

TENNESSEE VALLEY AUTHORITY

KNOXVILLE, TENNESSEE 37902

OCT 30 1987

Mr. Philip L. Stewart, Manager
Chattanooga Field Office
Division of Water Pollution Control
2501 Milne Street
Chattanooga, Tennessee 37406-3399

Dear Mr. Stewart:

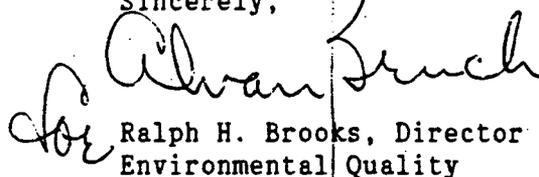
WATTS BAR NUCLEAR PLANT (WBN) - NPDES PERMIT NO. TN0020168 - COMPLIANCE
EVALUATION INSPECTION REPORT AND NOTICE OF VIOLATION

This is in response to your October 16 letter and follow up to Martin E. Rivers's August 5 letter to Ann Z. Farmer providing a response and commitment for resolving the violations and deficiencies noted in Ms. Farmer's June 30 compliance evaluation inspection report. The plan for correcting the large flow of water under the loading area of the batch plant is given in enclosure 1. The work described in enclosure 1 was completed August 14. The general operating instruction for operating the sewage treatment facility is given in enclosure 2. These instructions were issued July 31. The information about the potential sources of boron to the liquid radwaste system is being finalized and should be mailed by November 10.

At this time the extent of the repairs to the diffuser piping is unknown. Internal meetings are being held to discuss repairs that may be necessary beyond those identified in our August 22, 1986, letter to the Environmental Protection Agency (with a copy to the your office). When the additional repairs are completely identified, we will be able to provide the diagram you requested.

If there are any questions regarding this response, please call Madonna E. Martin of my staff at (615) 632-6695 in Knoxville.

Sincerely,


for Ralph H. Brooks, Director
Environmental Quality

Enclosures

cc: See page 2

8711040055 871030
PDR ADOCK 05000390
G PDR

TEOG
11

OCT 30 1987

Mr. Philip L. Stewart

cc (Enclosures):

Mr. Kenneth W. Bunting, Director
Division of Water Pollution Control
Tennessee Department of Health
and Environment
TERRA Building
150 Ninth Avenue, North
Nashville, Tennessee 37219-5404

Mr. Douglas K. Lankford, Chief
South Carolina/Tennessee Unit
Facilities Performance Branch
Water Management Division
U.S. Environmental Protection
Agency, Region IV
345 Courtland Street, NE.
Atlanta, Georgia 30365

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Mr. G. G. Zech, Assistant Director
Regional Inspections
Division of TVA Projects
Office of Special Projects
U.S. Nuclear Regulatory Commission,
Region II
101 Marietta Street, NW., Suite 2900
Atlanta, Georgia 30323

Mr. J. A. Zwolinski, Assistant Director
for Projects
Division of TVA Projects
Office of Special Projects
U.S. Nuclear Regulatory Commission
4350 East West Highway
EWW 322
Bethesda, Maryland 20814

ENCLOSURE 1
PLAN FOR CORRECTIVE DRAINAGE UNDER THE
CONCRETE BATCH PLANT AT WATTS BAR NUCLEAR PLANT

Heavy rainfall created a large flow of water under the loading area of the concrete batch plant and washed cement and fly ash residue down to the catch basin. The major source of the large flow came from a storm drain that serves the new training facility. The storm drain ended such that the water flowed directly under the concrete batch plant on its way to the catch basin cited during the inspection (see figure 1). The storm drain was extended around the batch plant on August 14. The storm drain extension will remain in place until the concrete batch is dismantled and removed. Rock cover and straw bales will be maintained around the catch basin to prevent excessive solids from washing into the basin.

TVA is continuing to use concrete truck rinse water and the concrete aggregate screen wash water to water roads for dust control.

