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AUTH.NAME AUTHOR AFFILIATION
EL-ASHRY,M.T. Tennessee Valley Authority
RECIP.NAME RECIPIENT AFFILIATION
WARR,J.N. Alabama, State of

SUBJECT: Forwards study plan for monitoring water quality & aquatic biological conditions in Guntersville reservoir,per Part III,7 of NPDES Permit AL0024635.

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JUN 12 1980

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TENNESSEE VALLEY AUTHORITY

NORRIS, TENNESSEE 37828

JUN 3 1980

Mr. James W. Warr, Director
Alabama Water Improvement Commission
State Office Building
Montgomery, Alabama 36130

Dear Mr. Warr:

As required by Part III.7. of the Bellefonte Nuclear Plant NPDES Permit No. AL0024635, enclosed is a copy of the study plan for monitoring the water quality and aquatic biological conditions in Guntersville Reservoir prior to operation of Bellefonte Nuclear Plant. Parts of this monitoring program will begin in September 1980 and the results of all preoperational monitoring will be contained in the final preoperational monitoring report to be submitted by March 31, 1983.

Sincerely,

Mohamed T. El-Ashry, Ph.D.
Director of Environmental
Quality

Enclosure
cc (Enclosure):
Mr. Sanford W. Harvey, Jr.
Director of Enforcement Division,
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Mr. Billy Joe Youngblood
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U.S. Nuclear Regulatory Commission
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AQUATIC BIOLOGICAL, AND WATER QUALITY PREOPERATIONAL MONITORING WORKPLAN FOR THE BELLEFONTE NUCLEAR PLANT

Introduction

Bellefonte Nuclear Plant (BNP), located at Tennessee River Mile (TRM) 392 on the west shore of Guntersville Reservoir near Scottsboro, Alabama, is presently scheduled for unit one fuel loading in September 1982 with commercial operation by September 1983. Fuel loading for unit two is scheduled for June 1983 and commercial operation by June 1984.

The NPDES permit (No. AL0024635) for BNP requires that pre-operational monitoring of the water quality and aquatic biological conditions in Guntersville Reservoir be implemented two years prior to fuel loading of unit one. The purpose of this monitoring program is to describe and evaluate baseline aquatic biological communities and water quality parameters prior to the operation of BNP. Because aquatic biological (nonfisheries) and water quality data have been collected from 1974 through 1979 as a combined preoperational - construction assessment monitoring program, these samples will be resumed in 1981 to provide a one-year (maximum) update of the existing baseline. Should fuel load slippages occur for the Unit 1 reactor, sampling schedules will be adjusted accordingly since current schedules are keyed to the predicted fuel loading date of September 1982. Data collected from 1974 through 1979 will be summarized in a report to be completed by October 1980. Data collected in 1981 and 1982 will be reported in the final preoperational monitoring report to be submitted March 31, 1983.

Data are also available from larval fish sampling and cove rotenone inventories conducted as part of the monitoring program at BNP, and these data, along with other fisheries data to be collected from 1980 through 1982, will be utilized in the preparation of the final preoperational monitoring report.

Radiological sampling will be conducted as part of this preoperational monitoring program. Samples will be analyzed and results reported by the TVA Radiological Hygiene Branch.

Procedures for Environmental Data Collection and Analysis

The procedures to be used for the collection of aquatic biological and water quality samples, including sample locations and collection schedules, are described below.

Fisheries Monitoring

Four types of gear will be employed to sample the fish community near BNP: quarterly samples with gill nets and boat-mounted electroshockers; annual samples of nearby coves using rotenone, and biweekly samples of fish eggs and larvae with fine-mesh, towed nets during the fish spawning season. Timing for quarterly gill net and electrofishing samples will be determined by water temperatures as follows: winter, less than 10°C; spring and fall, 15-18°C, and summer, 25°C and above.

Gill Netting

Gill netting will consist of two multifilament, sinking, experimental gill nets (1.3-6.4 cm bar mesh) 37.9 m long and x 2.4 m deep

fished perpendicular to both shorelines, 100 m apart, at each of three stations (TRM's 388.0, 391,0, 396.5). Samples will also be taken along the right shoreline at TRM 392.5. Mesh progressions will run in opposite directions for the two nets set on each shoreline. Nets will be fished four consecutive nights twice each quarter for a total of 112 samples each quarter. All fish captured will be identified to species and enumerated.

