

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

August 31, 1977

Mr. Charles Kaplan
Enforcement Division
Environmental Protection Agency
345 Courtland Street, NE.
Atlanta, Georgia 30303

50-390
391

Dear Mr. Kaplan:

Regulatory File GA
Re: Watts Bar Nuclear Plant
NPDES No. TN0020168



In accordance with agreements reached in the meeting on August 2, 1977, of representatives of EPA, NRC, Fish and Wildlife Service, Tennessee Division of Water Quality Control, and TVA, we are enclosing the following documents:

1. Conceptual Operational Monitoring Plan for Nonfisheries Aquatic Biota - Watts Bar Nuclear Plant
2. Watts Bar Nuclear Plant - Preoperational Monitoring Program - Larval Fish
3. Watts Bar Nuclear Plant - Operational Monitoring Program - Fisheries

In addition to the enclosed material, the following documents which were provided to you and all agencies represented at the meeting contain information related to monitoring as indicated below.

Environmental Information - Reassessment of environmental aspects or changes in design or construction with TVA's analysis of impact. In addition, updated information concerning certain biological monitoring data acquired since the FES was issued. Similarly, updated subsections of the Watts Bar FES.

Supplemental Environmental Information - TVA responses to NRC questions on plant design changes, monitoring programs and various thermal analyses.

1969 Molluscan Resources of the Tennessee River - Mussel abundance and B. G. Icom Malacologia 7(2-3):397-425 distribution.

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Baseline Adult Fish Monitoring Program - Program underway March 1977.

Preoperational Aquatic Biota (Non-Fish) Data - Supplemental data from 3 years of preoperation monitoring.

Ungate, C. D., and E. E. Driver, "Effect of Orientation - Diffuser Performance to Flow Direction on Diffuser-Induced Dilution and Plume Structure in a Shallow River," Water Systems Development Branch, TVA Division of Water Management.

The other documents which you received at the meeting provide information in response to specific NRC and EPA questions.

TVA-PES-Voluntown, Tennessee - Controls and evaluations of impacts 500-kV substation and transmission line.

TVA-THO-Milfoil Control - Concerns about infestations, control in Watts Bar and Chickamauga, and monitoring NRC questions at February 23, 1977, site visit.

Oxygenation of Turbine Discharges from Fort Patrick Henry

If you have any questions about this material, please let me know.

Sincerely yours,

Peter A. Krankel, Ph.D., P.E.
Director of Environmental Planning

Enclosures

cc (Enclosures):

- Director, Enforcement Division, EPA (Atlanta)
- Chief, Ecology Branch, EPA (Athens)
- Director for Environmental Projects, NRC (Washington) ✓
- Regional Director, Fish and Wildlife Service (Atlanta)
- Director, Tennessee Division of Water Quality Control (Nashville)
- Regional Engineer, Tennessee Division of Water Quality Control (Chattanooga)

CONCEPTUAL OPERATIONAL MONITORING PLAN FOR NONFISHERIES AQUATIC BIOTA
WATTS BAR NUCLEAR PLANT

I. Introduction

The preoperational water quality and aquatic biology (non-fish) monitoring programs were implemented in the vicinity of the Watts Bar Nuclear Plant in August 1973 and February 1973, respectively. These programs are scheduled to be continued through 1977, at which time preoperational monitoring will be discontinued and a complete preoperational report will be prepared for use as the basis for assessing impacts of plant operation. It is not appropriate to design a specific operational monitoring program until the results of the preoperational monitoring program have been completed. It is possible, however, to present a conceptual monitoring plan that can be updated with specific details once the assessment of the preoperational monitoring is completed. In conceptual form, the monitoring program will incorporate the following elements: (1) the assessment of the impacts on the nonfisheries biota of the intake structure 316(b); (2) the assessment and evaluation of bioaccumulation of selected trace metals by molluscs and other appropriate organisms; (3) the continued evaluation of selected trace metal concentrations in the water on a minimum support data basis; and (4) a low level effort for the maintenance of a continued data base for the biological communities.

