

Supplemental Information on Water Treatment Chemical Residuals in the Vogtle Unit 3 and 4 Final Discharge

The following information is provided in response to a telephone request from NRC for additional details on concentrations of water treatment chemical residuals present in the Vogtle Unit 3 and 4 final discharge. Biocide concentrations were provided in the response to RAI E3.3-1 (a) – (g) transmitted by letter AR-07-0061 dated January 30, 2007. The response provides a detailed discussion of onsite chemical use including the treatment process for potable water, cooling towers, and recirculating water systems. The chemical treatment regime for these systems on Unit 3 and 4 has not yet been developed by Westinghouse for the AP-1000 or by other vendors for the auxiliary systems such as the cooling towers. However, based on the best information available at this time, SNC understands that the treatment regime for systems discharging to the Savannah River such as the cooling towers will be very similar, if not essentially identical, to the treatment regime in place for Vogtle Unit 1 and 2. As such, SNC believes that an evaluation of the Unit 1 and 2 water treatment chemistry applied to Units 3 and 4 is appropriate to estimate the water quality impact of the discharge on the Savannah River. The response to RAI E3.3-1 is based on this premise. In particular, the section in the RAI addressing the cooling towers provides the majority of the information necessary to evaluate the environmental impact of the Vogtle Unit 3 and 4 discharge. The small discharges from other systems such as heat exchangers and cooling systems directly supporting the AP-1000 are routed to the cooling towers as makeup. Thus, any treatment chemical residuals are reflected in the final plant discharge chemical composition. With the exception of biocides, the majority of the chemicals used in water treatment at Vogtle are not toxic to aquatic organisms, especially in the range of concentration used at Vogtle. These water treatment chemicals include corrosion inhibitors for mild steel and yellow metals, and a dispersant. The specific chemicals and their concentrations are provided in the following table. The concentrations are based on the amount actually maintained in the system being treated. Values present in the discharge are typically much lower due to decomposition, uptake by the systems, and dilution from other water sources. This introduces additional conservatism into this evaluation. No monitoring of these residuals is required by the NPDES permit.

<u>Water Treatment Chemicals Used in Vogtle Cooling Towers</u>		
<u>Chemical</u>	<u>Use</u>	<u>Concentration</u>
Nalco Sure-Cool 1336 (tolyltriazole)	Corrosion control yellow metals	2 ppm
Nalco 3DT177 (polymer)	Corrosion control mild steel	10-11 pm
Nalco 3DT190 (polymer)	Dispersant	6-7 ppm
Nalco 7905	Dechlorination agent	25% excess to Halogen residual

The primary environmental issue related to water treatment at VEGP is the use of halogen-based biocides to control micro and macro-fouling in the circulating water system, including the cooling towers. As discussed in the RAI, the treatment regime is administered by a vendor (NALCO) and the biocide program consists of oxidizing biocides in one of three forms; liquid sodium hypochlorite, liquid sodium bromide activated with sodium hypochlorite, or stabilized bromine. In each case, any residual remaining in the blowdown is neutralized using a reducing agent (typically ammonium bisulfite) added at a rate to ensure stoichiometric excess to ensure all residual is removed (neutralized) prior to discharge. Approximately 25 % excess is provided, since the reducing agent has low toxicity, to ensure no oxidant residual is discharged to the river even if fluctuations in discharge flow occur. Biocide normally is added twice per week to achieve 0.2 to 0.75 ppm Free Available Oxidant (FAO) for control of algae and general biofouling. Approximately once per quarter, or as needed, biocide is added at 0.5 ppm FAO for a period of 120 hours to control Asiatic clams. Any biocide residual is neutralized by adding ammonium bisulfite directly to the cooling tower blowdown mixing box as discussed above. For example, if 0.5 ppm FAO is present in the blowdown, 0.5 ppm ammonium bisulfite would be added at the stoichiometric 100 % equivalent to neutralize 0.5 ppm FAO, plus an additional 25 % (0.5×0.25) = 0.125 ppm for a total of 0.625 ppm stoichiometric equivalent ammonium bisulfite. Thus the discharge would contain zero oxidant residual and 0.125 ppm ammonium bisulfite residual. The NPDES permit for Units 1 and 2 contains monitoring and reporting requirements for oxidant residual in the discharge with very low (essentially non-detect limits) limits. Monitoring of ammonium bisulfite is not required.

The RAI response also discusses the use of other chemicals in the cooling tower system including dispersant, and corrosion inhibitors for mild steel and yellow metals. Initially, the concentration levels for these chemicals were not included because they are applied at very low concentrations, are common to the power industry and have no significant impact on water quality. These chemicals or other similar chemicals are used to control corrosion and deposition of solids in cooling towers and other systems in the majority of power plants in the US. None of the chemicals display aquatic toxicity even at concentration levels many times the level they are used at Vogtle. For example, tolytriazole used for yellow metal corrosion control is present in the cooling towers at a concentration of up to 2 ppm. Values in the final discharge will be significantly lower. The Material Safety Data Sheet (MSDS) for this Nalco product indicates a 48 hour acute toxicity LC50 to daphnia magna (water fleas) of 420 ppm. Even when considered in combination with the Unit 1 and 2 discharge, they still do not produce a significant aquatic toxicity concern. These chemicals are not controlled under the current NPDES permit since the concentrations are very low and consistent with power industry applications.

In summary, the chemical constituents expected to be present in the discharge for Vogtle Units 3 and 4 do not produce a significant impact on the water quality in the Savannah River. The most significant chemicals in use are the oxidizing biocides used to control micro and macro-biological growth in the cooling towers. Any residual present from

biocide use is neutralized prior to discharge as discussed above. The small amounts of corrosion inhibitors and dispersant present do not result in a water quality concern and do not even warrant monitoring as a condition of the NPDES permit. The presence of small levels of residual water treatment chemicals in the Vogtle Unit 3 and 4 discharge does not present a water quality concern. Additionally, the cumulative impact associated with the discharge of all four Vogtle units should not significantly impact the water quality of the Savannah River.