Electrofishing

Electrofishing equipment will consist of a boat-mounted 230-volt 3.5-kilowatt direct current generator delivering a continuous current of approximately four amperes to the water. Fish visually affected by the electrofishing unit will be captured with long-handled dip nets, identified to species, and enumerated. A numerical estimate of those fish not captured will be included in the sample data, provided a positive species identification can be made.

Electrofishing samples will be taken twice during each quarter at the same four stations used for gill-netting. An electrofishing sample will consist of continually shocking a 100-meter section of shoreline while moving in a downstream direction. All samples will be timed. Five of these samples, separated by a buffer zone of at least 20 meters, will be taken along each shoreline at the four stations (except at the intake station, TRM 392.5, where only the right shoreline will be sampled). All stations will be sampled on the same day during each trip. In addition, five samples will be taken along both shorelines

in both the Town Creek and Mud Creek embayments.

Cove Rotenone

Cove rotenone studies will be conducted once each year during the autumnal period (August or September) in two 1-3 acre coves located in the Town Creek and Mud Creek embayments. All fish taken will be identified to species, placed in inch classes, enumerated, and weighed, using standard methods developed by TVA.

Larval Fish

To determine seasonal abundance of fish eggs and larvae at the BNP site, samples will be taken across a transect located at TRM 392.2. Four stratified samples will be taken in the channel (two strata on each side of Bellefonte Island). A full stratum tow will be made along each shoreline. Sampling frequency will be biweekly beginning in mid-March and continuing through August or mid-September. The six samples described above, each consisting of a ten-minute tow, will be taken during both day and night for each sample period.

Flora and Invertebrate Fauna

Aquatic biological sampling, including phytoplankton, chlorophyll *a* and carbon-14 estimates; zooplankton; periphyton; benthos, and sediments will be conducted monthly from February through October beginning in 1982. Location of sample stations, sample depths, and number of samples to be collected are summarized in Table 1.

In order to measure quantitative changes in the aquatic macrophyte vegetation above and below the BNP site, seven stations (Table 2) representing both shallow overbank habitat and steep shoreline habitat along the main channel will be sampled. Samples will be collected during alternate months beginning in September 1981 and continuing through September 1982. Aquatic macrophytes will be collected from the entire water column in five 0.1 m^2 quadrats at each 1.5-foot contour interval along a transect perpendicular to the bottom contour. Samples from deeper areas will be collected by divers.

In the laboratory, samples will be washed and separated by species, then oven-dried and ashed to determine ash-free dry weight. The mean standing crop of aquatic macrophytes, expressed in g/m^2 ash-free dry weight, will be calculated for each contour interval at each station. The means will then be summed for each sample period at each station. The summed means, representing an estimate of the standing crop at each station, will be plotted for each survey conducted during preoperational monitoring.

Water Quality

Water quality sampling will be conducted quarterly beginning in the fall quarter (September - November) of 1981. Sampling will continue for a period not to exceed one calendar year. Should fuel loading slippages occur for the unit 1 reactor, sampling schedules will be adjusted accordingly since current schedules are keyed to the predicted fuel loading date of September 1982. Location of sampling stations (including river miles and horizontal locations), sample collection depths, and parameters to be analyzed are summarized in Tables 3 and 4.

All samples will be collected in accordance with standard quality assurance procedures. The procedures described in Laboratory Branch Methods for Chemical Analysis of Water and Wastes, Environmental Protection Agency, Water Quality Office, Cincinnati, Ohio, 1979, will be followed for all sample analyses.