This operational plan would be reviewed annually and modified as deemed appropriate.

A. 316(b) Nonfisheries Intake Evaluation)

The 316 nonfisheries studies at Watts Bar Nuclear Plant will include monitoring of the phytoplankton and zooplankton communities

during different hydrological flow regimes with special emphasis during the primary fish spawning period, April through June. The spatial distribution of the two plankton communities within the vicinity of the plant will be of primary concern. Such data should provide an estimation of that portion of the plankton communities being entrained in the condenser cooling water, and consequently lost as both viable constituents of the reservoir biota and as an essential food resource to larval and other planktivorous fishes.

Plankton sampling will be conducted along transects established both upstream from and in line with the intake basin. Simultaneous hydrological studies will determine the source of the water entering the condenser cooling water system. These studies will accurately define the effects of the intake structure on the phytoplankton and zooplankton communities.

B. Bioaccumulation Studies

The accumulation or biomagnification of chemicals in the tissues of freshwater organisms represents an effective in situ method to evaluate the effect of an effluent on representative aquatic organisms. Corbicula manilensis (Asiatic clams) and/or other freshwater mussels will be placed in holding devices at appropriate stations upstream and downstream of Watts Bar Nuclear Plant. In addition, clams or mussels will be placed specifically within the area of defined mussel beds. After appropriate lengths of time the clams or mussels will be subsampled and the tissue will be analyzed for selected trace metals and other appropriate chemical parameters.

This particular methodology was not part of the preoperational monitoring program; however, the lack of a data base will not impair the use of this method. The test organisms will be collected from a source population (i.e., a population with sufficient numbers to assure the use of a similar gene pool throughout the monitoring program) and the background levels will be determined. The incubation of the test organisms at the Watts Bar Stations will permit the exact exposure history to be known and, with appropriate control stations upstream of Watts Bar Nuclear Plant, parametric statistical techniques can be utilized to determine effects.

C. Water Quality Monitoring

Concentrations of selected trace metals in the water will be determined on a minimum basis to support bioaccumulation studies. Additional instream water quality monitoring is not contemplated, except for analyses which may be necessary to support ecosystem status biological monitoring.

D. Ecosystem Status

The use of cooling towers at Watts Bar Nuclear Plant reduces the environmental concern of thermal effects. The level of effort devoted to instream ecosystem studies during the preoperational program is not justifiable in the operational phase. However, based on the analysis of the preoperational monitoring data, "most sensitive" parameters, if they exist, may be identifiable. Based on this identification, an appropriate instream biological and associated water quality monitoring program would be implemented. This program would serve as an indicator of the ecosystem status which could be compared with the results of the preoperational program.

WATTS BAR NUCLEAR PLANT

PREOPERATIONAL MONITORING PROGRAM - LARVAL FISH

To determine the temporal and spatial concentrations and distributions of ichthyoplankton in the vicinity of Watts Bar Nuclear Plant, preoperational sampling was initiated in 1976. Five equidistantly spaced stations were sampled along a transect adjacent to the plant intake at Tennessee River Mile 528.0. Full-stratum biweekly samples were taken four times a day (dawn, day, dusk, night) from March 24th through September 9th.

In 1977, sampling began March 16 (water temperature 10.5-11.0C) following the same procedure except samples were taken weekly until the end of June and biweekly thereafter. Daily sampling frequency was reduced to day and night. This sampling plan will be continued for the final year of preoperational monitoring (1978) but sampling will commence around March 1 to insure the monitoring of any early spawning tailwater species such as Stizostedion.

All samples are taken with a 0.5 m beam net (0.5 mm mesh) towed at 1.0 m/sec. Flow is recorded with a General Oceanics large-vane flowmeter mounted in the net mouth. All tows are of 10-minute duration, filter approximately 150 m³ of water, and are in an upstream direction.

Samples are preserved in the field in 10-percent Formalin and returned to the laboratory. Fish early life stages are identified to the lowest possible taxon using polarized stereomicroscopy and available taxonomic keys (e.g., Hogue, Wallus, and Kay, 1976; May and Gasaway, 1967; Norden, MS; Taber, 1967). Level of identification depends upon taxon in question, developmental stage, and condition of specimens.

