

Clean Water Act 316(b) Consulting

IMPINGEMENT AND ENTRAINMENT STUDIES FOR NPDES PERMITTING AES Thames, LLC Uncasville, CT

Beginning in February 2006, Kleinschmidt conducted a one year-long impingement and entrainment (I&E) monitoring study at the AES Thames Co-generation facility. The facility is located in the estuarine portion of the Thames River, approximately 10 miles upstream from Long Island Sound. This study was performed to examine the I&E rates reflective of current operations for the AES Thames facility and current fish populations in the lower Thames River estuary. While previous studies were conducted in 1990-1991, more recent information suggested that the relative occurrence, abundance, and distribution of resident fish in the Thames River and Long Island Sound had changed over the past decade. Therefore, Kleinschmidt developed a scope of study for conducting a new I&E study at the station from February 2006 to February 2007.

Impingement samples were collected once per week at the CWIS with each sampling event spanning a total of 24 hours. Impinged organisms removed from the traveling screens were identified to the lowest practical taxonomic category, enumerated, measured, and weighed. In addition, the physical condition of each organism was recorded as dead, alive, mutilated, or dead prior to impingement. Weekly species-specific impingement estimates were calculated by multiplying the raw impingement data for each of the species observed by the ratio of weekly plant flow to daily flow. In this manner, a species-specific and flow-weighted total annual impingement estimate was generated for the AES Thames facility. In addition, information gathered during the previous impingement monitoring study conducted at AES Thames in 1991, as well as published survival rates from literature, were applied to the numbers of estimated impinged organisms to determine the number of organisms that survive the impingement process and are returned to the Thames River alive following removal from the traveling screens. Applying these survival rates to the 29 fish species that the information was available



for reveals that up to 90 percent of the fish impinged annually are actually returned to the receiving waters alive following removal from the traveling screens. At least 87 percent of the crustaceans estimated to be impinged annually, survive the impingement process and are returned to the Thames River alive.

Entrainment sampling occurred on the same day of the week as impingement sampling, however during the cooler, less productive winter months entrainment sampling was reduced to a bi-weekly frequency. The samples were processed in Kleinschmidt's laboratory and subject to a rigorous quality assurance program. Annual species-specific entrainment estimates were calculated as the product of sample species density observed on every single day of plant operation and the corresponding plant flow volume on that day of operation. A non-linear polynomial regression model was used to predict entrainment for the days between sampling intervals when the plant was operating. In addition to reporting annual entrainment estimates, the number of entrained fishes occurring annually at the AES Thames facility were converted into adult equivalents.

Kleinschmidt
Energy & Water Resource Consultants

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