



Tennessee Valley Authority  
1101 Market Street, LP 3R  
Chattanooga, Tennessee 37402-2801

**R. M. Krich**  
Vice President  
Nuclear Licensing

July 6, 2010

10 CFR 50.4

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 1  
Facility Operating License No. NPF-90  
NRC Docket No. 50-390

**Subject: Notification of National Pollutant Discharge Elimination System Permit Renewal**

- References:
1. TVA Letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 1 - Notification of National Pollution Discharge Elimination System (NPDES) Permit Renewal," dated December 19, 2006
  2. State of Tennessee, Department of Environment and Conservation Letter to TVA, "NPDES Permit No. TN0020168, TVA - Watts Bar Nuclear Plant, Spring City, Rhea County, Tennessee," dated June 4, 2010

The Tennessee Valley Authority (TVA) notified NRC that an application for renewal of National Pollutant Discharge Elimination System (NPDES) Permit No. TN0020168 for the Watts Bar Nuclear Plant site had been submitted to the state of Tennessee (Reference 1). The purpose of this letter is to notify NRC that NPDES Permit No. TN0020168 has been renewed. The renewed permit was provided to TVA via Reference 2 (enclosed). The enclosed copy of the renewed permit is being submitted to the NRC in accordance with Section 3.2, "Reporting Requirements for Changes to, and Renewal of, the NPDES Permit or State Certification," of Appendix B, "Environmental Protection Plan," to Facility Operating License No. NPF-90.

There are no regulatory commitments in this letter. If you have any questions, please contact Kevin Casey, Senior Project Manager, at (423) 751-8523.

Respectfully,

for  
R. M. Krich

cc: See page 2

COOL  
NRC

U.S. Nuclear Regulatory Commission  
Page 2  
July 6, 2010

Enclosure: NPDES Permit No. TN0020168, Issuance Date: June 4, 2010

cc (Enclosure):

NRC Regional Administrator - Region II

NRC Senior Resident Inspector - Watts Bar Nuclear Plant

**Enclosure**

**NPDES Permit No. TN0020168  
Issuance Date: June 4, 2010**



STATE OF TENNESSEE  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

401 CHURCH STREET  
L & C ANNEX 6TH FLOOR  
NASHVILLE TN 37243  
June 4, 2010

Mr. Gordon G Park  
Manager of Environmental Compliance  
Tennessee Valley Authority  
5D Lookout Place  
1101 Market Street  
Chattanooga, TN 37402

Subject: NPDES Permit No. TN0020168  
TVA - Watts Bar Nuclear Plant  
Spring City, Rhea County, Tennessee

Dear Mr. Park:

In accordance with the provisions of the Tennessee Water Quality Control Act, Tennessee Code Annotated (T.C.A.), Sections 69-3-101 through 69-3-120, the Division of Water Pollution Control hereby issues the enclosed NPDES Permit. The continuance and/or reissuance of this NPDES Permit is contingent upon your meeting the conditions and requirements as stated therein.

Please be advised that a petition for permit appeal may be filed, pursuant to T.C.A. Section 69-3-105, subsection (i), by the permit applicant or by any aggrieved person who participated in the public comment period or gave testimony at a formal public hearing whose appeal is based upon any of the issues that were provided to the commissioner in writing during the public comment period or in testimony at a formal public hearing on the permit application. Additionally, for those permits for which the department gives public notice of a draft permit, any permit applicant or aggrieved person may base a permit appeal on any material change to conditions in the final permit from those in the draft, unless the material change has been subject to additional opportunity for public comment. Any petition for permit appeal under this subsection (i) shall be filed with the board within thirty (30) days after public notice of the commissioner's decision to issue or deny the permit.

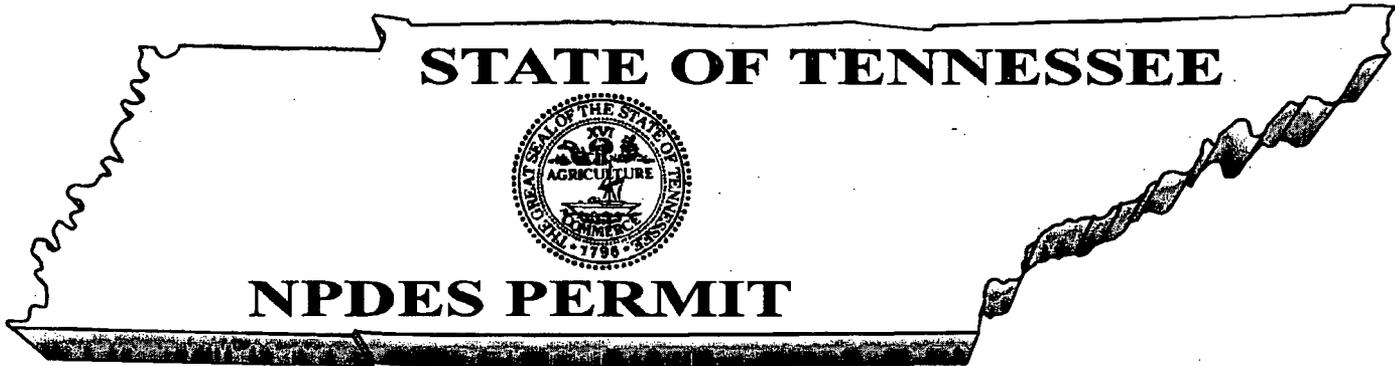
If you have questions, please contact the Division of Water Pollution Control at your local Field Office at 1-888-891-TDEC; or, at this office, please contact Ms. Souraya Fathi at (615) 532-0485 or by E-mail at [Souraya.Fathi@tn.gov](mailto:Souraya.Fathi@tn.gov).

Sincerely,

Vojin Janjic  
Manager, Permit Section  
Division of Water Pollution Control

Enclosure

cc/ec: DWPC, Permit Section & Chattanooga Environmental Field Office  
Ms. Jerri L. Phillips, Environmental Scientist, TVA Watts Bar Nuclear Plant, [jlphillips@tva.gov](mailto:jlphillips@tva.gov)  
Ms. Betsy M. Eiford-Lee, Chemistry/Environmental Manager, [bmeiford-lee@tva.gov](mailto:bmeiford-lee@tva.gov)  
Mr. Michael D. Skaggs, WBN Vice President, TVA - Watts Bar Nuclear Plant, [mdskaggs@tva.gov](mailto:mdskaggs@tva.gov)  
Mr. Darrin J. Hutchison, Chemistry/Environmental Technical Support Manager, Tennessee Valley Authority, PO Box 2000, Spring City, TN 37381  
Ms. Karrie-Jo Robinson Shell, Environmental Engineer, EPA Region 4, [shell.karrie-jo@epa.gov](mailto:shell.karrie-jo@epa.gov)  
Mr. Brian Paddock, Attorney, Save Our Cumberland Mountains (SOCM), [bpaddock@twakes.net](mailto:bpaddock@twakes.net)  
Mr. Barry W. Sulkin, Consultant, Southern Environmental Law Center, 4443 Pecan Valley Road, Nashville, TN 37218  
Ms. Leslie Nale, Plant Manager, TVA, [lnnale@tva.gov](mailto:lnnale@tva.gov)



**No. TN0020168**

Authorization to discharge under the  
National Pollutant Discharge Elimination System (NPDES)

Issued By

**Tennessee Department of Environment and Conservation  
Division of Water Pollution Control  
401 Church Street  
6th Floor, L & C Annex  
Nashville, Tennessee 37243-1534**

Under authority of the Tennessee Water Quality Control Act of 1977 (T.C.A. 69-3-101 et seq.) and the delegation of authority from the United States Environmental Protection Agency under the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 1251, et seq.)

**Discharger: TVA - Watts Bar Nuclear Plant**

is authorized to discharge: **process wastewater, cooling water and storm water runoff from Outfalls 101 and 102, turbine building sump water, alum sludge supernatant, reverse osmosis reject water, drum dewatering water, water purification plant water, and Supplemental Condenser Cooling Water (noncontact) from Outfall 113**

from a facility located: **in Spring City, Rhea County, Tennessee**

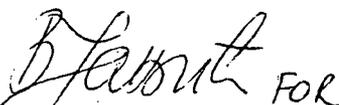
to receiving waters named: **Tennessee River at mile 527.9 (Outfall 101), Tennessee River at mile 527.2 (Outfall 102), and Tennessee River at mile 529.2 (Outfall 113)**

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on: **July 1, 2010**

This permit shall expire on: **December 31, 2011**

Issuance date: **June 4, 2010**

  
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Paul E. Davis, Director  
Division of Water Pollution Control

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7EB 7-6-10

**PART I**

**A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

TVA - Watts Bar Nuclear Plant is authorized to discharge process wastewater, cooling water and storm water to the Tennessee River (Outfalls 101,102, and 113) associated with nuclear electric power generation as described in the Rationale and permit application. These discharges and three internal discharge locations (Outfalls 103 and 107) shall be limited and monitored by the permittee as follows.

TVA Watts Bar Nuclear Plant is authorized to discharge low volume wastewater, noncontact-cooling water, cooling tower blowdown, boiler blowdown water, storm water, and other process and nonprocess wastewater as described in the permit Rationale and application. Outfall 101 discharges through a dual-pipe diffuser to the Tennessee River at mile 527.9. These discharges shall be limited and monitored as specified below:

PERMIT LIMITS						
TVA-Watts Bar Nuclear						
OUTFALL 101						
Cooling Water, Storm Water and Process Wastewater						
EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MONIT. FREQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		Continuous	Recorder <sup>1</sup>
Certification of Instream Flow of 3,500 cfs when required	--		Report as Yes/No		1/Month	Operation Records
pH <sup>2</sup>	Range 6.0 - 9.0				2/Month	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	100.0	--	1/Month	Grab
OIL & GREASE	15.0	--	20.0	--	1/Month	Grab
CHROMIUM, TOTAL	0.2		0.2		WAIVED <sup>6</sup>	Grab
ZINC, TOTAL	1.0		1.0	--	2/Month	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>2,3</sup>	0.10	--	0.10	--	5/Week	Grab <sup>2,3</sup>
TEMPERATURE, Effluent <sup>4</sup>	--	--	35 °C	--	Continuous	Recorder
IC25 <sup>5</sup>	25% Inhibition Concentration shall be $\geq$ 3.3% effluent				2/year	Composite <sup>5</sup>

**There shall be no discharge of PCBs.**

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD). In the event that the continuous flow monitor is out of service, flow monitoring shall be estimated by intake pump logs.

<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> The acceptable methods for analysis of TRC are any methods specified in 40 CFR Part 136.

<sup>4</sup> When the temperature monitoring equipment fails, monitoring will be done once per day. Reasonable and timely effort will be made to restore the temperature recorder to operation as soon as possible. See Part III for further temperature requirement.

<sup>5</sup> See Part III for methodology.

<sup>6</sup> Monitoring for chromium is waived per 40 CFR 122.44 (a)(2)(i). See Rationale for more comments.

Discharges from Outfall 101 are authorized only during periods when the flow in the receiving stream is at a minimum of 3,500 cubic feet per second (cfs) or greater. Compliance with the minimum in-stream flow requirement of 3,500 cubic feet per second shall be certified monthly with the submission of Discharge Monitoring Reports submitted to the Division for this outfall. Records concerning the instream flow shall be maintained and available upon request.

