TENNESSEE VALLEY AUTHORITY
KNOXVILLE, TENNESSEE 37902

JUN 29 1988

Mr. Philip L. Stewart, Manager
Chattanooga Field Office
Division of Water Pollution Control
State of Tennessee
Department of Health and Environment
2501 Milne Avenue
Chattanooga, Tennessee 37406-3399

Dear Mr. Stewart:

SEQUOYAH NUCLEAR PLANT (SQN) - NPDES PERMIT NO. TN0026450 - COMPLIANCE EVALUATION INSPECTION AND NOTICE OF VIOLATION

This is in response to your May 26 letter on the above subject. The following are actions which have or will be taken to correct the violations noted in the inspection report and transmittal letter.

VIOLATIONS

1. Sewage Treatment Plant Discharges, Discharge Serial Numbers (DSNs) 111, 112, and 113--As discussed in our notification of noncompliance for May 1987, the BOD5 excursions for DSN 111 were due to short circuiting in one of the four sand beds. The defective bed was isolated on May 7, 1987, and there have been no exceedances of quality parameters for DSN 111 since that time. A source of extraneous, nonsanitary wastewater inflow (the service building sump discharge) was identified and diverted from the DSN 111 collector system to the yard drainage system in July 1987. Subsequently, we have not experienced any problems with hydraulic overloading. The inflow/infiltration problem associated with a broken manhole from February 1987 to July 1987 has been corrected. This resulted in hydraulic overloading at DSN 112. Also, sewage is being routinely pumped from this system and hauled to the Chattanooga regional sewage treatment facility to minimize the potential for noncompliances. As noted in your letter, DSNs 111 and 113 will be eliminated by routing domestic wastes to the Soddy-Daisy collection system. Approximately 15,000 gallons per day presently routed to DSN 112 will also be diverted at that time. We expect the connection to Soddy-Daisy to be in place by this fall.

2. Untreated, Unpermitted Discharge from the Sink Drain--The sink drain from the pipe shop has been routed to a subsurface disposal system consisting of an absorption field 2-feet wide and 40-feet long. The sink was isolated on March 31 and was not placed back into service until the drain was rerouted. In addition, a sign will be placed above the sink stating for hand washing only.

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3. Calibration Records for the Diffuser Pond Flow Measurement (DSN101)--The diffuser flow is calculated from an equation relating flow to the difference in elevation between the diffuser pond and the reservoir. The reservoir and pond water elevations are measured using the bubble pressure gage technique which is a widely accepted method. The difference in water elevation is related to the diffuser flow by performing a calibration test.

   Enclosed is data for the last calibration test which was performed December 16-19, 1986. The calibration test is performed under the supervision of TVA's Engineering Laboratory in accordance with standard practices. The calibration data and related documentation are kept on file at the Engineering Laboratory. A copy of the data and related information have also been provided to the plant staff for their NPDES records.

   The bubble gages work on the principle that the pressure at the point of bubble release is equal to the depth of water above the source. This is an accurate and widely used method of continuously measuring depth above a given datum. The water elevations in the diffuser pond and the river are surveyed periodically, and the readings are compared with the bubble gage readings for accuracy. The most recent check was performed on March 1 and the difference between the surveyed and the measured water levels in the pond and the river were 0.07 and 0.10 foot, respectively. These differences are well within the accepted range of performance of the bubble gages and introduce less than 10-percent error in the calculated diffuser flow.

   With regard to the maximum flows reported for February, March, April, and September 1987, the detailed records were examined for the months in question and it was found that in all cases, the calculated diffuser flows were in error because of malfunction of the air-flow equipment. These records also showed intermittent performance of the gage between February 12 and 18. The gage was serviced and has been in good working condition since that time. The corrected flow values have been calculated from the usable part of the record, and revised Discharge Monitoring Reports will be sent shortly.

   As part of the Environmental Data Station (EDS) upgrade, extensive data checking is now performed. All measured parameters outside their expected range are automatically flagged and brought to the EDS staff so that corrective action can be taken in a more timely manner.