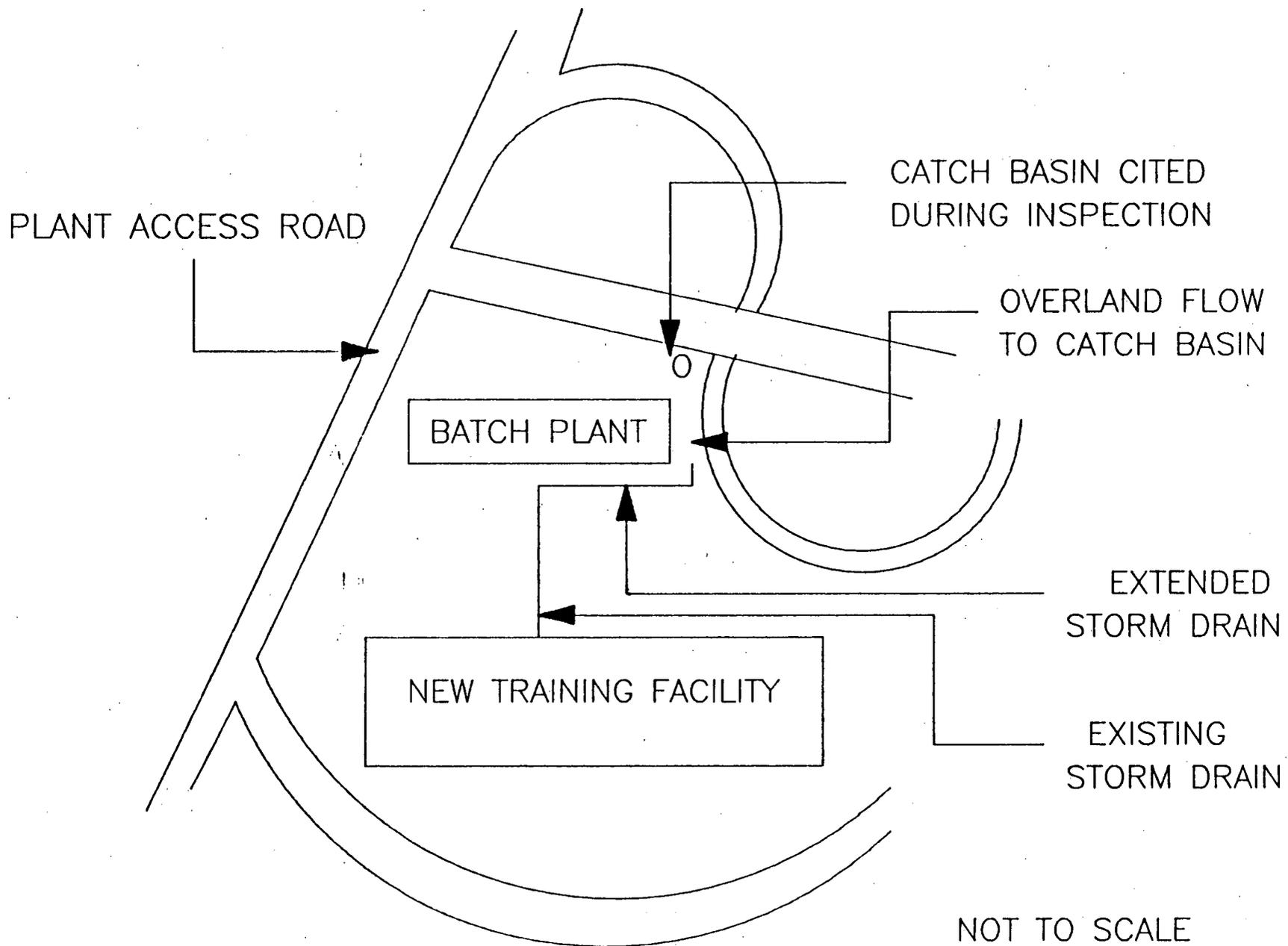


FIGURE 1. WATTS BAR NUCLEAR PLANT – CONCRETE BATCH PLANT DRAINAGE

ENCLOSURE 2
GENERAL OPERATING INSTRUCTION
FOR THE
SEWAGE TREATMENT FACILITY
AT
WATTS BAR NUCLEAR PLANT

Title: WASTEWATER TREATMENT PLANT - GENERAL OPERATING INSTRUCTION

No. _____

Rev. _____

1.0 OBJECTIVE

To prescribe the procedure for operating the extended aeration wastewater treatment facility located at Watts Bar Nuclear Plant.

2.0 SCOPE

The primary considerations in operating the wastewater treatment facility are (1) safety, (2) compliance with the NPDES permit, and (3) economics. With these factors in mind, this GOI provides the State-certified operator with general guidelines and instructions to be used in operation of the wastewater treatment plants.