TVA Watts Bar Nuclear Plant is authorized to discharge low volume wastewater, once through condenser cooling water, noncontact cooling water, boiler blowdown water, storm water, and other process and nonprocess wastewater as described in the permit Rationale and application. Discharge is authorized through Outfall 102 to the Tennessee River at mile 527.2. These discharges shall be limited and monitored by the permittee as specified below:

PERMIT LIMITS						
TVA-Watts Bar Nuclear						
OUTFALL 102						
Cooling water, Stormwater runoff and Process Wastewater						
EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		1/Day	Instantaneous
Certification of Instream Flow of 3,500 cfs when required	--		Report as Yes/No		1/Month <sup>5</sup>	Operation Records
pH <sup>2</sup>	Range 6.0 - 9.0				2/Month <sup>6</sup>	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	100.0	--	1/Month <sup>6</sup>	Grab
OIL & GREASE	15.0	--	20.0	--	1/Month <sup>6</sup>	Grab
CHROMIUM, TOTAL	2.0	--	2.0	--	WAVED <sup>6</sup>	Grab
ZINC, TOTAL	1.0	--	1.0	--	2/Month <sup>6</sup>	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>2,3</sup>	0.10	--	0.10	--	5/Week	Grab <sup>2,3</sup>
TEMPERATURE, Effluent	--	--	35° C	--	1/Day	Grab
IC25 <sup>4</sup>	25% Inhibition Concentration shall be ≥3.3% effluent				2/year <sup>4</sup>	Composite <sup>4</sup>

There shall be no discharge of PCBs.

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD).

<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> The acceptable methods for analysis of TRC are any methods specified in 40 CFR Part 136.

<sup>4</sup> Sampling and analysis required only if discharge is operated 30 days or more during the semi-annual periods January through June or July through December and if all toxicity testing requirements have not already been completed for Outfall 101. See Pa

<sup>5</sup> Certification shall be made during any month that a discharge occurs from this outfall.

<sup>6</sup> If there is discharge during 1 or more days from this outfall, sampling is required to comply with the maximum daily limit. If there are two or more separate days of discharge, or a continuous discharge during 5 or more consecutive days from this outfall then one sample is required from that "batch" discharge in order to report the monthly average limit.

<sup>7</sup> Monitoring for chromium is waived per 40 CFR 122.44 (a)(2)(i). See Rationale for more comments.

Additional monitoring requirements and conditions applicable to Outfall 102 include:

Discharge through Outfall 102 (emergency overflow) is permitted only under emergency situations. This includes times when the diffuser pipe system is isolated as a result of diffuser maintenance and other emergency situations to preserve the integrity of the yard holding pond dikes such as in the event of a catastrophic storm event. All reasonable efforts shall be taken to resume normal discharge through Outfall 101 as soon as possible.

TVA Watts Bar Nuclear Plant is authorized to discharge turbine building sump water, alum sludge supernate, R.O. reject water, drum dewatering water, water purification plant water, and storm water through Outfall 103, the Low Volume Waste Pond, an internal monitoring point as described in the Rationale and the permit application. These discharges shall be limited and monitored by the permittee as specified below:

<b>PERMIT LIMITS</b>						
<b>TVA-Watts Bar Nuclear</b>						
<b>OUTFALL 103 (Internal Monitoring Point)</b>						
<b>Low Volume Waste Holding Pond</b>						
<b>EFFLUENT CHARACTERISTIC</b>	<b>EFFLUENT LIMITATIONS</b>				<b>MONITORING REQUIREMENTS</b>	
	<b>MONTHLY</b>		<b>DAILY</b>		<b>MSRMT. FRQNCY.</b>	<b>SAMPLE TYPE</b>
	<b>AVG. CONC. (mg/l)</b>	<b>AVG. AMNT. (lb/day)</b>	<b>MAX. CONC. (mg/l)</b>	<b>MAX. AMNT. (lb/day)</b>		
<b>FLOW</b>	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		Continuous <sup>1</sup>	Recorder
<b>pH<sup>2</sup></b>	Range 6.0 - 9.0				1/Month	Grab
<b>TOTAL SUSPENDED SOLIDS (TSS)</b>	30.0	--	100.0	--	1/Month	Grab
<b>OIL &amp; GREASE</b>	15.0	--	20.0	--	1/Month	Grab

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD).

<sup>2</sup> pH analyses shall be performed within fifteen (15) minutes of sample collection.

TVA Watts Bar Nuclear Plant is authorized to discharge metal cleaning wastewater, turbine building station sump water, diesel generator coolant, intermittent micro-filtered condenser tube cleaning discharges, and storm water through Outfall 107, the Lined and Unlined Ponds, an internal monitoring point as described in the Rationale and permit application. These discharges shall be limited and monitored by the permittee as specified below:

<b>PERMIT LIMITS</b>						
<b><u>TVA-Watts Bar Nuclear</u></b>						
<b>OUTFALL 107 (Internal Monitoring Point)</b>						
<b>Metal Cleaning Wastewater</b>						
<b>EFFLUENT CHARACTERISTIC</b>	<b>EFFLUENT LIMITATIONS</b>				<b>MONITORING REQUIREMENTS</b>	
	<b>MONTHLY</b>		<b>DAILY</b>		<b>MSRMNT. FRQNCY.</b>	<b>SAMPLE TYPE</b>
	<b>AVG. CONC. (mg/l)</b>	<b>AVG. AMNT. (lb/day)</b>	<b>MAX. CONC. (mg/l)</b>	<b>MAX. AMNT. (lb/day)</b>		
<b>FLOW</b>	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		1/Batch <sup>1</sup>	Calculated
<b>pH<sup>2</sup></b>	Report		Report		1/Batch <sup>2</sup>	Grab
<b>TOTAL SUSPENDED SOLIDS (TSS)</b>	30.0	--	30.0	--	1/Batch	Grab
<b>OIL &amp; GREASE</b>	15.0	--	15.0	--	1/Batch	Grab
<b>COPPER, TOTAL RECOVERABLE</b>	1.0	--	1.0	--	1/Batch	Grab
<b>IRON, TOTAL RECOVERABLE</b>	1.0	--	1.0	--	1/Batch	Grab
<b>PHOSPHORUS, TOTAL<sup>3</sup></b>	1.0	--	1.0	--	1/Batch	Grab

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD) for each batch discharge. If a batch discharge extends for more than a 24-hour period, flow

<sup>2</sup> pH analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> Sampling for phosphorus is required only when metal cleaning chemicals containing phosphorus are being used.

PCB 7-6-10

TVA Watts Bar Nuclear Plant is authorized to discharge supplemental condenser cooling water through Outfall 113 to the Tennessee River at mile 529.2 as described in the Rationale and permit application. These discharges shall be limited and monitored by the permittee as specified below:

PERMIT LIMITS						
TVA-Watts Bar Nuclear						
OUTFALL 113						
Supplemental Condenser Cooling Water						
EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		PERMIT FREQUENCY	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		Continuous	Recorder
Certification of Instream Flow of 3,500 cfs when required	--		Report as Yes/No		1/Month	Operation Records
pH <sup>2</sup>	Range 6.0 - 9.0				1/Month	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	100.0	--	1/Month	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>3,3,6</sup>	0.092	--	0.158	--	1/Month <sup>6</sup>	Grab
DISSOLVED OXYGEN (D.O.)	--	--	Report Min.	--	1/Month	Grab
TEMPERATURE, Effluent	Report Effluent Temperature <sup>4</sup>				Hourly	Recorder <sup>7</sup>
TEMPERATURE, Edge of Mixing Zone	--	--	30.5 °C	--	Hourly	Recorder <sup>7</sup>
TEMPERATURE, Rise Upstream to Downstream	--	--	3 °C	--	Hourly	Calculated <sup>7</sup>
TEMPERATURE, Rate of Change, °C per hour	--	--	2 °C/Hour	--	Hourly	Calculated <sup>7</sup>
TEMPERATURE, Receiving Stream Bottom	--	--	33.5 °C	--	Hourly	Recorded
IC25 <sup>5</sup>	25% Inhibition Concentration shall be ≥8% effluent				Semi-annual	Composite <sup>5</sup>

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD).  
<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.  
<sup>3</sup> The acceptable methods for analysis of TRC are any methods specified in 40 CFR Part 136.  
<sup>4</sup> See text below table for requirements.  
<sup>5</sup> See Part III for methodology.  
<sup>6</sup> Sampling for TRC shall be 5/Week during periods when the Supplemental Condenser Cooling Water (SCCW) system is in operation.  
<sup>7</sup> See additional (buleted) comments in permit. Begins on page 8 of 27.

PERMIT LIMITS FOR OUTFALL 114	
TVA-Watts Bar Nuclear	
Supplemental Condenser Cooling Water Intake Screen Backwash water	
1.) No numerical monitoring limitations are applied to this outfall.	

JCB 7-6-10

Additional limitations, conditions, and monitoring requirements applicable to Outfalls 101, 102, 103, 107, and 113 include:

There shall be no distinctly visible floating scum, oil or other matter contained in the wastewater discharge. The wastewater discharge must not cause an objectionable color contrast in the receiving stream.

The wastewater discharge shall not contain pollutants in quantities that will be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream.

Sludge or any other material removed by any treatment works must be disposed of in a manner, which prevents its entrance into, or pollution of any surface or subsurface waters. Additionally, the disposal of such sludge or other material must be in compliance with the Tennessee Solid Waste Disposal Act, TCA 68-31-101 et seq. and the Tennessee Hazardous Waste Management Act, TCA 68-46-101 et seq.

For the purpose of evaluating Total Residual Chlorine/Total Residual Oxidant (TRC/TRO) as required in this permit, analyses shall include any residual bromine with results reported as chlorine, i.e., one test shall be used for situations where combinations of chlorine and bromine are used. The permittee shall sample the effluent when chemical additives are used resulting in TRC/TRO pollutants in the discharge as stipulated in the preceding permit limits tables.

For batch discharges the monitoring and reporting of measurements of FLOW, the "Monthly Avg." shall be the total flow volume during the reporting period divided by the number of calendar days in that period. The "Daily Max." shall be the total flow volume for the day with the greatest amount of discharge during the reporting period. Example: 3 discharges of 15,000 gallons/day and 1 discharge of 20,000 gallons/day during a 1-month period result in a Monthly Avg. of 65,000 gallons/30 days, or 2,166 gallons/day (to be reported as 0.002166 MGD). The Daily Max to be reported for this example is 20,000 gallons/day or 0.020 MGD.

There shall be no discharge of PCB. With regard to PCB sampling, the permittee will have the opportunity to conduct additional tests, as necessary, to establish the existence of any PCBs in the effluent if they exist. The results of these additional tests and any conclusions drawn must be submitted to the Division within fifteen (15) days along with the monthly discharge monitoring report. The Division shall maintain the exclusive determination of the validity of the additional tests and any conclusions to be drawn from them regarding the possibility of matrix interferences, or the need for additional monitoring. The decision of the division in this matter shall be final.

Priority Pollutants contained in chemicals added for cooling tower maintenance except for zinc, shall not be discharged in cooling tower blowdown in amounts that are detectable by analytical methods in 40 CFR Part 136.

The use of water treatment chemicals containing chromium is prohibited under this permit. Chromium monitoring is waived by authority of 40 CFR 122.44 (a)(2)(i), where application sample results demonstrated no Cr pollutant discharged from these outfalls (101 and 102).

JCB 7-6-10

Discharges are authorized for Outfall 101 only during periods when flow in the receiving stream is at a minimum of 3,500 cubic feet per second. All changes to the flow rate of the SCCW discharge (Outfall 113) shall be done during periods when flow in the receiving waters is at a minimum of 3,500 Cubic feet per second. This includes periods of start-up, shutdown as well as other similar abrupt flow rate changes of the SCCW. When thermally loaded effluent is discharged through Outfall 102, all reasonable efforts shall be made to keep flow to a minimum of 3500 cubic feet per second in the receiving waters. If such flow is absent, the permittee shall verify protection of water quality by taking instream temperature measurements. Compliance with flow requirements for 3,500 cfs flow instream for Outfalls 101, 102 and 113 discharges shall be certified monthly with the submission of Discharge Monitoring Reports submitted to the Division for these outfalls. Records concerning the instream flow shall be maintained and available upon request.