WATTS BAR NUCLEAR PLANT
OPERATIONAL MONITORING PROGRAM - FISHERIES

Discussed below are proposed fisheries operational monitoring plans. Preoperational fisheries monitoring is now being conducted in the vicinity of Watts Bar Nuclear Plant and the results will be reported in November 1978. Included in this report will be any proposed modifications to the final operational monitoring plans.

Impingement

Fish impingement studies on the intake screens will commence when Watts Bar Nuclear Plant becomes operational. The number of fish impinged on each intake screen during a 24-hour period will be determined once each week. At the beginning of the test period, screens will be cleaned and at the end of the 24 hours, each of the screens will be individually washed. The impinged fish from each screen will be separated by species into 25 mm length classes. The total number and weight for each length class and species will then be determined.

Entrainment

To determine the spatial and temporal concentrations and distributions of ichthyoplankton in the vicinity of Watts Bar Nuclear Plant, samples will be taken along a transect adjacent to the intake at Tennessee River Mile 528.0. Full-stratum samples will be taken at five equidistantly spaced stations during both day and night. Sampling will begin on March 1 to assure monitoring of early spawners (e.g., Stizostedion). Samples will be taken weekly until the end of June when a biweekly schedule will be initiated.

All samples will be taken with an 0.5 m beam net (0.5 mm mesh) towed at 1.0 m/sec in an upstream direction. Flow is recorded with a General Oceanics large-vane flowmeter mounted in the net mouth. All tows are of 10 minutes duration and filter approximately 150 m³ of water.

To determine levels of ichthyoplankton entrainment, intake sampling at other TVA plants has been accomplished using 0.5 m diameter stationary nets suspended in a 3 x 3 array in front of the intake structure. Unless an improved gear type or sampling design is developed, this method of intake sampling will be employed at Watts Bar Nuclear Plant. Sampling frequency will be the same as transect sampling and sample duration will be sufficient to filter approximately 150 m³ of water through each net.

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Thermal Effects

Subject to final review following analyses of preoperational data, TVA has tentatively determined that no operational fisheries monitoring for thermal effects will be conducted at Watts Bar Nuclear Plant. Our reasons are as follows:

1. The mixing zone, where thermal effects would be most obvious, occupies a maximum area of approximately 0.6 ha (1.5 acres) in the middle of the reservoir. TVA has concluded

- that fish might avoid this area but that such effects would not be significant because of the extremely small area that would be affected. Therefore, it should not be necessary to conduct detailed studies to determine whether or not fish actually avoid the mixing zone.
2. Outside the mixing zone water temperatures will always be within 5 F of ambient and most thermal effects studies have concluded that no significant impacts will occur as a result of these slight elevations in temperature.
 3. TVA has conducted intensive fisheries investigations at other sites that were influenced by potentially more adverse thermal conditions and has typically found negligible or no deleterious effects. Because of these results, there should be no need to monitor fisheries experiencing the less stressful conditions that will occur as a result of the thermal discharges from Watts Bar Nuclear Plant.
 4. Any studies performed to detect thermal effects in the vicinity of Watts Bar Nuclear Plant will be confounded by other (and in our view, more important) habitat variables such as flow, substrate, current velocities, etc., because the operation of the Watts Bar hydroelectric plant is probably the dominant factor in determining fish movements, distributions, and habitats in the area.
 5. As a practical matter, it will be difficult, if not impossible, to sample in the thermal discharge area because of the swift currents typically found there. In addition, the proximity of the dam and Watts Bar Fossil Plant to the nuclear plan will make it difficult to collect "control" samples with which to compare thermally-affected samples.

For these reasons, TVA has tentatively concluded that operational monitoring for potential thermal effects of Watts Bar Nuclear Plant on the fisheries resources of Chickamauga Reservoir (Watts Bar tailwater) is not necessary or practical. This decision will be reviewed at the end of the preoperational monitoring program.

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