3.0 REFERENCES

- 3.1 Field Operations Natural Resource Engineering Procedures Manual, Volume 1, March 2, 1983.
- 3.2 Operation of Extended Aeration Package Plants, Manual of Practice OM-7, Operations and Maintenance, Water Pollution Control Federation, 1985.
- 3.3 Operator's Pocket Guide to Activated Sludge, Part 1, The Basics, CRS Group Engineers, Inc., 1978.
- 3.4 Operator's Pocket Guide to Activated Sludge, Part II, Process Control and Trouble Shooting, CRS Group Engineers, Inc., 1978.
- 3.5 United States Environmental Protection Agency, National Pollutant Discharge Elimination System, Permit Number TN0020168, October 1, 1984.
- 3.6 State of Tennessee, Tennessee Department of Health and Environment, Section 401 Certification, September 14, 1984 (mistakenly dated September 14, 1983).

4.0 ABBREVIATIONS

- 4.1 NPDES--National Pollutant Discharge Elimination System
- 4.2 WBN--Watts Bar Nuclear Plant, ONP
- 4.3 FO EAST--Field Operations, Eastern Area, S&F OPS
- 4.4 NRE--Natural Resource Engineering Section, FO EAST
- 4.5 LB--Laboratory Branch, S&F OPS
- 4.6 P&S--Property and Supply Unit, Knoxville, S&F OPS
- 4.7 BOD₅--Biochemical oxygen demand

4.8 DO--Dissolved oxygen

4.9 pH--Measure of hydrogen ion activity

4.10 TSS--Total suspended solids

5.0 RESPONSIBILITIES

5.1 Section Supervisor--The FO EAST manager (M-5 level) is responsible for NRE activities at one or more office locations within FO EAST. This manager reports directly to the NRE functional manager and directly supervises the unit supervisors and project engineers.

5.2 Project Engineer--The project engineer is responsible for ensuring that the wastewater treatment facility at WBN is operated safely and effectively to comply with the NPDES permit. The project engineer reports directly to the section supervisor.

5.3 Unit Supervisor--The unit supervisor (SE-6) is responsible for the technical adequacy of the particular functional work being performed. The unit supervisor reports directly to the section supervisor and directly supervises the operator.

5.4 Operator--The operator is responsible for operating the WBN wastewater treatment facilities in accordance with this instruction. In addition, the operator shall show competency to operate a wastewater treatment plant by holding a State Grade I (or above) Package Plant Operator certification. The operator reports directly to the unit supervisor.

6.0 GENERAL OPERATING INSTRUCTIONS

6.1 Daily Operational Routine

6.1.1 Change the aeration system for the equalization and sludge holding tanks from blower-supplied air to plant air.

6.1.1.1 Turn off the equalization tank aeration blowers at the switch panel.

6.1.1.2 Close the blue air supply-valve-to the sludge holding tank.

6.1.1.3 Open the red air supply valve to the sludge holding tank.

6.1.1.4 Open the two blue air supply valves that supply plant air.

6.1.2 Read and record the pump time reading from the lift station timers.

6.1.3 Read and record the wastewater level on the staff gage located in the equalization tank.

6.1.4 Observe the general plant area for unusual sounds, odors, or appearance.

Title: WASTEWATER TREATMENT PLANT - GENERAL OPERATING INSTRUCTION

No. _____

Rev. _____

- 6.1.5 Check all mechanical equipment and electrical systems for proper operation.
- 6.1.5.1 Check the plant aeration system in the equalization tank and sludge holding tank for proper operation.
- 6.1.5.2 Check the equalization tank pumps for proper operation.
- 6.1.5.3 Check alarm system for proper operation.
- 6.1.5.4 Check the communitor for proper operation.
- 6.1.5.5 Check the lift station pump for proper operation.
- 6.1.5.6 Check the influent flow splitter for proper operation.
- 6.1.5.7 Check the diffusers in the sludge holding tanks for proper operation.
- 6.1.5.8 Check the plant influent pipe for blockages.
- 6.1.5.9 Check the plant bar screen for accumulated material.
- 6.1.5.10 Check the plant blower for proper operation.
- 6.1.5.11 Check the diffusers in the aeration tank for proper operation.
- 6.1.5.12 Observe the aeration tank mixed liquor solids for color and appearance.
- 6.1.5.13 Observe the sludge return pipes and skimmer pipes for proper operation.
- 6.1.5.14 Observe the surface of the clarifier for any floating material.
- 6.1.5.15 Observe the depth of the sludge blanket in the clarifier.
- 6.1.5.16 Observe the clarifier effluent weir troughs for algae buildup, spilling of solids, or short-circuit flow.
- 6.1.5.17 Observe the plant V-notch weirs for cleanliness and obstructions.
- 6.1.5.18 Check the chlorine pump for proper operation.
- 6.1.5.19 Check the level of chlorine solution in the chlorine crock.
- 6.1.5.20 Observe the chlorine contact chambers for floating scum or solids.
- 6.1.5.21 Observe the combined final effluent weir for floating scum and the clarity of the effluent.
- 6.1.5.22 Check the V-notch weir, staff plate, and flow recorder for proper operation.
- 6.1.5.23 Notify the FO EAST unit supervisor or the FO EAST project engineer of any unusual conditions observed during the initial plant inspection.