The thermal mixing zones for Outfall 113 remain unchanged from the previous permit (see diagram in Appendix 5H). The discharge from Outfall 113 shall be limited and monitored by the permittee as specified below:

- In recognition of the dynamic behavior of the thermal effluent in the river, monitoring shall be required for an active mixing zone and a passive mixing zone as described in the permit rationale. The passive mixing zone includes the following dimensions: (1) a maximum width of from bank to bank in the river, and (2) a maximum length of 1000 feet downstream of the outfall. It has been documented that there is a zone of (cool water) refuge in the bottom layer to allow for fish and other species to pass below the thermal plume. Compliance with the requirements below will be established for the active mixing zone at a maximum length of 2000 feet downstream of the outfall.
- Compliance for the passive mixing zone shall be by two instream temperature surveys, one conducted during winter ambient conditions and one during summer ambient conditions. The surveys shall be performed while the SCCW system is thermally loaded with low river flow conditions and shall include temperature profiles at a sufficient number of locations across the downstream edge of the passive mixing zone to locate the effluent plume. The measurements shall be compared with the results from the thermal plume model and shall be summarized in a report to the division semiannually.
- Compliance with TEMPERATURE, Edge of Mixing zone; TEMPERATURE, Rise Upstream to Downstream; and TEMPERATURE, Rate of Change shall be applicable at the edge of the active mixing zone.
- Daily maximum temperatures for the TEMPERATURE, effluent; TEMPERATURE, Edge of Mixing zone; TEMPERATURE, Rise Upstream to Downstream; and TEMPERATURE, Rate of Change shall be determined from 1-hour average values. The average values shall be calculated every 15 minutes using the current and previous four 15-minute values, thus creating a rolling average.
- As demonstrated by monitoring at the edge of the active mixing zone, the maximum temperature shall not exceed 30.5°C (except as a result of natural causes), the maximum change in temperature relative to the upstream control point shall not

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exceed 3°C (except as a result of natural causes), and the maximum temperature rate of change shall not exceed 2°C per hour (except as a result of natural causes).

- The upstream ambient river temperature (control point) for determining the TEMPERATURE, Rise Upstream to Downstream for the active mixing zone shall be determined by sensors positioned in the discharge from the powerhouse at Watts Bar Dam. The upstream ambient river temperature shall be determined by the first sensor at or below a depth of 5 feet. This monitor shall also be used for ambient river temperature for the passive mixing zone surveys.
- The river temperature for determining the TEMPERATURE, Edge of Mixing Zone and TEMPERATURE, rate-of-change shall be by two floating water temperature stations at the downstream edge of the active mixing zone. One station shall be located near the right-hand shoreline of the river (facing downstream) and one station shall be located near the center of the river. At each station, the water temperature at the 5-foot depth shall be determined as the average of sensors at three depths—3 feet, 5 feet, and 7 feet. The downstream river temperature and temperature rate of change shall be determined by the average temperature of the two floating water temperature stations.
- Compliance with TEMPERATURE, Receiving Stream Bottom shall be applicable at the edge of a square mussel relocation zone located on the bottom of the river at the outfall and having a side dimension not less than 150 feet. The temperature shall be determined by four sensors located along the periphery of the mussel relocation zone.
- The daily maximum value for the TEMPERATURE, Receiving Stream Bottom shall be determined from 15-minute values. The temperature of the 15-minute value shall be determined as the maximum of the four sensors required for the mussel relocation zone. The temperature shall be reported on the Discharge Monitoring Reports as the daily maximum (highest value for a day) and monthly average value (average of all four monitors).

## B. MONITORING PROCEDURES

### 1. Representative Sampling

Samples and measurements taken in compliance with the monitoring requirements specified herein shall be representative of the volume and nature of the monitored discharge, and shall be taken after treatment and prior to mixing with uncontaminated storm water runoff or the receiving stream.

The permittee shall maintain a capability for composite sampling of Outfall 101 discharges. Temporary or mobile equipment may be used for this since the sampling protocol instituted does not utilize standard sample collection equipment to collect the samples. TVA shall ensure sampling protocol conforms to 40 CFR 136 procedures.

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## 2. Sampling Frequency

If there is a discharge from a permitted outfall on any given day during the monitoring period, the permittee must sample and report the results of analyses accordingly, and the permittee should not mark the 'No Discharge' box on the Discharge Monitoring Report form.

## 3. Test Procedures

- a. Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304 (h) of the Clean Water Act (the "Act"), as amended, under which such procedures may be required.
- b. Unless otherwise noted in the permit, all pollutant parameters shall be determined according to methods prescribed in Title 40, CFR, Part 136, as amended, promulgated pursuant to Section 304 (h) of the Act.
- c. Test Method for E. Coli

Because 40 CFR Part 136 does not include test methods for measuring E. coli in effluent matrices, the Division has added a notation on the limits table page requiring the use of the methods either proposed or added by the EPA to Part 136 for measuring E. coli in ambient waters.

The Division has no basis to believe that the proposed or added methods for ambient waters are inappropriate for treated sanitary wastewater effluent. The Division prefers measurement of the E. coli in treated effluent to the measurement of the ambient E. coli up and downstream of the outfall. Comparison of upstream to downstream ambient monitoring data can fail to conclusively characterize a wastewater effluent. Additionally, meaningful comparison of E. coli in the treated effluent to E. coli in receiving stream should be based on use of the same test method. Analyzing the effluent using ambient test methods characterizes the effluent in terms that shall allow comparison to future data gathered from assessments of ambient pathogens.

## 4. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. The exact place, date and time of sampling;
- b. The exact person(s) collecting samples;
- c. The dates and times the analyses were performed;
- d. The person(s) or laboratory who performed the analyses;
- e. The analytical techniques or methods used, and;
- f. The results of all required analyses.

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## 5. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation shall be retained for a minimum of three (3) years, or longer, if requested by the Division of Water Pollution Control.

## C. DEFINITIONS

The **Daily Maximum Concentration** is a limitation on the average concentration, in milligrams per liter (mg/L), of the discharge during any calendar day. When a proportional-to-flow composite sampling device is used, the daily concentration is the concentration of that 24-hour composite; when other sampling means are used, the daily concentration is the arithmetic mean of the concentrations of equal volume samples collected during any calendar day or sampling period.

The **Monthly Average Concentration**, a limitation on the discharge concentration, in milligrams per liter (mg/L), is the arithmetic mean of all daily concentrations determined in a one-month period. For the purpose of this definition, a frequency of 2/Month is representative of 2 separate daily samples, each sample having been collected on a separate day during the monitoring period.

The **Monthly Average Amount**, a discharge limitation measured in pounds per day (lb/day), is the total amount of any pollutant in the discharge by weight during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by a permit, the monthly average amount shall be determined by the summation of all the measured daily discharges by weight divided by the number of days during the calendar month when the measurements were made. For the purpose of this definition, a frequency of 2/Month is representative of 2 separate daily samples, each sample having been collected on a separate day during the monitoring period.

The **Daily Maximum Amount**, is a limitation measured in pounds per day (lb/day), on the total amount of any pollutant in the discharge by weight during any calendar day.

The **Instantaneous Concentration** is a limitation on the concentration, in milligrams per liter (mg/L), of any pollutant contained in the discharge determined from a grab sample taken at any point in time.

A **Composite Sample**, for the purposes of this permit, is a sample collected continuously over a period of 24-hours at a rate proportional to the flow. Composite sample should be a combination of at least 8 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

A **Grab Sample**, for the purposes of this permit, is defined as a single effluent sample of at least 100 milliliters (sample volumes <100 milliliters are allowed when specified per standard methods; latest edition) collected at a randomly selected time over a period not exceeding 15 minutes. The sample(s) shall be collected at the period(s) most representative of the total discharge.

For the purpose of this permit, a **Calendar Day** is defined as any 24-hour period.

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For the purpose of this permit, a **Quarter** is defined as any one of the following three month periods: January 1 through March 31, April 1 through June 30, July 1 through September 30, or October 1 through December 31.

For the purpose of this permit, **Semi-annually** means the same as "once every six months." Measurements of the effluent characteristics concentrations may be made anytime during a 6 month period beginning from the issuance date of this permit so long as the second set of measurements for a given 12 month period are made approximately 6 months subsequent to that time, if feasible.

For the purpose of this permit, **Annually** is defined as a monitoring frequency of once every twelve (12) months beginning with the date of issuance of this permit so long as the following set of measurements for a given 12 month period are made approximately 12 months subsequent to that time.

#### **D. REPORTING**

##### **1. Monitoring Results**

Monitoring results shall be recorded monthly and submitted monthly using Discharge Monitoring Report (DMR) forms supplied by the Division of Water Pollution Control or comparable forms provided by the permittee, and approved by the Division of Water Pollution Control. Submittals shall be postmarked no later than 15 days after the completion of the reporting period. The top two copies of each report are to be submitted. A copy should be retained for the permittee's files. DMRs and any communication regarding compliance with the conditions of this permit must be sent to:

**TENNESSEE DEPT. OF ENVIRONMENT & CONSERVATION  
DIVISION OF WATER POLLUTION CONTROL  
COMPLIANCE REVIEW SECTION  
401 CHURCH STREET  
L & C ANNEX 6TH FLOOR  
NASHVILLE TN 37243-1534**

The first DMR is due on the fifteenth of the month following permit effectiveness.

DMRs and any other information or report must be signed and certified by a responsible corporate officer as defined in 40 CFR 122.22, a general partner or proprietor, or a principal municipal executive officer or ranking elected official, or his duly authorized representative. Such authorization must be submitted in writing and must explain the duties and responsibilities of the authorized representative.

The electronic submission of DMRs shall be accepted only if approved in writing by the division. For purposes of determining compliance with this permit, data submitted in electronic format is legally equivalent to data submitted on signed and certified DMR forms.

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## **2. Additional Monitoring by Permittee**

If the permittee monitors any pollutant specifically limited by this permit more frequently than required at the location(s) designated, using approved analytical methods as specified herein, the results of such monitoring shall be included in the calculation and reporting of the values required in the DMR form. Such increased frequency shall also be indicated on the form.

## **3. Falsifying Results and/or Reports**

Knowingly making any false statement on any report required by this permit or falsifying any result may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Water Pollution Control Act, as amended, and in Section 69-3-115 of the Tennessee Water Quality Control Act.

## **4. Outlier Data**

Outlier data include analytical results that are probably false. The validity of results is based on operational knowledge and a properly implemented quality assurance program. False results may include laboratory artifacts, potential sample tampering, broken or suspect sample containers, sample contamination or similar demonstrated quality control flaw.

Outlier data are identified through a properly implemented quality assurance program, and according to ASTM standards (e.g. Grubbs Test, 'h' and 'k' statistics). Furthermore, outliers should be verified, corrected, or removed, based on further inquiries into the matter. If an outlier was verified (through repeated testing and/or analysis), it should remain in the preliminary data set. If an outlier resulted from a transcription or similar clerical error, it should be corrected and subsequently reported.

Therefore, only if an outlier was associated with problems in the collection or analysis of the samples, and as such does not conform with the Guidelines Establishing Test Procedures for the Analysis of Pollutants (40 CFR §136), it can be removed from the data set and not reported on the Discharge Monitoring Report forms (DMRs). Otherwise, all results (including monitoring of pollutants more frequently than required at the location(s) designated, using approved analytical methods as specified in the permit) should be included in the calculation and reporting of the values required in the DMR form. The permittee is encouraged to use "comment" section of the DMR form (or attach additional pages), in order to explain any potential outliers or dubious results.

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**PART II**

**A. GENERAL PROVISIONS**

**1. Duty to Reapply**

Permittee is not authorized to discharge after the expiration date of this permit. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information and forms as are required to the Director of Water Pollution Control (the "Director") no later than 180 days prior to the expiration date. Such applications must be properly signed and certified.

**2. Right of Entry**

The permittee shall allow the Director, the Regional Administrator of the U.S. Environmental Protection Agency, or their authorized representatives, upon the presentation of credentials:

- a. To enter upon the permittee's premises where an effluent source is located or where records are required to be kept under the terms and conditions of this permit, and at reasonable times to copy these records;
- b. To inspect at reasonable times any monitoring equipment or method or any collection, treatment, pollution management, or discharge facilities required under this permit; and
- c. To sample at reasonable times any discharge of pollutants.