DEFICIENCIES

1. Time of Analysis for Total Residual Chlorine (TRC) Samples--The data logsheets for TRC sampling at the heat exchangers are being revised

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to require that lab analysts record both the time of TRC sample collection and the time of sample analysis. We expect to have the procedures revised and in effect by July 10. During the interim, the time of analysis is being noted on the back of the existing logsheets.

2. Pump and Haul System for DSN 113--As noted in your letter, an application for a hold and haul system permit has been submitted.

3. Turbine Building Sump Discharges to the Low Volume Waste Treatment Pond--The leaking section of pipe and dike erosion will be repaired by July 1. A recently implemented pond, channel, and dike inspection program will ensure that greater attention is focused on identifying and correcting problems of this nature. The effluent flow measurement device is scheduled to be installed by September 1.

4. Containment for the Sodium Hypochlorite Solution Tanks--Drawings for providing containment have been issued. These plans also include provisions for controlling discharges from the hypochlorite building sump. This will be accomplished by plugging the three upper sump drains and valving the discharge from the lower drain. We expect to have this work completed by August 15.

5. Testing/Maintenance of the Cooling Tower Lift Pumps--The lift pump motors have been reworked during the past two months. The lift station was tested on June 2 and 3 (helper mode) and on June 7 (closed mode). One tower is presently operable in both helper and closed modes.

If your staff has any questions regarding these responses, please have them call Madonna E. Martin at (615) 632-6695 in Knoxville, Tennessee.

Sincerely,

M Paul Schmierbach
for Ralph H. Brooks, Director
Environmental Quality

Enclosure
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CALIBRATION OF THE SEQUOYAH NUCLEAR PLANT DIFFUSER DISCHARGE

INTRODUCTION

Velocity measurements were conducted by the Tennessee Valley Authority's Engineering Laboratory in the diffuser pond at the Sequoyah Nuclear Plant (SQN) on December 16-19, 1986, to calibrate the diffuser discharge flowrate. The objective of this calibration was to establish a head-discharge relationship which could be applied to the SQN Computed Thermal Compliance Model (CTCM) to increase the accuracy of the model's calculated diffuser discharge.

During these measurements SQN was shut-down to check documentation of environmental qualifications of plant equipment.

DESCRIPTION OF TEST SITE AND VELOCITY INSTRUMENT

Measurement Cross Section

Velocities were measured in a cross section about 680 feet from the diffuser entrance. This location was selected because the water flows generally parallel to the banks and the width is sufficiently narrow to permit quick velocity traverses. The section width varied from 405 feet during the lowest calibrated flow to 454 feet during the maximum flowrate. The maximum water depth was about 20 feet.

Velocity Instrument

An Electromagnetic Water Current Meter was used to measure the velocities. The meter's current sensor measures water flow in a plane normal to the longitudinal axis of the probe, and shows this flow as two orthogonal components (X and Y) on two panel meters in a portable case. A north seeking magnetic compass shows current sensor alignment relative to geomagnetic north on a third meter. From these X and Y flow components and sensor alignment, both the velocity magnitude and direction are determined. The instruments size and weight makes it easily handled from a small boat.

The velocity meter was calibrated prior to the field measurements in the Engineering Laboratory's tow tank velocity calibration facility. This calibration covered velocities ranging from 0.03 to 1.5 feet per second (ft/s). The instrument is capable of measuring velocities up to 10 ft/s with an overall accuracy within ± 4 percent of full scale over the velocity range of the instrument.

TEST PROCEDURE

The idle SQN reactors reduced the cooling water requirement to a flowrate within the pumping capacity of two condenser circulating water (CCW) pumps and four emergency raw cooling water (ERCW) pumps. Accordingly, the diffuser discharge calibration started with this pump rate on December 16 and covered the range of flowrates accompanying three, four, and six CCW pumps on December 17, 18, and 19, respectively. Four ERCW pumps operated during each measurement and the diffuser pond was discharging to the reservoir through both diffuser pipes.