6.2 Daily Operational and NPDES Tests

6.2.1 Daily Operational Tests

6.2.1.1 Settleability Test--Conduct a 30-minute mixed liquor settleability test, as described in reference 3.1, on a sample collected under aeration from the aeration chamber of each plant.

6.2.1.1.1 The results of the 30-minute settleability test have ranged from 200 to 900 ml/L.

6.2.1.1.2 Plot the results of the 30-minute settleability test and submit plots as described in section 7.0.

6.2.1.2 Dissolved Oxygen (DO)--Measure the DO of the contents of the aeration tank and clarifier of each plant as described in reference 3.1.

6.2.1.2.1 The DO in the aeration tank may be in a range of 1.5 to 5 mg/L while the DO in the clarifier should be at least 1.0 mg/L.

6.2.1.2.2 Plot the results of the DO test and submit plots as described in section 7.0.

6.2.1.3 pH--Measure the pH of the mixed liquor in the aeration tank of each plant as described in reference 3.1.

6.2.1.3.1 The pH of the mixed liquor should be in the range of 6.5 to 8.5 standard units.

6.2.1.3.2 Plot the results of the pH test and submit plots as described in section 7.0.

6.2.2 Daily NPDES Tests

6.2.2.1 The following tests are required on a daily basis by the NPDES permit (references 3.5 and 3.6). Samples shall be collected, as described in reference 3.1, from the combined final effluent directly into sample containers and should be analyzed within the specified holding times using only NPDES-approved procedures (reference 3.1).

6.2.2.1.1 pH--The NPDES permit (references 3.5 and 3.6) requires that pH be analyzed 5 times per week and shall not be less than 6.0 or greater than 9.0 standard units. The range at which the plants operated without a noncompliance for the initial 16 months of operation was 6.1 to 7.3 standard units.

6.2.2.1.2 Settleable Solids (Imhoff Cone)--The NPDES permit (references 3.5 and 3.6) requires that settleable solids be analyzed 5 times per week and the daily maximum may not exceed 1.0 ml/L. The range at which the plants operated without a noncompliance for the initial 16 months of operation was 0.1 to 0.8 ml/L.

- 6.2.2.1.3 Residual Chlorine- The NPDES permit (reference 3.5 and 3.6) requires chlorine residual be analyzed 5 times per week and that the daily maximum may not exceed 0.5 mg/L. The range at which the plants operated without a noncompliance for the initial 16 months of operation was 0.1 to 0.5 mg/L.
- 6.2.2.1.4 DO--The NPDES permit (references 3.5 and 3.6) requires that DO be measured 5 times per week and may not be less than 1.0 mg/L. The range at which the plants operated without a noncompliance for the initial 16 months of operation was 2.0 to 6.8 mg/L.
- 6.2.2.1.5 Flow--Flow is recorded on a continuous recorder, and an instantaneous flow is also recorded 5 days per week.
- 6.2.2.2 Notify the FO EAST unit supervisor or the FO EAST project engineer of any unusual test results or NPDES permit (references 3.5 and 3.6) violations.
- 6.2.3 Weekly Operational Tests
 - 6.2.3.1 Mixed Liquor Suspended Solids--Mixed liquor suspended solids samples are collected and analyzed on a weekly basis to aid in determining when solids are to be wasted.
 - 6.2.3.1.1 Results of the mixed liquor suspended solids test have ranged from 2,000 to 6,500 mg/L without a noncompliance during the initial 16 months of operation.
 - 6.2.3.2 BOD₅--A sample collected from the plant influent and analyzed for BOD₅ is used in determining the strength of the incoming sewage and the data are also used to calculate the accumulation of biological solids and other factors such as food to microorganism ratios and organic strength of the waste.
 - 6.2.3.2.1 Results of analysis of the influent BOD₅ samples have ranged from 95 to 800 mg/L without a noncompliance during the initial 16 months of operation.
 - 6.2.3.3 Total Suspended Solids (TSS)--A sample of influent suspended solids is used to determine the organic and inorganic material in the incoming wastewater. The concentration of the influent TSS is used to determine sludge age in operational application.
 - 6.2.3.3.1 Results of analysis of the influent TSS samples have ranged from 90 to 1,400 mg/L without a noncompliance during the initial 16 months of operation.
- 6.2.4 Weekly NPDES Sampling
 - 6.2.4.1 The following samples are required on a weekly basis by the NPDES permit (references 3.5 and 3.6). Samples shall be collected from the combined final effluent directly into sample containers, as specified in reference 3.1, and shall be analyzed by LB within the specified holding times using only NPDES-approved procedures.