Prepared by Johnny P. Buchanan and Doug S. Walsh

Table 1
PREOPERATIONAL AQUATIC BIOLOGICAL SAMPLING FOR EVALUATING
THE BELLEFONTE NUCLEAR PLANT SITE AT GUNTERSVILLE RESERVOIR
MONTHLY FEBRUARY-OCTOBER

Station (TRM)	Phytoplankton Chlorophyll a & Carbon-14 Estimates[1] Depths	Zooplankton	Periphyton Substrates[2]	Benthic Fauna (Ponar Grab Sampler) (No. Samples)	Sediment[3] (No. Samples)
Channel					
396.8	0.3, 1, 3, & 5	Duplicate Vertical Bottom to Suface Hauls	2 Racks	10	2
391.2	0.3, 1, 3, & 5	Duplicate Vertical Bottom to Suface Hauls	2 Racks	10	2
388.0	0.3, 1, 3, & 5	Duplicate Vertical Bottom to Suface Hauls	2 Racks	10	2
Left Overbank					
386.4	0.3 & 1	Duplicate Vertical Bottom to Suface Hauls	2 Racks	10	2
388.4	0.3 & 1	Duplicate Vertical Bottom to Suface Hauls	2 Racks	10	2
391.1	0.3 & 1	Duplicate Vertical Bottom to Suface Hauls	2 Racks	20	2
389.9	0.3 & 1		2 Racks	20	2

1. Duplicate samples are taken at each depth for phytoplankton and chlorophyll a. Carbon-14 estimates are determined at the channel stations by using two light bottles at each depth plus one dark bottle at 0.3 and 5-meter depths.
2. Periphyton racks to be collected beginning in April should be placed during the March survey, thus allowing 30 days for colonization.
3. Sediment will be collected for particle size analysis.

Table 2

AQUATIC MACROPHYTES

Station	Sampling Frequency	Number of Samples Per Contour
TRM 396.8 (Raccoon Cr.)	Bimonthly	Five Frames Per Contour Taken At 1.5 ft. Contour Intervals From Shoreline To a Depth of Approximately 7.5 ft. (Number of Samples Varies According to Water Level)
TRM 396.0 (Raccoon Cr. mile 0.1)	Bimonthly	
TRM 390.8 (Below Diffuser)	Bimonthly	
TRM 389.4 (Sublett Ferry)	Bimonthly	
TRM 389.4 (Right Overbank)	Bimonthly	
TRM 389.5 (Jones Cr.) - Channel	Bimonthly	
TRM 389.5 (Jones Cr.) (Left Overbank)	Bimonthly	

Table 3

Water Quality Analysis
Sampling Locations and Identification

River Mile (TRM)	Horizontal Location (%)	Depth (M)
396.8	50*	0.3[a]
		1.0[b]
		3.0[b]
		5.0[a]
394.6 (Town Creek 0.2)	50*	0.3[a]
391.6	95	0.3[c]
391.2	60*	0.3[a]
		5.0[a]
391.1	Behind left overbank land barrier*	0.3[c]
		1.0[c]
389.9	10*	0.3[c]
		1.0[c]
388.4 (Jones Creek 0.4)	Behind land barrier*	0.3[c]
		1.0[c]
	30*	0.3[a]
		5.0[a]
	80	0.3[c]
386.4	Behind left overbank land barrier*	0.3[c]
		1.0[c]

a. Category A parameters (refer to Table 4)
b. Category B parameters (refer to Table 4)
c. Category C parameters (refer to Table 4)
*Profile for temperature, pH, DO, and conductivity, plus temperature and DO at 1.5 meters

Table 4

Sample Parameters

Category A[1]	Category B[1]	Category C[1]
Alkalinity	Alkalinity	BOD_5
BOD_5	Total organic carbon	Suspended solids
Color, true	Organic nitrogen	Dissolved solids
Color, apparent	Nitrate plus nitrite	Turbidity
Suspended solids	Phosphorus, total	Phosphorus, total
Dissolved solids	Phosphorus, soluble	Organic nitrogen
Turbidity	Dissolved mineral	Ammonia
Sodium		Nitrate plus nitrite
Chloride		Alkalinity
Sulfate		pH
Boron		
Manganese, total		
Manganese, soluble		
Iron, total		
Iron, soluble		
Iron, ferrous		
Organic nitrogen		
Ammonia		
Nitrate plus nitrite		
Total organic carbon		
COD		
Phosphorus, total		
Phosphorus, soluble		
Silica, dissolved		
Potassium		
Calcium		
Magnesium		
Hardness		
Aluminum		
Barium		
Beryllium		
Cadmium		
Chromium		
Copper		
Lead		
Lithium		
Mercury		
Titanium		
Nickel		
Zinc		
Arsenic		
Selenium		
Fecal coliform		
Silver		

1. Refer to Table 3