Because the diffuser discharge depends upon the water level difference (head) between the diffuser pond and Chickamauga Reservoir, water levels in the pond and reservoir were held as constant as possible during the velocity measurements. Therefore, arrangements were made with SQN Operations to start the number of CCW pumps required for each diffuser discharge measurement several hours before the start of velocity measurements. The diffuser pond and river elevations were monitored at the SQN Environmental Data Station (EDS) until they stabilized.

After the elevations stabilized, vertical velocity profiles were recorded at 20- or 30-foot intervals across the measuring section beginning 10 feet from the right bank. Distances to the measuring points were measured from an initial point on the bank by tag line. The boat was held motionless by the tag line and a small stern anchor. In each vertical profile, velocities were recorded at 3.28-foot depth intervals from the water surface to the bottom. This measurement procedure followed the standard method for river discharge rating measurements (1) with the exception of closer spaced depth measurements. This spacing was increased for greater accuracy in the event of thermal stratification in the pond or current flow in contrary directions at some depths.

DATA ANALYSIS

Flowrates for each calibrated diffuser discharge were computed by multiplying each recorded velocity in feet per second by the area for that particular velocity depth in square feet. The flowrate in cells with downstream vectors were signed positive values and cells with upstream vectors (which occurred near the banks) were signed negative values. The total cross section flowrate was determined from the algebraic sum of these cells.

Areas were computed by the following method:

Area = Depth x Width

Depth = 0.5(distance to velocity above) + 0.5(distance to velocity below) (feet)

Width = 0.5(distance to velocity to right) + 0.5(distance to velocity to left) (feet)

Results of the diffuser flow calibration are summarized in Table 1. These measurements showed a diffuser discharge flowrate averaging 12 percent less than the flowrate computed by the CTCM at the EDS. Based on this percentage difference, the coefficient in the equation for computing the diffuser discharge in the CTCM was adjusted from 540 to 476 to bring the computed flowrates into closer agreement with calibration results.

Flowrates computed by the CTCM after the coefficient change are compared to the measured flowrates in Figure 1. The average percent difference between the model's computed discharge and the measured discharge was about 6.4 percent with lower percentages of 5.8 and 3.6 percent associated with higher discharge flowrates when four and six CCW pumps were operating. The good agreement between the model and measured flow at high flowrates is important because when SQN is in normal operation the diffusers operate in that flow range most of the time. And it is in this flow range where the greatest thermal impact on reservoir water is likely to occur.

The decrease in diffuser discharge was brought about by rubbish accumulation in the diffuser pipes and normal aging of the pipes and the discharge holes.

REFERENCE

"National Handbook Of Recommended Methods For Water-Data Acquisition," Prepared under the sponsorship of the Office of Water Data Coordination, Geological Survey, U.S. Department of the Interior, Reston, Virginia, 1977.

TABLE 1

Sequoyah Nuclear Plant Diffuser Discharge Calibration
December 1986

Date	Number CCW Pumps Operating	Elevations Pond Ft.MSL*	River Ft.MSL	Pond - River (Head) Ft.	Measured Diffuser Discharge (cfs)
12/16	2	678.03	677.00	1.03	889
12/17	3	678.46	676.90	1.56	1297
12/18	4	680.41	676.90	3.51	1686
12/19	6	683.53	677.17	6.36	2490

Notes: 1. The pond and river elevations and the elevation difference (Head) were recorded at the SQN Environmental Data Station.

2. Diffuser discharge flowrates are in cubic feet per second.

3. Four ERCW pumps were in service during each measurement.

4. *Mean Sea Level.