- 6.2.4.1.1 BOD₅--The NPDES permit (references 3.5 and 3.6) requires that a BOD₅ sample be collected and analyzed once per week and the maximum concentration may not exceed 45 mg/L. The range within which the plants have operated without a noncompliance for the initial 16 months of operation is 1.0 to 38.0 mg/L.
- 6.2.4.1.2 TSS--The NPDES permit (references 3.5 and 3.6) requires that a TSS sample be collected and analyzed once per week and the maximum concentration may not exceed 45 mg/L. The range within which the plants have operated without a noncompliance for the initial 16 months of operation is 1.0 to 18 mg/L.
- 6.2.4.1.3 Fecal Coliform--The NPDES permit (references 3.5 and 3.6) requires that a fecal coliform sample be collected and analyzed once per week and the maximum number of colonies present cannot exceed 1,000 per 100 mL of sample. The range within which the plants have operated without a noncompliance for the initial 16 months of operation is <10 to 340 colonies per 100 mL of sample.
- 6.2.4.2 Notify the FO EAST unit supervisor or the FO EAST project engineer of any unusual test results or NPDES permit (references 3.5 and 3.6) violations.
- 6.3 Daily Operational Maintenance and Cleanup
 - 6.3.1 Remove accumulated material from lift station screening basket.
 - 6.3.2 Clean influent flow splitter box.
 - 6.3.3 Clean plant bar screens.
 - 6.3.4 Waste excess solids from the clarifier of each plant to the sludge holding tank for approximately 10 minutes using the procedure described in section 6.6 and/or reference 3.2.
 - 6.3.5 With the aeration system on, scrape the hopper of the clarifier.
 - 6.3.6 Scrape and remove any algae that may be on the surface of the clarifier effluent weir trough.
 - 6.3.7 Using the pressure hose, wash the plant interior walls and pipes above the water level.
 - 6.3.8 Remove any floating material from the surface of the clarifier and place in a trash can with a plastic liner and lid.
 - 6.3.9 Inspect and adjust sludge return flow and skimmer.

6.4 Completing Daily Operational Routine

- 6.4.1 At noon, read and record pump time reading from the lift station timers. Read and record the wastewater level on the staff gage in the equalization tank.
- 6.4.2 Before leaving the plant, read and record reading from the lift station timers and the staff gage in the equalization tank.
- 6.4.3 Change the aeration system for the equalization tanks and sludge holding tank from plant air to blower-supplied air at approximately 1500 hours.
 - 6.4.3.1 Close two blue air supply valves that supply plant air.
 - 6.4.3.2 Close red air supply valve to sludge holding tank.
 - 6.4.3.3 Open blue air supply valve to sludge holding tank.
 - 6.4.3.4 Turn on the equalization tank aeration system blowers.

6.5 Sludge Wasting

- 6.5.1 A properly operating wastewater treatment plant will build biological solids which will routinely have to be wasted from the plant. This section describes generally the procedure for determining when sludge should be wasted.
- 6.5.2 The primary factors used to determine when solids are to be wasted are (1) food to microorganism ratio, (2) sludge age, and (3) sludge volume index (references 3.3 and 3.4).
 - 6.5.2.1 Other factors used to determine when solids are to be wasted and the amount of solids to be wasted are (1) the result of the 30-minute mixed liquor settleability test, (2) mixed liquor suspended solids values, (3) historical operational data, and (4) operator experience.
- 6.5.3 As results of the daily and weekly operational tests become available, the data are entered on the Wastewater Operational Data Form, Attachment 1.
- 6.5.4 When all the operational data are available, the food to microorganism ratio, sludge age, and sludge volume index are calculated, as described in references 3.3 and 3.4 and attachment 1, by the project engineer.
- 6.5.5 The calculated values are compared to ideal operation ranges (see section 6.5.6).
- 6.5.6 Ideal Operating Ranges
 - 6.5.6.1 Food to Microorganism Ratio

0.05 to 0.10

6.5.6.2 Sludge Age

10 to 20 days

6.5.6.3 Sludge Volume Index

80 to 120

6.5.6.4 Mixed Liquor 30-Minute Settleable Solids

200 to 700 ml/L

6.5.6.5 Mixed Liquor Suspended Solids

2,000 to 5,000 mg/L

6.5.7 When the primary factors are out of the ideal range and/or the other factor(s) indicate the need for solids wasting, the procedure described in section 6.6 should be followed.