**3. Availability of Reports**

Except for data determined to be confidential under Section 308 of the Federal Water Pollution Control Act, as amended, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division of Water Pollution Control. As required by the Federal Act, effluent data shall not be considered confidential.

**4. Proper Operation and Maintenance**

- a. The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory and process controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. Backup continuous pH and flow monitoring equipment are not required.
- b. Dilution water shall not be added to comply with effluent requirements to achieve BCT, BPT, BAT and or other technology-based effluent limitations such as those in State of Tennessee Rule 1200-4-5-.03.

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## 5. Treatment Facility Failure

The permittee, in order to maintain compliance with this permit, shall control production, all discharges, or both, upon reduction, loss, or failure of the treatment facility, until the facility is restored or an alternative method of treatment is provided. This requirement applies in such situations as the reduction, loss, or failure of the primary source of power.

## 6. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

## 7. Severability

The provisions of this permit are severable. If any provision of this permit due to any circumstance, is held invalid, then the application of such provision to other circumstances and to the remainder of this permit shall not be affected thereby.

## 8. Other Information

If the permittee becomes aware that he failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, then he shall promptly submit such facts or information.

## B. CHANGES AFFECTING THE PERMIT

### 1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

- a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
- b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).

### 2. Permit Modification, Revocation, or Termination

- a. This permit may be modified, revoked and reissued, or terminated for cause as described in 40 CFR 122.62 and 122.64, Federal Register, Volume 49, No. 188 (Wednesday, September 26, 1984), as amended.
- b. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance

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with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

c. If any applicable effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established for any toxic pollutant under Section 307(a) of the Federal Water Pollution Control Act, as amended, the Director shall modify or revoke and reissue the permit to conform to the prohibition or to the effluent standard, providing that the effluent standard is more stringent than the limitation in the permit on the toxic pollutant. The permittee shall comply with these effluent standards or prohibitions within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified or revoked and reissued to incorporate the requirement.

d. The filing of a request by the permittee for a modification, revocation, reissuance, termination, or notification of planned changes or anticipated noncompliance does not halt any permit condition.

### 3. Change of Ownership

This permit may be transferred to another party (provided there are neither modifications to the facility or its operations, nor any other changes which might affect the permit limits and conditions contained in the permit) by the permittee if:

- a. The permittee notifies the Director of the proposed transfer at least 30 days in advance of the proposed transfer date;
- b. The notice includes a written agreement between the existing and new permittee's containing a specified date for transfer of permit responsibility, coverage, and liability between them; and
- c. The Director, within 30 days, does not notify the current permittee and the new permittee of his intent to modify, revoke or reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.

Pursuant to the requirements of 40 CFR 122.61, concerning transfer of ownership, the permittee must provide the following information to the division in their formal notice of intent to transfer ownership: 1) the NPDES permit number of the subject permit; 2) the effective date of the proposed transfer; 3) the name and address of the transferor; 4) the name and address of the transferee; 5) the names of the responsible parties for both the transferor and transferee; 6) a statement that the transferee assumes responsibility for the subject NPDES permit; 7) a statement that the transferor relinquishes responsibility for the subject NPDES permit; 8) the signatures of the responsible parties for both the transferor and transferee pursuant to the requirements of 40 CFR 122.22(a), "Signatories to permit applications"; and, 9) a statement regarding any proposed modifications to the facility, its operations, or any other changes which might affect the permit limits and conditions contained in the permit.

### 4. Change of Mailing Address

The permittee shall promptly provide to the Director written notice of any change of mailing address. In the absence of such notice the original address of the permittee shall be assumed to be correct.

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## C. NONCOMPLIANCE

### 1. Effect of Noncompliance

All discharges shall be consistent with the terms and conditions of this permit. Any permit noncompliance constitutes a violation of applicable State and Federal laws and is grounds for enforcement action, permit termination, permit modification, or denial of permit reissuance.

### 2. Reporting of Noncompliance

#### a. 24-Hour Reporting

In the case of any noncompliance which could cause a threat to public drinking supplies, or any other discharge which could constitute a threat to human health or the environment, the required notice of non-compliance shall be provided to the Division of Water Pollution Control in the appropriate Environmental Assistance Center within 24-hours from the time the permittee becomes aware of the circumstances. (The Environmental Assistance Center should be contacted for names and phone numbers of environmental response personnel).

A written submission must be provided within five days of the time the permittee becomes aware of the circumstances unless this requirement is waived by the Director on a case-by-case basis. The permittee shall provide the Director with the following information:

- i. A description of the discharge and cause of noncompliance;
- ii. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and
- iii. The steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

#### b. Scheduled Reporting

For instances of noncompliance, which are not reported under subparagraph 2.a. above, the permittee shall report the noncompliance on the Discharge Monitoring Report. The report shall contain all information concerning the steps taken, or planned, to reduce, eliminate, and prevent recurrence of the violation and the anticipated time the violation is expected to continue.

### 3. Overflow

- a. "**Overflow**," means the discharge to land or water of wastes from any portion of the collection, transmission, or treatment system other than through permitted outfalls.
- b. Overflows are prohibited.

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- c. The permittee shall operate the collection system so as to avoid overflows. No new or additional flows shall be added upstream of any point in the collection system, which experiences chronic overflows (greater than 5 events per year) or would otherwise overload any portion of the system.
- d. Unless there is specific enforcement action to the contrary, the permittee is relieved of this requirement after: 1) an authorized representative of the Commissioner of the Department of Environment and Conservation has approved an engineering report and construction plans and specifications prepared in accordance with accepted engineering practices for correction of the problem; 2) the correction work is underway; and 3) the cumulative, peak-design, flows potentially added from new connections and line extensions upstream of any chronic overflow point are less than or proportional to the amount of inflow and infiltration removal documented upstream of that point. The inflow and infiltration reduction must be measured by the permittee using practices that are customary in the environmental engineering field and reported in an attachment to a Monthly Operating Report submitted to the local TDEC Environmental Assistance Center. The data measurement period shall be sufficient to account for seasonal rainfall patterns and seasonal groundwater table elevations.
- e. In the event that more than five (5) overflows have occurred from a single point in the collection system for reasons that may not warrant the self-imposed moratorium or completion of the actions identified in this paragraph, the permittee may request a meeting with the Division of Water Pollution Control EAC staff to petition for a waiver based on mitigating evidence.

#### 4. Upset

- a. "**Upset**," means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
- b. An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence that:
  - i. An upset occurred and that the permittee can identify the cause(s) of the upset;
  - ii. The permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;
  - iii. The permittee submitted information required under "Reporting of Noncompliance" within 24-hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days); and

- iv. The permittee complied with any remedial measures required under "Adverse Impact."

## 5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

## 6. Bypass

- a. "**Bypass**" is the intentional diversion of wastewater away from any portion of a treatment facility. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which would cause them to become inoperable, or substantial and permanent loss of natural resources, which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
- b. Bypasses are prohibited unless the following 3 conditions are met:
- i. The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;
  - ii. There are not feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass, which occurred during normal periods of equipment downtime or preventative maintenance;
  - iii. The permittee submits notice of an unanticipated bypass to the Division of Water Pollution Control in the appropriate environmental assistance center within 24-hours of becoming aware of the bypass (if this information is provided orally, a written submission must be provided within five days). When the need for the bypass is foreseeable, prior notification shall be submitted to the Director, if possible, at least 10 days before the date of the bypass.
- c. Bypasses not exceeding limitations are allowed **only** if the bypass is necessary for essential maintenance to assure efficient operation. All other bypasses are prohibited. Allowable bypasses not exceeding limitations are not subject to the reporting requirements of 6.b.iii, above.

## 7. Washout

- a. For domestic wastewater plants only, a "washout" shall be defined as loss of Mixed Liquor Suspended Solids (MLSS) of 30.00% or more. This refers to the MLSS in the

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aeration basin(s) only. This does not include MLSS decrease due to solids wasting to the sludge disposal system. A washout can be caused by improper operation or from peak flows due to infiltration and inflow.

- b. A washout is prohibited. If a washout occurs, the permittee must report the incident to the Division of Water Pollution Control in the appropriate Environmental Assistance Center within 24-hours by telephone. A written submission must be provided within 5 days. The washout must be noted on the discharge monitoring report. Each day of a washout is a separate violation.

#### D. LIABILITIES

##### 1. Civil and Criminal Liability

Except as provided in permit conditions for "Bypassing," "Overflow," and "Upset," nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Notwithstanding this permit, the permittee shall remain liable for any damages sustained by the State of Tennessee, including but not limited to fish kills and losses of aquatic life and/or wildlife, as a result of the discharge of wastewater to any surface or subsurface waters. Additionally, notwithstanding this Permit, it shall be the responsibility of the permittee to conduct its wastewater treatment and/or discharge activities in a manner such that public or private nuisances or health hazards shall not be created.

##### 2. Liability Under State Law

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or the Federal Water Pollution Control Act, as amended.

### PART III

#### OTHER REQUIREMENTS

##### A. TOXIC POLLUTANTS

The permittee shall notify the Division of Water Pollution Control as soon as it knows or has reason to believe:

1. That any activity has occurred or will occur which would result in the discharge on a routine or frequent basis, of any toxic substance(s) (listed at 40 CFR 122, Appendix D, Table II and III) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":
  - a. One hundred micrograms per liter (100 ug/l);

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- b. Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
  - c. Five (5) times the maximum concentration value reported for that pollutant(s) in the permit application in accordance with 122.21(g)(7); or
  - d. The level established by the Director in accordance with 122.44(f).
2. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":
- a. Five hundred micrograms per liter (500 ug/l);
  - b. One milligram per liter (1 mg/L) for antimony;
  - c. Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 122.21(g)(7); or
  - d. The level established by the Director in accordance with 122.44(f).

**B. REOPENER CLAUSE**

If an applicable standard or limitation is promulgated under Sections 301(b)(2)(C) and (D), 304(B)(2), and 307(a)(2) and that effluent standard or limitation is more stringent than any effluent limitation in the permit or controls a pollutant not limited in the permit, the permit shall be promptly modified or revoked and reissued to conform to that effluent standard or limitation.

**C. PLACEMENT OF SIGNS**

Within sixty (60) days of the effective date of this permit, the permittee shall place and maintain a sign at each outfall and any bypass/overflow point in the collection system. For the purposes of this requirement, any bypass/overflow point that has discharged five (5) or more times in the last year must be so posted. The sign(s) should be clearly visible to the public from the bank and the receiving stream or from the nearest public property/right-of-way, if applicable. The minimum sign size should be two feet by two feet (2' x 2') with one-inch (1") letters. The sign should be made of durable material and have a white background with black letters.

The sign(s) are to provide notice to the public as to the nature of the discharge and, in the case of the permitted outfalls, that the discharge is regulated by the Tennessee Department of Environment and Conservation, Division of Water Pollution Control. The following is given as an example of the minimal amount of information that must be included on the sign:

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**TREATED INDUSTRIAL WASTEWATER and STORM WATER RUNOFF**  
**TVA - Watts Bar Nuclear Plant**  
**(Permittee's Phone Number)**  
**NPDES Permit NO. TN0020168**  
**TENNESSEE DIVISION OF WATER POLLUTION CONTROL**  
**1-888-891-8332 ENVIRONMENTAL ASSISTANCE CENTER - CHATTANOOGA**

**D. ANTIDegradation**

Pursuant to the Rules of the Tennessee Department of Environment and Conservation, Chapter 1200-4-3-.06, titled "Tennessee Antidegradation Statement," and in consideration of the Department's directive in attaining the greatest degree of effluent reduction achievable in municipal, industrial, and other wastes, the permittee shall further be required, pursuant to the terms and conditions of this permit, to comply with the effluent limitations and schedules of compliance required to implement applicable water quality standards, to comply with a State Water Quality Plan or other State or Federal laws or regulations, or where practicable, to comply with a standard permitting no discharge of pollutants.

