

Info Needs Item AE-A

Information Item:

Temperature data for SSES diffuser.

Response:

Summer thermal plume surveys (Ref. 1) were conducted at the Susquehanna SES river water diffuser at mid-day on August 21 and September 3, 2008. During each survey, both boiling water reactors were at full power. The river water withdrawal at the intake on both days was approximately 39,000 gpm with a mean temperature of 74.4°F, and the blowdown, as it exited the cooling tower basins on site, was 12,000 gpm at an average of 82.7°F.

The average river flow on August 21, 2008, was 3,230 cfs at a river level of 487 ft elevation. The thermal plume did not reach the river surface before dissipating. The 0.5°F isotherm thermal plume was less than 40 ft wide at the diffuser and narrowed as it extended 120 ft downriver. On September 3, 2008, the average river flow was 2,140 cfs at a river level of 486.5 ft elevation. The 0.5°F isotherm thermal plume was 100 ft wide and extended downriver from the diffuser 300 feet. The 0.5°F thermal plume appeared to reach the surface of the river. However, subsurface temperatures from 1 to 3 feet at both sites were lower than the surface temperatures, and since any thermal heating reaching the river surface would first have to pass through these levels, the thermal plume may not have even reached the surface of the river at these sites. Averaging the surface temperature deltas of the 20 site measurements reveals that the surface temperature of the plume may have increased the ambient river temperatures by 0.4°F only immediately above the plume, but that some of this increase was also caused by solar radiation despite an attempt to adjust for it.

Based on the study, it was concluded that thermal plumes from the SSES discharge pose no thermal environmental hazard to aquatic life in the Susquehanna River.

The Autumn, Winter, and Spring studies are documented in Ref. 2. The Autumn study showed that the plume was within 5 ft of the diffuser along the inner half of the pipe. However, it extended downriver about 130 ft along the outer half of the diffuser. This portion of the plume remained near the bottom until about 75 ft downriver when it began to billow toward the surface. The Winter study showed that the thermal plume remained within 10 ft of the diffuser along the inner half of the pipe, and then extended downriver about 25 ft along the outer half. It tended to billow upward, but it was always less than 10 ft below the surface. The Spring study showed that most of the plume was located downriver from the outer half of the diffuser where it extended about 80 ft in length. The plume tended to billow upward, but never reached closer than 7 ft of the surface. The conclusion of Ref. 2 was that the diffuser discharge of SSES quickly mixed thermally-enriched water from the cooling tower blowdown with river water so that impact to the Susquehanna River was negligible.

References:

- 1) Ecology III, Thermal Plume Surveys in the Susquehanna River at the Susquehanna Steam Electric Station Discharge Diffuser, Summer 2008, Revision 2.
- 2) Ecology III, Thermal Plume Studies in the Susquehanna River at the Discharge Diffuser of the Susquehanna Steam Electric Station 1986-87.