6.6 Solids Wasting

6.6.1 Close the air valve to the diffusers in the sludge holding tank at least 1 hour before wasting sludge.

6.6.2 Open the valve on the waste sludge line to the sludge holding tank.

6.6.3 Close the valve on the return sludge line to the aeration tank.

6.6.4 Waste solids for approximately 10 minutes or the time specified by the FO EAST project engineer.

6.6.5 Open the valve on the return sludge line to the aeration tank.

6.6.6 Close the valve on the waste sludge line to the sludge holding tank.

6.6.7 Open the air valve to the sludge holding tank to obtain good mixing.

6.6.8 As sludge in the sludge holding tank becomes concentrated, it will be necessary to have the sludge removed by a scavenger truck.

6.6.9 Collect a sample of sludge from the sludge holding tank while aerating and conduct a 30-minute settleability test. When the result of the test indicates that the sludge is concentrated (i.e., the sludge reading is approximately 700 to 900 ml/L), notify the FO EAST unit supervisor or the FO EAST project leader. Arrangements will be made to have a scavenger truck remove the sludge.

Title: WASTEWATER TREATMENT PLANT - GENERAL OPERATING INSTRUCTION

No. _____

Rev. _____

- 6.6.10 When notified that the sludge holding tank is full and the sludge has been concentrated, the unit supervisor will request the services of a scavenger truck.
- 6.6.11 The unit supervisor will fill out Form TVA 11022, Purchase Request, for the desired number of loads of sludge to be removed. Written supervisory authorization from the FO EAST project engineer or section supervisor is required.
- 6.6.12 Mail form TVA 11022 to the Property and Supply Unit (P&S) in Knoxville. In an emergency situation, the form TVA 11022 may be telecopied to P&S.
- 6.6.13 P&S will issue an RD number under an existing contract for the requested number of loads to be removed.
- 6.6.14 The vendor may be telephoned and services requested using the RD number issued by P&S.
- 6.6.15 When the vendor removes the sludge from the sludge holding tank or other tanks, a shipping ticket will be signed by the vendor. The shipping ticket serves as a record of the amount of sludge removed and as a chain-of-custody of the sludge. The vendor is required by contract to dispose of the sludge in a State-approved disposal facility.
- 6.6.16 Copies of the shipping ticket are retained by the wastewater treatment plant operator, FO EAST, and the Watts Bar site environmental manager.

7.0 RECORDS

- 7.1 Records such as plots, Monthly Operators Reports, flow charts, etc., will be forwarded to the FO EAST project engineer for distribution and retention as specified in reference 3.1.
- 7.1.2 The operator shall maintain a log of daily activities.

OPERATION DATA

Station No. _____

Date collected: _____

Field/Lab Data

	Plant				Other
	90° "V" A	90° "V" B	90° "V" C	60° "V" D	Other
Volume of aeration tank-MG (Feet)	0.030	0.030	0.030	0.030	
Flow-MGD					
Inf. BOD-mg/L * Inf. BOD-lbs. a/					
Inf. TSS-mg/L * Inf. TSS-lbs. b/					
Eff. BOD-mg/L Eff. TSS-mg/L					
ML Sett. Solids-ml/L ** c/					
ML Susp. Solids-mg/L * d/					
ML Susp. Solids-lbs. e/					
DO (aeration tank)					
pH (aeration tank)					
Chlorine residual					
Last date solids wasted					
Volume of solids wasted					
Aeration cycle					

Calculations

F/M ratio <u>f/</u>				
sludge age <u>g/</u>				
SVI <u>h/</u>				

* From Lab. data.

** From Oper. log sheet.

a/ BOD (mg/L) x MGD (weir) x 8.34

b/ TSS (mg/L) x MGD (weir) x 8.34

d/ = c/ x Vol. aeration (M.Gal) x 8.34

f/ = a/b

g/ = c/b

h/ = c/d x 1000

Remarks: _____