**E. BIOMONITORING REQUIREMENTS, CHRONIC**

The permittee shall conduct a 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test and a 7-Day Fathead Minnow (*Pimephales promelas*) Larval Survival and Growth Test on the same samples of final effluent from Outfalls 101, 102, and 113.

The measured endpoint for toxicity shall be the inhibition concentration causing 25% reduction (IC25) in survival, reproduction, or growth of the test organisms. The IC25 shall be determined based on a 25% reduction as compared to the controls. The average reproduction and growth responses shall be determined based on the number of *Ceriodaphnia dubia* or *Pimephales promelas* larvae used to initiate the test. A separate statistical analysis based on survival information is not required.

Test shall be conducted and its results reported based on appropriate replicates of a total of five serial dilutions and a control, using the percent effluent dilutions as presented in the following table:

Outfalls 101 & 102					
Serial Dilutions for Whole Effluent Toxicity (WET) Testing					
4 X PL	2 X PL	Permit Limit (PL)	0.50 X PL	0.25 X PL	Control
% effluent					
13.2	6.6	3.3	1.7	0.83	0

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Outfall 113					
Serial Dilutions for Whole Effluent Toxicity (WET) Testing					
4 X PL	2 X PL	Permit Limit (PL)	0.50 X PL	0.25 X PL	Control
% effluent					
32	16	8	4	2	0

The dilution/control water used shall be a moderately hard water as described in Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013 (or the most current edition). Results from a chronic standard reference toxicant quality assurance test for each species tested shall be submitted with the discharge monitoring report. Reference toxicant tests shall be conducted as required in EPA-821-R-02-013 (or the most current edition). Additionally, the analysis of this multi-concentration test shall include review of the concentration-response relationship to ensure that calculated test results are interpreted appropriately.

Toxicity will be demonstrated if the IC25 is less than the permit limit indicated for each outfall in the above table(s). Toxicity demonstrated by the tests specified herein constitutes a violation of this permit. However, if raw water intake samples (tested concurrently with the effluent samples) are shown to be toxic enough to represent a test failure (100 percent samples statistically less than controls using t-tests and minnow growth or daphnid reproduction is 25 percent less than controls) and if effluent toxicity is not statistically greater than calculated intake toxicity, the effluent toxicity test in question will be considered invalid. In the event these two above described conditions occur, the toxicity test shall be repeated according to the schedule requirements for test failure. Effluent toxicity that is not consistent with the intake toxicity conditions specified above constitutes a violation of this permit. If pathogens are demonstrated to be the source of toxicity to *Pimephales promelas* in the intake water, the permittee may be allowed to treat effluent samples for toxicity testing on *Pimephales promelas* with UV radiation only in accordance with prior written approval from the Division.

All tests will be conducted using a minimum of three 24-hour flow-proportionate composite samples of final effluent (e.g., collected on days 1, 3 and 5). If, in any control more than 20% of the test organisms die in 7 days, the test (control and effluent) is considered invalid and the test shall be repeated within 30 days of the date the initial test is invalidated. Furthermore, if the results do not meet the acceptability criteria of section 4.9.1, EPA-821-R-02-013 (or the most current edition), or if the required concentration-response review fails to yield a valid relationship per guidance contained in Method Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing, EPA-821-B-00-004 (or the most current edition), that test shall be repeated. Any test initiated but terminated before completion must also be reported along with a complete explanation for the termination.

The toxicity tests specified herein shall be conducted semi-annually (2/Year) for Outfalls 101, 102, and 113 and begin no later than 90 days from the effective date of this permit.

**In the event of a test failure**, the permittee must start a follow-up test within 2 weeks and submit results from a follow-up test within 30 days from obtaining initial WET testing results. The follow-up test must be conducted using the same serial dilutions as presented in the

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corresponding table(s) above. **The follow-up test will not negate an initial failed test. In addition, the failure of a follow-up test will constitute a separate permit violation, which must also be reported.**

In the event of 2 consecutive test failures or 3 test failures within a 12 month period for the same outfall, the permittee must initiate a Toxicity Identification Evaluation/Toxicity Reduction Evaluation (TIE/TRE) study within 30 days and so notify the Division by letter. This notification shall include a schedule of activities for the initial investigation of that outfall. **During the term of the TIE/TRE study, the frequency of biomonitoring shall be once every three months.** Additionally, the permittee shall submit progress reports once every three months throughout the term of the TIE/TRE study. The toxicity must be reduced to allowable limits for that outfall within 2 years of initiation of the TIE/TRE study. Subsequent to the results obtained from the TIE/TRE studies, the permittee may request an extension of the TIE/TRE study period if necessary to conduct further analyses. The final determination of any extension period will be made at the discretion of the Division.

The TIE/TRE study may be terminated at any time upon the completion and submission of 2 consecutive tests (for the same outfall) demonstrating compliance. Following the completion of TIE/TRE study, the frequency of monitoring will return to a regular schedule, as defined previously in this section as well in Part I of the permit. **During the course of the TIE/TRE study, the permittee will continue to conduct toxicity testing of the outfall being investigated at the frequency of once every three months but will not be required to perform follow-up tests for that outfall during the period of TIE/TRE study.**

Test procedures; quality assurance practices, determinations of effluent survival/reproduction and survival/growth values, and report formats will be made in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013, or the most current edition.

Results of all tests, reference toxicant information, copies of raw data sheets, statistical analysis and chemical analyses shall be compiled in a report. The report will be written in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013, or the most current edition.

Two copies of biomonitoring reports (including follow-up reports) shall be submitted to the division. One copy of the report shall be submitted along with the discharge monitoring report (DMR). The second copy shall be submitted to the local Division of Water Pollution Control office address:

**Environmental Assistance Center- Chattanooga  
Division of Water Pollution Control  
540 McCallie Avenue, Suite 550  
Chattanooga, TN 37402-2013**

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**F. BIOCIDES/CORROSION TREATMENT PLAN**

The permittee shall not conduct treatments of intake or process waters under this permit using biocides, dispersants, surfactants, corrosion inhibiting chemicals, or detoxification chemicals except under the written plan which has been given prior approval by the Division of Water Pollution Control and in accordance with conditions specified in that approval.

**PART IV**

**STORM WATER POLLUTION PREVENTION PLAN**

Storm water runoff associated with industrial activity that is not discharged to the receiving stream through Outfalls 101 and 102 are currently authorized under the Tennessee Storm Water Multi-Sector General permit for Industrial Activities (TMSP), Permit Number TNR051343. The TMSP requires development, implementation, and routine evaluation and updating of a storm water pollution prevention plan (SWPPP). The permittee shall ensure that the appropriate pollution prevention measures are identified in the SWPPP to also minimize the discharge of pollutants in storm water or from ancillary activities via Outfall 101 and 102. Any necessary plan modifications shall be completed in accordance with the schedules set forth in the TMSP.

The discharger will develop, document and maintain a storm water pollution prevention plan (SWPPP) pursuant to the requirements as set forth in the Tennessee Multi-Sector General Permit for Industrial Activities, Sector O, "Storm Water Discharges Associated With Industrial Activity From Steam Electric Power Generating Facilities", Part 3, "Storm Water Pollution Prevention Plan Requirements." The plan shall be signed by either a principal executive officer of a corporation, the owner or proprietor of a sole proprietorship, or a partner or general partner of a partnership.

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**ADDENDUM TO RATIONALE  
TVA - Watts Bar Nuclear Plant  
PERMIT NO. TN0020168**

June 4, 2010

Addendum prepared by: Ms. Souraya Fathi

**I. Recent administrative history**

TVA - Watts Bar Nuclear Plant (TVA-WB) submitted NPDES application for renewal of its individual permit on June 16, 2006. Additional sampling data was submitted April 27, 2009.

The Division of Water Pollution Control (the division) placed a draft permit on public notice and transmitted the draft permit to applicant on August 24, 2009.

The division held a public hearing regarding the NPDES draft permit on December 10, 2009. Public comment period expired on December 21, 2009. However, it was extended to January 15, 2010, due to the holidays and to accommodate interested parties that requested more time to submit draft permit comments.

**II. Comments and responses on the draft permit**

- 1. The permittee requested for internal monitoring points IMP 111 and OSN 112 to be deleted from the reissued permit and for all references to IMP 111 and OSN 112 be removed, as these point sources have been eliminated. The permittee also requested coverage for SW-11 (formerly OSN 112) be issued simultaneously under a TMSP Notice of Coverage.**

***Response:***

Upon consultation with the division's Environmental Field Office staff, we concur that both IMPs (111 and 112) can be removed from the final permit. However, the Rationale will remain unchanged from when it went on Public Notice on August 24, 2009.

- 2. The permittee requested that statement "and intermittent micro-filtered condenser tube cleaning discharges" be added to the introductory paragraph for IMP 107.**

***Response:***

The above statement will be added to the introductory paragraph for IMP 107 in the final permit.

- 3. The requirement to submit a monitoring report for 316(b) should be removed as the previous 316(b) rule has been remanded by the court. The only current 316(b) condition is that best technology available determinations shall be based on best professional judgment. It is expected that the 316(b) rule will be reissued at some point in the near future, but**

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**there is no guarantee as to the contents or the timeframe of its issuance. This report may be therefore rendered completely unnecessary based on the reissued 316(b) regulations.**

***Response:***

Rule 316(b) and a corresponding monitoring report have indeed been remanded by the court. Therefore, requirement to submit the report has been removed in the final permit.

**4. Other typographical errors and missing information needed to be corrected or added to the permit as detailed in the comment letter submitted on September 23, 2009.**

***Response:***

All typographical errors and missing information mentioned in the September 23, 2009 letter have been corrected or added in the final permit.

**5. This permit fails to address effects of WBN on ichthyoplankton, adult fish and mussels.**

***Response:***

The proposed NPDES permit is protective of designated uses of the receiving stream. This is accomplished by imposing limitations, restrictions and requirements necessary to achieve compliance with applicable water quality criteria. Protection of designated uses and corresponding criteria ensures protection for all fish and aquatic life, including larval and juvenile stages of life. In the Baxter, D. S., K. D. Gardner, and G. D. Hickman. 2001. *Watts Bar Nuclear Plant Supplemental Condenser Cooling Water System Fish Monitoring Program*. Norris: Tennessee Valley Authority, Resource Stewardship, a 2001 fish monitoring program for the Supplemental Condenser Cooling Water (SCCW) was concluded that no significant impact to ichthyoplankton populations from WBN SCCW operation would occur. Entrainment rates indicate the operation of WBN Unit 1 would have little or no effect on larval fish and egg populations in Chickamauga Reservoir because the WBN condenser cooling water system (CCW) is commensurate with a closed cycle cooling system. In addition, presence of balanced population of fish species in the receiving stream confirms ichthyoplankton is not adversely affected by the Watts Bar Nuclear Plant operations. In addition, a chronic whole effluent toxicity (WET) testing for inhibition concentration, 25% is required at Outfalls 101, 102 and 113. The frequency of WET testing is 2/year.

**6. Flow limits should be imposed at Outfall 113.**

***Response:***

When in operation, the Supplemental Condenser Cooling Water (SCCW) system at Watts Bar Nuclear Plant releases approximately 130 MGD of flow into the river at a location about 0.7 miles downstream of Watts Bar Dam. The current NPDES permit requires (Page 8 of 27) a minimum flow from Watts Bar Dam of 3500 cubic feet per second when significant changes are made to the SCCW flow (Outfall 113), including start-up, shut-down or other similar alterations. There is no need to

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maintain a continuous flow from Watts Bar Dam during steady-state operation of the SCCW system. TVA has adequately demonstrated the existence of zones of passage during periods of no flow and during periods of flow from Watts Bar Hydro and non-detrimental effects to fish and aquatic life for operation of the SCCW.