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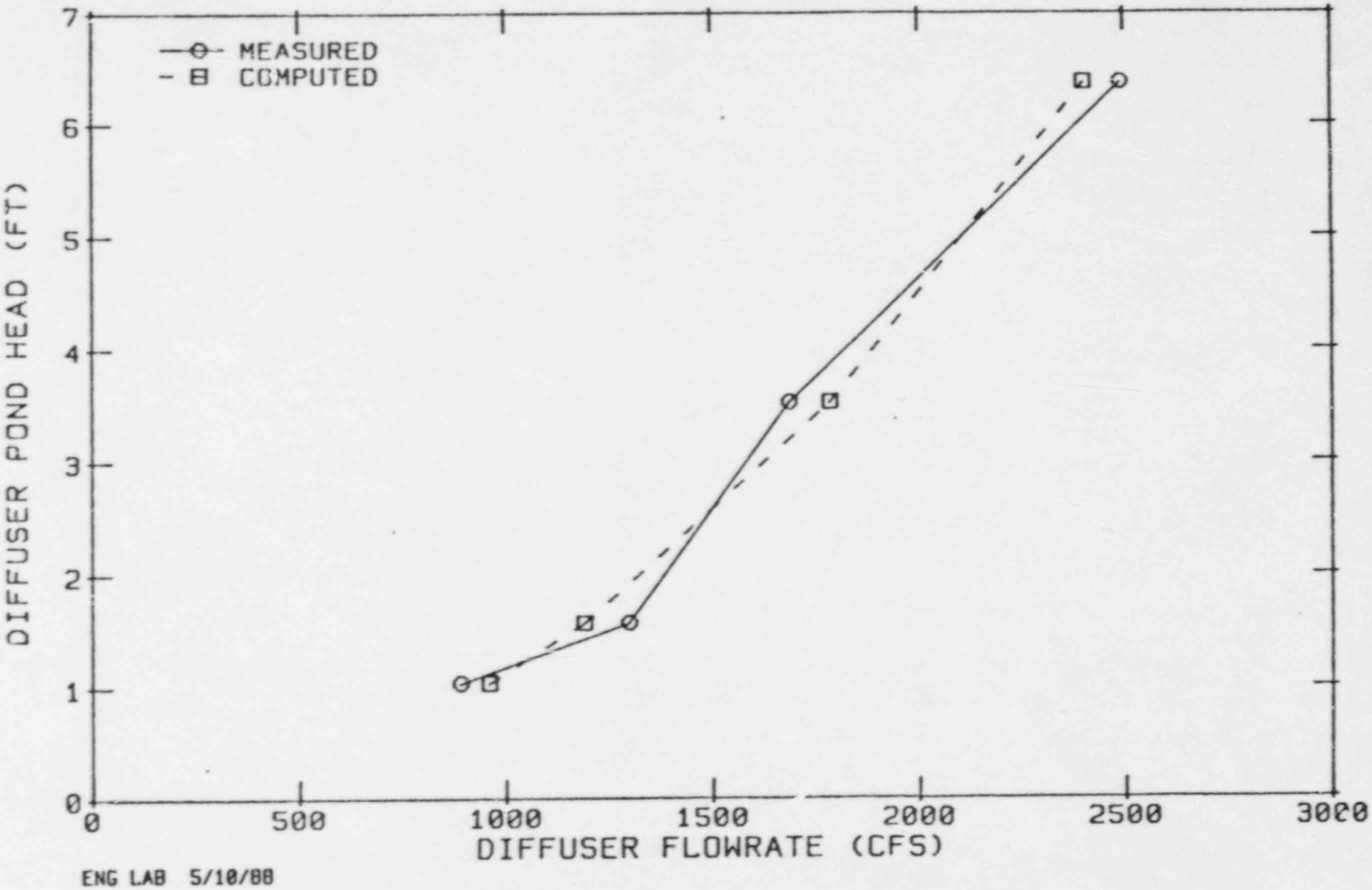

Figure 1. Diffuser Pond Head vs Measured and Computed Diffuser Discharge For Flow Calibration, December 16 Through 19, 1986, Sequoyah Nuclear Plant.