9	64.9	0	0	7.83E+07

Table 3.2-2 Computed Temperatures Based On 1976-1993 Meteorology and Dam Releases
24 hour averaging, 1230 MWe generation, with supplemental cooling water
3 CCW pumps, Jan -Feb; Bypass flow Nov - Apr

		Intake	River Temperature				Discharge Temperature				Total
		Temperature	ambient	downstream	rise	rate	WBN diffuser		SCCW		heat
		24-Hr Avg (F)	24-Hr Avg (F)	24-Hr Avg (F)	24-Hr Avg (F)	Hourly (F/hr)	1-Hr Avg (F)	24-Hr Avg (F)	1-Hr Avg (F)	24-Hr Avg (F)	(BTU/hr)
January	Max	52.8	51.7	52.7	3.8	1.4	77.2	77.1	64.6	64.9	1.31E+09
	Avg	43.5	42	43.7	1.6	N/A	60.7	60.8	52.5	52.5	6.83E+08
February	Max	52.8	51	52.7	3.8	1.7	80.3	77.4	65	63.6	1.39E+09
	Avg	43.7	41.9	43.7	2	N/A	63.1	63.1	53.7	53.7	7.71E+08
March	Max	59.1	56.1	58.5	4	1.5	85.7	81.8	72.4	70.2	1.37E+09
	Avg	49.6	47.7	49.6	2	N/A	69.4	69.3	59.8	59.7	7.92E+08
April	Max	66.4	65.1	66.3	3.2	1.4	86.8	83.1	75.8	74	1.25E+09
	Avg	58.2	56.7	58.3	1.7	N/A	73.8	73.7	66.3	66.2	7.11E+08
May	Max	75.2	71.9	74.4	5.3	3.5	90.1	87.2	90	87.2	1.84E+09
	Avg	67.1	64.5	67.1	2.7	N/A	78.8	78.7	78.7	78.6	1.02E+09
June	Max	80.2	78.8	80	4.2	1.6	92.6	89.4	92.6	89.4	1.69E+09
	Avg	72.8	70.7	72.8	2.1	N/A	83.4	83.3	83.4	83.3	9.17E+08
July	Max	83.7	82.5	83.5	3.4	1.6	95.9	91	95.9	91	1.55E+09
	Avg	76.5	74.9	76.5	1.6	N/A	85.7	85.7	85.7	85.7	7.81E+08
August	Max	82.9	81.7	82.8	2.4	1.3	94.3	89.4	94.2	89.4	1.15E+09
	Avg	77.7	76.5	77.7	1.2	N/A	85	85	85	85	6.10E+08
September	Max	82.3	81.1	82	2.4	1	91.7	88.1	91.6	88.1	1.03E+09
	Avg	76.1	75	76.2	1.1	N/A	81.4	81.5	81.4	81.5	4.63E+08
October	Max	78.3	76.7	78	3.1	1.1	89	86.2	89	86.2	1.31E+09
	Avg	69.3	68	69.4	1.3	N/A	74.2	74.3	74.2	74.3	4.25E+08
November	Max	69.4	67.9	69.7	3.1	1.2	84.6	82.7	76.8	78.9	1.08E+09
	Avg	59.9	58.8	60.2	1.2	N/A	69.5	69.6	64.8	65	4.26E+08
December	Max	60.6	59.2	60.7	3.7	1.5	84.1	80.9	71.4	69.3	1.23E+09
	Avg	50.1	48.7	50.3	1.5	N/A	64.9	64.9	57.7	57.8	5.90E+08

Definition of column headings for tables 3.2.1 and 3.2.2:

Intake Temperature - Intake temperature for the RCW and ERCW systems (°F), determined by adding the instream temperature rise due to the SCCW discharge to the ambient river temperature.

River Temperature

ambient - Ambient river temperature (WBH discharge temperature) (°F)
downstream - River temperature at downstream end of WBN diffuser mixing zone (°F)
rise - Instream DT at downstream end of WBN diffuser mixing zone (F°)
rate - Rate of change of river temperature at downstream end of WBN diffuser mixing zone (F°/hr)

Discharge Temperature

WBN Diffuser - Temperature of discharge through WBN diffuser (°F)
SCCW - Temperature of discharge through SCCW surface discharge (°F)

Total Heat - Combined heat discharge to river from WBN diffuser and SCCW discharge (BTU/hr)

Chemical Impacts

The chemical characteristics of the discharge are dependent upon the concentration level of dissolved solids in the CCW system. This is a function of the evaporative losses from the towers and the combined rate of makeup plus SCCW flows of river water. With maximum evaporative losses of 15,000 gpm and a minimum total flow into the towers of 85,000 gpm, the maximum concentration of dissolved solids would be approximately 1.4 times that in the river. A normal range of 1.1 to 1.2 concentrations would result from operation of this system.

Implementation of the SCCW will not increase or change the use of chemicals. Corrosion control chemicals are not used specifically for the CCW system which the SCCW supplies. These chemicals are only used in the once-through

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CERTIFICATE OF SERVICE

I certify that on October 5, 2009, I posted on the NRC's Electronic Information Exchange System copies of the foregoing Petitioners' Reply to Responses of NRC Staff and Tennessee Valley Authority to Petitioners' Amended Contention 7. It is my understanding that as a result, the following parties were served:

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(*signed electronically by*)
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