Furthermore, TVA operates Watts Bar Dam as part of a larger integrated river system. To effectively fulfill the multipurpose objectives of the river system, the flow at Watts Bar Dam at times needs to be reduced to conserve water for future needs, such as for power production, water supply, or water quality. Requiring a continuous flow from Watts Bar Dam in support of steady-state operation of the SCCW system would limit TVA's ability to optimize reservoir releases in support of these and other similar stakeholder commitments embedded in the current river operations policy.

- 7. Proposed thermal limits are not adequate to protect aquatic organisms: Temperature limits for Outfall 113 are too high; Monitoring requirements for Outfall 113 are inadequate.**

***Response:***

TVA is required to provide a release of at least 3500 cfs from Watts Bar Dam to support the operation of Outfalls 101, 102, and 113. The current NPDES permit also requires monitoring of bottom temperature at Outfall 113. If bottom temperature encroaches on the NPDES limit (33.5°C), the SCCW system would be removed from service. The monthly discharge monitoring report (DMR) summary for Outfall 113 indicates that the temperature receiving stream bottom data was well below the permitted limit of 33.5°C. The maximum temperature recorded was 29.20°C on August 31, 2006, and in 2007 drought conditions, temperature was also well below the permit limit. Also, refer to response to comment number 4.

- 8. The NPDES permit does not adequately analyze or control chemical discharges: The draft permit and rationale lack necessary information regarding impacts of chemical effluents; Failure to evaluate effects of biocides.**

***Response:***

Proposed chemical additives and their respective toxicological data are presented to the state for approval prior to plant use in the facility's Biocide and Corrosion Treatment Plan (B/CTP) required by the WBN Unit NPDES permit. To ensure the water quality criteria in the receiving stream is maintained, the state reviews the chemical usage request and evaluates the reasonable potential environmental impacts of a specific chemical discharge to determine the plant NPDES permit monitoring requirements and discharge limits. Upon start of operation in May 1996, WBN was issued NPDES permit number TN0020168. WBN is authorized to discharge process and non-process wastewater, cooling water and storm water runoff from Outfall 101 and Outfall 102 turbine building sump water, alum sludge supernate, reverse osmosis reject water, drum dewatering water, water purification plant water, and storm water runoff from internal monitoring point (IMP) 103; metal cleaning wastewater, turbine building station sump water, diesel generator coolant, and storm water through IMP 107; treated sanitary wastewater through IMP 111; HVAC cooling water, storm water, and fire protection wastewater through Outfall 112; and SCCW from Outfall 113 to the Tennessee River. In addition to revisions to the B/CTP, the potential sources of chemicals and chemical

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quantities are reviewed and updated in connection with the application for NPDES Permit renewal. Compliance with the State Water Quality criteria is also confirmed by routine semi-annual Whole Effluent Toxicity (WET) testing at Outfall 101, Outfall 112, and Outfall 113. Also, refer to responses to comments number 4 and 6.

- 9. The NPDES Permit should include effluent limitations for tritium. In addition, there may be tritium and other radionuclides leaking into surrounding soil and groundwater. Consequently, there should be sampling for radionuclides around this and other nuclear sites in Tennessee.**

***Response:***

Effluent discharges authorized through an NPDES program can not cause condition of pollution, nor a discharge of toxics in toxic amounts can be authorized. Any substance, including radioactive materials, is of interest to our agency if it has reasonable potential to exceed applicable water quality criteria. However, radioactive releases to the environment, notwithstanding point source discharges authorized via this permit, are not regulated under the Clean Water Act, but are instead regulated under the Nuclear Regulatory Commission (NRC) by issuance of an Operating License. Pertinent regulations are found under 10 CFR Part 20 and 10 CFR Part 50. Watts Bar Nuclear effluents that may contain radioactive material are not addressed as part of the NPDES permitting process. TVA's releases of tritium to the environment from Watts Bar operations have been and continue to be well within the NRC's regulatory limits and the terms of Watts Bar's Operating License.

As a nuclear powered generating station licensed to operate by the Nuclear Regulatory Commission (NRC), any and all of the liquid and gaseous effluents from Watts Bar that may contain radioactive material are subject to and regulated by the NRC. Therefore, radioactive releases from the operation of nuclear plants are outside the scope of the National Pollutant Discharge Elimination System (NPDES) program implemented under the Clean Water Act. Specifically, the controls and limits for the release of radioactive material are established and regulated under the terms of 10 CFR Part 20, "Standards for Protection Against Radiation" and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," and any such releases to the environment are controlled and monitored under the terms of the Watts Bar Operating License. Watts Bar-related liquid and gaseous effluents that may contain radioactive material are not addressed as part of the NPDES permitting process.

TVA has coordinated its NRC license-related activities with TDEC's Division of Radiological Health (DRH) and this includes the Tritium Project-related activities at Watts Bar. This coordination is not connected with the NPDES permitting process. A copy of TVA's License Amendment Request, dated August 20, 2001, was sent to DRH, describing TVA's plan to insert Tritium Producing Burnable Absorber Rods (TPBARs) into the Watts Bar Unit 1 reactor core to support the U.S. Department of Energy's program for maintaining the nation's tritium inventory.

Prior to each fuel cycle, TVA calculates the expected tritium release from TPBARs in establishing the number of TPBARs to be irradiated. This action assures that the annual limits and operating objective, as established in Watts Bar's Operating License, are not exceeded. TVA's letter of March 22, 2005, to the NRC discussed higher than expected tritium permeation from the TPBARs into the reactor coolant system during the first operational irradiation cycle, and committed to monitor such

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levels to assure that cumulative tritium levels resulting from the TPBARs as well as non-TPBAR sources due to plant operations remained below established limits. To do so, TVA has limited the number of TPBARs so that the total tritium released remains below already approved regulatory limits.

TVA's releases of tritium to the environment from Watts Bar operations have been and continue to be well within the NRC's regulatory limits and the terms of Watts Bar's Operating License. This has been the case before and subsequent to the implementation of the Tritium Project.

**10. TDEC should establish a procedural mechanism for reviewing the NPDES Permit before Watts Bar Unit 2 begins operation.**

***Response:***

If operation of Watts Bar Unit 2 commences in the future, and if operation has material effect on point source discharges authorized by this permit, we expect for TVA to submit an application for permit modification. The application would be expected at least 180 days prior to the proposed discharge commences. This NPDES permit reflects only activities, processes and wastewater streams described in the NPDES application. Therefore, this permit does not authorize any future discharges from Unit 2, or any other unit operations at the facility not described in the current application.

**RATIONALE**

**TVA - Watts Bar Nuclear Plant**  
**NPDES PERMIT NO. TN0020168**  
**Spring City, Rhea County, Tennessee**

Permit Writers: Ms. Souraya Fathi

**I. DISCHARGER**

**TVA - Watts Bar Nuclear Plant**  
**Hwy 68 Nuclear Plant Road**  
**Spring City, Rhea County, Tennessee**

**Official Contact Person:**  
**Mr. Robert J. Crawford**  
**Environmental Supervisor**  
**(423) 365-8005**

**Nature of Business: Electric Services**

**SIC Code(s): 4911**  
**Industrial Classification: Primary**  
**Discharger Rating: Major**

**II. PERMIT STATUS**

**Expired: November 4, 2006**  
**Application for renewal received July 13, 2006**  
**Proposed Draft Permit Public Noticed: August 24, 2009**

**Watershed Scheduling**

**Environmental Assistance Center: Chattanooga**  
**Primary Longitude: -84.785833 Primary Latitude: 35.593333**  
**Hydrocode: 6020001 Watershed Group: 1**  
**Watershed Identification: Tennessee River (Meigs & Rhea County)**  
**Target Reissuance Year: 2011**

### III. FACILITY DISCHARGES AND RECEIVING WATERS

TVA - Watts Bar Nuclear Plant discharges cooling water, storm water and other treated wastewaters to the Tennessee River ( Chickamauga Reservoir) just downstream of Watts Bar Dam. The facility also discharges treated sanitary wastewater, storm water and other treated wastewaters to the Yellow Creek embayment of Chickamauga Reservoir. Appendix 1 summarizes facility discharges and the receiving stream information for seven outfalls, numbered 101, 102, 103, 107, 111, 112, and 113. There are four (4) main outfalls (Nos. 101, 102, 112, and 113) which discharge directly to waters of the state. Three (3) other outfalls (Nos. 103, 107, and 111) are internal discharges that contribute to the main outfalls, and outfalls 101 and 102 also provide stormwater runoff relief. New to this permit is Outfall 114, which is designated as the supplemental condenser cooling water (SCCW) traveling screen backwash outfall. Each of the eight (8) outfalls is discussed in more detail as follows:

#### **Outfall 101**

Outfall 101 receives wastewater from two primary sources, the Cooling Tower Blowdown Line (24.048 MGD) and the Yard Holding Pond (1.142 MGD). The Watts Bar Nuclear facility utilizes natural draft cooling towers, which recirculate cooling water. In order to control build up of dissolved solids, a portion of the recirculated water must be discharged, i.e., cooling tower blowdown. Cooling tower blowdown, at 24.048 MGD, represents the majority of the flow through the Cooling Tower Blowdown Line (due to the nature of the plant operation, this line may also contain once through cooling water from the supplemental condenser cooling water system). The remaining portion (as seen from Appendix 1) is made up of low volume wastes and metal cleaning wastes.

The Yard Holding Pond receives low volume wastes and stormwater runoff from numerous sources and is designed to provide oil skimming, neutralization, and sedimentation treatment. The pond has a volume of approximately 40 million gallons. However, at times the pond is used as an alternative route to discharge emergency raw cooling water discharge and cooling tower blowdown. These two alternative discharges, at 8.43 MGD, comprise 87.6% of the long-term average flow to the pond.

The Cooling Tower Blowdown Line and the Yard Holding Pond overflow are combined and discharged through a pipeline feeding a diffuser located in the Tennessee River at approximate mile 527.9. Discharge through the diffuser is only allowed when there is 3500 cubic feet per second (cfs) flow from Watts Bar Dam.

#### **Outfall 102**

This outfall represents the emergency discharge overflow weir for the Yard Holding Pond. The overflow weir operates only in the event of an emergency which prevents the use of the pipeline and diffuser or in the event that the pipeline and/or diffuser require maintenance. Based on information from the plant permit application, this outfall has not been used in the last three years. In the event of a discharge, the flow would enter an unnamed tributary and flow for approximately 3000 feet to the Tennessee River at mile 527.2. Wastewater sources are the same as for Outfall 101.

#### **Outfall 103 (Internal Monitoring Point)**

This outfall represents the discharge from the Low Volume Waste Treatment Pond. The outfall does not discharge directly to waters of the state, but rather discharges to the Yard Holding Pond (Outfall 101). The Low Volume Waste Treatment Pond receives low volume wastes, storm water, and water leakage wastes as described in Appendix 1. This Pond has a total volume of approximately 17 million gallons, but normally is maintained at about 5 million gallons of wastewater. Treatment is provided by oil skimming, sedimentation, and neutralization. The outfall has been established as an internal monitoring point to verify treatment effectiveness and compliance with 40 CFR Part 423 effluent guidelines for low volume wastes.

#### **Outfall 107 (Internal Monitoring Point)**

This outfall represents the combined batch release from two holding/treatment ponds known as the Lined Pond and the Unlined Pond. These ponds are used to collect and treat wastes from periodic metal cleaning operations, and a small portion of storm water, diesel generator coolant, and drum rinsing water. Treatment may be provided by chemical addition (when necessary to meet limits) and recirculation/aeration to reduce concentrations of copper, iron, and/or phosphorus prior to discharge to the Yard Holding Pond (Outfall 101). The Lined Pond has an approximate volume of 0.91 million gallons and the Unlined Pond has an approximate volume of 6.5 million gallons. Following treatment, the typical scenario is for the Lined Pond to be pumped to the Unlined Pond and the Unlined Pond discharged through Outfall 101. Batch releases are normally confined to periods of 24 hours or less. Records from March 2005 through March 2009 indicate that about 3 discharges per year occur. The long term average flow from the ponds (including days of zero flow) is 1.74 MGD, however, actual flow during discharge is between 2 and 3 MGD. This internal outfall has been established to verify treatment effectiveness and compliance with 40 CFR Part 423 effluent guidelines for metal cleaning wastes.

#### **Outfall 111 (Internal Monitoring Point)**

This outfall represents the discharge of plant sanitary wastes following treatment via a four unit extended aeration process treatment facility with ultraviolet (UV) or chlorine disinfection. This is an internal outfall that does not discharge directly to waters of the state. It has been established to verify proper operation and treatment effectiveness of the sanitary wastewater treatment plant. The discharge flows to the Construction Runoff Holding Pond, which overflows to Outfall 112.

#### **Outfall 112**

This outfall represents the discharge from the Construction Runoff Holding Pond. In addition to sanitary wastes, the pond receives heating and air conditioning cooling water, high-pressure fire protection system flushing water, potable water leaks, and storm water as shown in Appendix 1. The discharge enters an unnamed tributary, which flows to Yellow Creek. The tributary enters the Yellow Creek embayment of Chickamauga Reservoir at a point approximately 1.3 miles above its confluence with the Tennessee River at mile 526.9. The Construction Runoff Holding Pond was designed to receive wastes primarily from storm water runoff from a paint shop area, construction laydown areas and employee parking areas. The drainage area is approximately 208 acres of which most are non-industrial wooded and 65 acres are impervious. Other

sources contributing to a minor extent are treated sanitary wastewater, fire protection flushing water, HVAC cooling water, and potable water leaks. The pond provides treatment by sedimentation and oil skimming. Long-term annual average flow is 0.38 MGD.

#### **Outfall 113**

This outfall represents the discharge of Supplemental Condenser Cooling Water, which is primarily non-contact, once through cooling water (due to the nature of the operation of the plant this line can also contain cooling tower blowdown). The flow is the largest discharge from the facility averaging 129.0 MGD. The water is routed to a former discharge point of the TVA - Watts Bar Fossil Plant and discharged at the surface of the Tennessee River at approximate mile 529.2.

#### **Outfall 114**

This outfall consists of traveling screen backwash from the supplemental condenser cooling water intake. The discharge from the outfall consists only of screen reject and raw water. This outfall is new to the WBN permit and TVA requested that no monitoring requirements be applied, consistent with other screen backwash discharges at TVA facilities. The Division agrees with this request. Flow is estimated at 0.019 MGD.

#### **Tennessee River**

The TVA - Watts Bar Nuclear Plant has three direct discharges to the Tennessee River (Outfalls 101, 102, and 113). The plant withdraws cooling water and most other water used for industrial processes through the Intake Pumping Station located at Tennessee River mile 528.0. However, the Supplemental Condenser Cooling Water (129.0 MGD discharged through Outfall 113) is withdrawn from above Watts Bar Dam and is discharged to the River below the dam, but above the Plant Intake Pumping Station.

For purposes of protecting water quality, the Tennessee River below Watts Bar Dam is designated for fish and aquatic life use, recreation use, irrigation use, livestock watering and wildlife use, domestic water supply use, industrial water supply use, and navigation use. The flow of the river is controlled by the Tennessee Valley Authority (TVA) Watts Bar Dam and minimum flows at this location have been developed by the USGS as presented in Appendix 1.

#### **Yellow Creek**

The Yellow Creek embayment of Chickamauga Lake is designated for fish and aquatic life use, recreation use, irrigation use, and livestock watering and wildlife use. Low flow conditions in this stream are assumed to be zero.

#### **Drought Conditions and its Effect on WBN**

Tennessee has experienced extreme drought conditions during the latter part of year 2006 and all of 2007, and is expected to continue through 2008. In contrast, watershed storage areas in the Ohio Valley area experienced flooding, which did not positively affect the Tennessee River. Nonetheless, Tennessee and TVA River Operations systems will continue to monitor these and other natural conditions affecting the sources

for cooling waters throughout the permit period, and will continue to assess and report to the Division any adverse conditions relating to the drought.

#### IV. APPLICABLE EFFLUENT LIMITATIONS GUIDELINES

The Standard Industrial Classification (SIC) code for TVA - Watts Bar Nuclear Plant is 4911, establishments engaged in generation, transmission, and/or distribution of electric energy for sale. Process wastewater discharged through Outfalls 101, 102, 103, 107, 111, 112, and 113 is regulated by 40 CFR Part 423, Steam Electric Power Generating Point Source Category. This regulation is applicable to discharges resulting from the operation of a generating unit by an establishment primarily engaged in the generation of electricity for distribution or sale which results primarily from a process utilizing fossil-type fuel (coal, oil, or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium.

Appendix 2 lists the applicable best available technology (BAT) and best conventional pollution control technology (BPT) effluent limitations guidelines from 40 CFR Part 423.12 and 423.13. The guideline numeric limitations are listed for four specific wastewater sources, low volume wastes, metal cleaning wastes, cooling tower blowdown, and once through cooling water. In determining which guideline sources are attributable to each of the seven (7) outfalls, the Part 423.11, Specialized Definitions were used as follows:

The term Low Volume Wastes means, taken collectively as if from one source, wastewater from all sources except those for which specific limitations are otherwise established in this part. Low Volume Waste sources include, but are not limited to: wastewaters from wet scrubber air pollution control systems, ion exchange water treatment system, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes and recirculating house service water systems. Sanitary and air conditioning wastes are not included.

The term chemical Metal Cleaning Wastes means any wastewater resulting from cleaning [with or without chemical cleaning compounds] any metal process equipment including, but not limited to, boiler tube cleaning.

The term Once Through Cooling Water means water passed through the main cooling condensers in one or two passes for the purpose of removing waste heat.

The term Recirculating Cooling Water means water that is passed through the main condensers for the purpose of removing waste heat, passed through a cooling device for purpose of removing such heat from the water and then passed again, except for blowdown, through the main condenser.

The term Blowdown means the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentration in amounts exceeding limits established by best engineering practices.

The above definitions specifically exclude sanitary wastewater and air conditioning wastes. For sanitary wastes, Tennessee Effluent Guidelines from Rule 1200-4-5-03 (1) and/or best professional judgment have been applied.

The effluent limitations presented in 40 CFR 423 (see Appendix 2) are normally to be established in the permit as mass limitations by multiplying the flow of the specific waste source times the applicable concentration limit. However, 40 CFR, Part 423.12 (b) (11) and Part 423.13 (g) allow the permitting authority, at its discretion, to substitute concentration limits instead of the mass limitations. For the TVA-Watts Bar Nuclear Plant permit, only concentration limits will be established.

Also in developing guideline limitations for each Outfall, EPA Rule Part 423.12 (12) and Part 423.13(12) is applicable as follows:

In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in the BPT/BAT limitation tables attributable to each controlled source shall not exceed the specified limitation for that source.

Utilizing these definitions and the waste source identification provided in the permit application (see summary tables in Appendix 1), the following waste sources and proportions are applied to each outfall as follows:

<b>Guideline Waste Sources and Flows by Outfall</b>			
Outfall No	Contributing BPT/BAT Waste Source	Waste Source Flow	
		Flow MGD	% Outfall Total
101	Low Volume Wastes	8.63	25.5%
	Metal Cleaning Wastes	1.142	3.4%
	<u>Cooling Tower Blowdown</u>	<u>24.048</u>	71.1%
	Total Outfall Flow	<b>33.82</b>	
102	Low Volume Wastes	8.63	25.5%
	Metal Cleaning Wastes	1.142	3.4%
	<u>Cooling Tower Blowdown</u>	<u>24.048</u>	71.1%
	Total Outfall Flow	<b>33.82</b>	
103	Low Volume Wastes	<b>0.2145</b>	100.0%
107	<u>Metal Cleaning Wastes</u>	<b>0.0330</b>	100.0%
112	Sanitary Waste (Non-guideline)	0.017	6.9%
	Air Conditioning Wastes (Non-guideline)	0.001	0.4%
	<u>Other (Non-guideline) Wastes</u>	<u>0.229</u>	92.7%
	Total Outfall Flow (Non-guideline)	<b>0.247</b>	
113	Once Through Coling Water	<b>129</b>	100.0%
114	Supplemental Condenser Cooling Water, Intake Screen backwash	<b>0.019</b>	100.0%

Note: Outfall 114 is backwash water and is not considered in the monitoring requirements for this permit.

Where the effluent limitation guideline concentration limits include the same parameter(s) for each source, the allocation of guideline limits by flow is straightforward. However, where a parameter is limited for one source and not limited for another, some judgment must take place. The approach taken has been to assure that each source complies with its parameter guideline concentration without that source being diluted by other wastewater source(s) for which the parameter is not limited. One means to accomplish this is to utilize internal outfalls, which enable monitoring at a location that is source specific. This approach has been utilized at the Watts Bar Nuclear Plant for Outfalls 103, 107, and 111.

Using the above guidance, the 40 CFR guidelines have been applied to the plant outfalls as shown in Appendix 2 and described as follows:

#### Outfall 101

Cooling tower blowdown represents approximately 71% of the outfall flow and Low Volume wastes represent 28.9%. Thus the guidelines for Cooling Tower Blowdown and Low Volume Waste will be applied to the total waste stream. The total suspended solids limit and the oil and grease limit applicable to the low volume waste sources is considered applicable to the cooling tower blowdown source as well. Because the metal cleaning wastes represent only 0.1% of the flow, the guideline limits for this source will not be applied to Outfall 101. Rather, compliance with metal cleaning waste limits will be handled by employing an internal monitoring point (Outfall 107). The applicable BPT and BAT limits are given in Appendix 2.

#### Outfall 102

Since this is an emergency discharge for Outfall 101, the same guidelines apply as for Outfall 101. The limitations are presented in Appendix 2.

#### Outfall 103

This outfall receives Low Volume Wastes exclusively; therefore, the Low Volume Waste guideline limitations will apply. The limitations are presented in Appendix 2.

#### Outfall 107

This outfall receives 99.9% Metal Cleaning Wastes and 1% Low Volume Wastes. Therefore the Metal Cleaning Waste limitations will be applied as shown in Appendix 2.

#### Outfall 111

Outfall 111 is an internal monitoring point, which receives sanitary waste flow from the extended aeration process sewage treatment plant. Sanitary wastewater is specifically excluded from the Federal guidelines (see 40 CFR 423.11(b)). However, Tennessee Rule 1200-4-5-.03, Effluent Limitations for Effluent Limited Segments specifies effluent limitations for domestic wastewater treatment plants. This rule specifies monthly average and daily maximum limits for BOD5 and total suspended solids (TSS). The rule also specifies a daily maximum limit for settleable solids. These limits are presented in Appendix 2.

#### Outfall 112

This outfall primarily receives storm water, high pressure fire protection system flushing water, HVAC cooling water, treated sanitary wastewater and potable water leaks. The storm water accounts for 88.2% of the flow and is not covered under the 40

CFR 423 guidelines. The sanitary wastewater and the HVAC cooling water, which account for 7.3% of the total flow, are specifically defined as non guideline under 40 CFR Part 423.11 (b). The remaining two waste sources, fire protection system flushing water and potable water leaks, representing 4.4% of the total flow, are also considered non-guideline sources. Thus 40 CFR Part 423 limitations do not apply to this outfall and effluent limitations will be established based on best professional judgment and protection of the receiving stream.

#### Outfall 113

This outfall receives noncontact supplemental condenser cooling water. The wastewater is defined by 40 CFR 423 as Once Through Cooling Water. Thus Outfall 113 will be subject to the effluent limitations for the Once Through Cooling Water Source given in 40 CFR Part 423.12 (6) and Part 423.13 (b) (1&2) and shown in Appendix 2.

#### Outfall 114

This outfall is new to the WBN permit and TVA requested that no monitoring requirements be applied, consistent with other screen backwash discharges at TVA facilities. The Division agrees with this request. Flow is estimated at 0.019 MGD.

### **V. PREVIOUS PERMIT LIMITS AND MONITORING REQUIREMENTS**

Appendix 3 lists the permit limitations and monitoring requirements as defined in the previous permit for the seven outfalls.

### **VI. HISTORICAL MONITORING AND INSPECTION**

During the previous permit term, TVA - Watts Bar Nuclear Plant did not have any appreciable difficulty in meeting effluent limitations as outlined in the previous permit. The self monitoring data reported on Discharge Monitoring Report forms during the previous permit term are summarized in Appendix 4.

Any violations of permit limitations that occurred are shown in the tables found in Appendix 4. This information is downloaded from the EPA PCS database, and statistically summarized.

During the previous permit term, the Division's personnel from the Environmental Assistance Center (EAC) - Chattanooga performed a Water Compliance Evaluation Inspection (CEI) of the TVA - Watts Bar Nuclear Plant on 8/9/09. The purpose of the inspection was to independently determine the facility's compliance with the terms and conditions of the NPDES Permit Number TN0020168. The inspectors met with Ms. Jerri Phillips, Ms. Betsy Eiford-Lee, and Mr. Darrin Hutchison, and discussed the permit compliance. During the inspection, Ms. Phillips presented the NPDES Permit, the Storm Water Pollution Prevention Plan (SWPPP) along with other environmental response plans, and monitoring reports for the facility. The inspectors inspected and verified the outfalls for the facility.

## VII. NEW PERMIT LIMITS AND MONITORING REQUIREMENTS

The proposed new permit limits have been selected by determining a technology-based limit and evaluating if that limit protects the water quality of the receiving stream. If the technology-based limit would cause violations of water quality, the water quality-based limit is chosen. For this facility the technology-based limit is determined from EPA effluent limitations guidelines applicable to the steam electric power generating point source category (see Part IV); or by way of operational and/or treatability data. Furthermore, effluent limitations in this permit must comply with any approved Total Maximum Daily Load (TMDL) studies. Water quality calculation procedures are explained in this section under the heading: Metals and Toxics.

Appendix 5a through 5e presents the water quality calculations, Appendix 5f presents a comparison of the different limitations, and Appendix 5g lists all proposed effluent limitations and monitoring requirements to be included in the new permit.

The results of the water quality calculations are compared to the effluent guideline limitations in Appendix 5f and the proposed final permit limitations are presented in Appendix 5g. The effluent characteristics limited in the permit and monitoring requirements are discussed individually by outfall as follows as well as certain other permit conditions for the facility that are not outfall specific:

### Outfall 101

#### Flow

Monitoring of flow quantifies the load of pollutants to the stream. Flow shall be reported in Million Gallons per Day (MGD). Measurement frequency shall be continuous by recorder. These requirements are unchanged from the previous permit.

#### Oil and Grease

An oil and grease limitation is applied to this outfall because of the significant presence of low volume wastes. The limits are established at 15 mg/l monthly average and 20 mg/l daily maximum in accordance with BPT technology-based limits from 40 CFR Part 423.12 (b) (3).

According to the State of Tennessee Water Quality Standards for the protection of Fish & Aquatic Life [Chapter 1200-4-3-.03(3) (c)], there shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character that may be detrimental to fish and aquatic life in the receiving stream. The permit writer is selecting technology-based limits for oil and grease of 15 mg/L as a monthly average concentration and 20 mg/L as a daily maximum concentration. In addition, the permit shall contain language prohibiting visible floating scum, oil or other matter in the wastewater discharge. Sample type shall be grab. These limits are unchanged from the previous permit. Monitoring frequency in the new permit shall remain at once per month. Sample type shall be grab.

#### Total Suspended Solids (TSS)

Total Suspended Solids is a general indicator of the quality of a wastewater and shall be limited in this permit. The technology-based limit of 30 mg/l monthly average

and 100 mg/l daily maximum is taken from 40 CFR Part 423, Subpart 423.12 (b) (3), the BPT limitations applicable to low volume wastes.

The State of Tennessee Water Quality Standards for the protection of Fish & Aquatic Life [Chapter 1200-4-3-.03(3) (c)] state there shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character that may be detrimental to fish and aquatic life in the receiving stream.

The permit writer believes the limit of 30 mg/L monthly average, and 100 mg/L daily maximum concentrations shall provide protection of water quality in the receiving stream. Considering the nature of wastewater collection and discharge system, the sampling frequency shall be once per month and the sample type shall be grab. These limits are unchanged from the previous permit. Sample type shall be grab.

#### pH

Technology-based BPT effluent limitations from 40 CFR, Part 423, Subpart 423.12 (b) (1) establish a pH limitation of 6.0 to 9.0 for all discharges from this facility.

According to the State of Tennessee Water Quality Standards [Chapter 1200-4-3-.03(3) (b)], the pH for the protection of Fish and Aquatic Life shall lie within the range of 6.5 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24-hours. Appendix 5d presents calculations that show that the combined discharge from Outfalls 101 and 113 will not cause the pH of the Tennessee River to fall below the 6.5 minimum pH standard. Considering that the receiving stream will provide pH buffering, effluent limitations for pH shall be retained in a range 6.0 to 9.0. Sampling frequency shall be twice per month and the sample type shall be grab.

#### Total Residual Chlorine

Technology-based (BAT) limits of 0.2 mg/L monthly average and 0.5 mg/L daily maximum limits apply to free available chlorine in cooling tower blowdown in accordance with 40 CFR, part 423, Subpart 423.13 (b) (1). The total residual chlorine test includes all chlorine species measured in the free available chlorine test as well as other chlorine compounds such as chloroamines. Thus the permit writer has substituted the total chlorine residual test in place of the free available chlorine test for compliance with the 40 CFR limitations.

The previous permit has a limit of 0.1 mg/L monthly average and 0.1 mg/L daily maximum for Outfall 101. The 0.1 mg/l concentration is greater than the acute criteria for TRC at 0.019 mg/l. Because of the large volume of water discharged by TVA there exists the potential for exposure of aquatic life to toxic concentrations of chlorine in the discharge. However, since chlorine residual reacts and dissipates rapidly upon mixing into the ambient waters, the concentrations above the acute value should not exist for any significant area. Thus the 0.1 mg/l concentration limit for TRC is considered to be protective of water quality in the Tennessee River at a flow from Outfall 113 of 178.38 MGD and from Outfall 101 of 67.43 MGD.

The monthly average limit of 0.10 mg/L and the daily maximum limit of 0.10 mg/L for Total Residual Chlorine (TRC) shall be retained in the new permit. The limits are

based on the protection of water quality in the Tennessee River during periods when Outfall 101 and Outfall 113 exceed their long term average flow and based on antibacksliding provisions of 40 CFR Part 122.44 (l). These limits are also determined to be appropriate because the facility is discharging TRC in excess of 2 hours per day in accordance with the approved Biocide/Corrosion Treatment Plan.

#### Chromium

Outfall 101 is primarily composed of cooling tower blowdown. 40 CFR Part 423.13 provides BAT effluent limitations for total chromium applicable to the discharge of cooling tower blowdown wastewater discharges. The limits are 0.2 mg/L monthly average and 0.2 mg/L daily maximum. The Watts Bar Nuclear Plant does not use corrosion control chemicals or biocides containing chromium at the facility. Sampling data submitted with the application demonstrated that chromium could not be detected in the effluent at a detection limit of 0.001 mg/L. Thus chromium will be included as a permit limit however, monitoring for chromium is waived per 40 CFR Part 122.44 (a)(2)(i). A statement shall be placed in the permit as follows: The use of water treatment chemicals containing chromium is prohibited under this permit.

#### Zinc

Outfall 101 is primarily composed of cooling tower blowdown. 40 CFR Part 423.13 provides BAT effluent limitations for total zinc applicable to cooling tower blowdown wastewater discharges. The limits are 1.0 mg/L monthly average and 1.0 mg/L daily maximum. The TVA - Watts Bar Nuclear Plant utilizes zinc in corrosion inhibitors for treatment of raw water. TVA's policy is to control the feed of zinc containing chemicals to limit the discharge concentration to 0.2 mg/L or less.

The zinc limit of 1.0 mg/L daily average and 1.0 mg/L daily maximum shall be continued in the new permit. The corrosion inhibiting chemicals are added to the raw water system, and are recirculated through the condensers and the cooling towers. Thus the concentration of zinc is not expected to be highly variable with time. Therefore, a measurement frequency of 2/month and sample type of grab should be adequate to characterize zinc in this outfall.

#### Effluent Temperature

Temperature shall be limited according to the State of Tennessee Water Quality Standards for the protection of Fish & Aquatic Life [Chapter 1200-4-3-.03(3)(e)]. It is recognized that the temperature of the cooling water discharge will be greater than the temperature of the water prior to its use for cooling or other purposes. This discharge must not cause the temperature change in the receiving stream to exceed 3°C relative to an upstream control point. Also, this discharge must not cause the temperature of the receiving stream to exceed 30.5°C (except as a result of natural causes), and this discharge must not cause the maximum rate of temperature change in the receiving stream to exceed 2°C per hour (except as a result of natural causes).

The elevated temperature water of outfall 101 is mixed with the Tennessee River receiving water by being discharged through a diffuser. Instream temperature criteria must be met at the edge of the mixing zone. The mixing zone is defined for this discharge as being a maximum width of 240 feet (the width of the diffuser) and

extending 240 feet downstream. An operational requirement of the plant is that the diffuser is only operated when 3500 cubic feet per second (CFS) flow is present from the dam. Mathematical modeling of the temperature during mixing was carried out by TVA and was submitted in a report in December 1993 (Discharge Temperature Limit Evaluation for Watts Bar Nuclear Plant, Report # WR28-1-85-137. The report was based on the 24-hour average for discharge evaluation as specified in the NPDES permit issued in 1993. The modeling assumed both nuclear units in operation and concluded that a steady-state discharge of 38.3 °C under worst case conditions, which included 1) full thermal load from the fossil plant, 2) the worst meteorology and 3) no operation of Watts Bar Hydro facility, would still protect the water quality based on modeling using daily averaging. A daily average value of 35 °C was proposed to include a margin of safety. A continuous discharge at the temperature maximum of 35 °C will not exceed water quality outside of the mixing zone based on past modeling. The Division approved a one-hour averaging period for evaluating compliance with temperature criteria in the receiving stream.

A numeric effluent limitation of 35° C shall continue as the daily maximum that can be discharged. Measurement frequency shall be continuous and sample type shall be by recorder. These limits are unchanged from the previous permit.

Refer to paragraph above titled: **"Drought Conditions and its Effect on WBN"**  
The Division is denying the request made by TVA in their Application letter to remove certain temperature monitoring in the river because of the ongoing drought condition.

#### Toxicity Testing

Raw water used at the facility is treated with corrosion inhibitors and biocide products. These products, which can become concentrated in the cooling tower system, are discharged through Outfall 101. The chemical makeup of the products used can change during the permit period and the combined toxicity effect of the chemicals is not known. Thus it is not feasible to control toxicity only by the application of chemical specific effluent limits to the discharge. Toxicity testing of sensitive aquatic species (coupled with evaluation of new chemical products before they are used) is a reasonable method to evaluate the toxicity impacts of the products in the effluent. Therefore a whole effluent toxicity testing requirement shall remain in the permit. The calculations of the appropriate dilutions for the test are given in Appendix 5e of the Rationale and Part III of the permit.

The new permit shall require IC25 testing at a wastewater dilution of 3.3%. Monitoring frequency shall be semi-annual and sample type shall be composite.

### **Outfall 102**

Outfall 102 is an emergency discharge used when the Outfall 101 diffuser cannot be used. Thus the limits for this outfall shall be the same as for Outfall 101. The new permit limitations for this outfall are unchanged from the previous permit. Sampling frequency and sample type are adjusted for flow and temperature to reflect that continuous monitoring equipment would not be available during an emergency discharge. When thermally loaded effluent is discharged through Outfall 102, all reasonable efforts shall be made to keep flow to a minimum of 3500 cubic feet per second in the receiving waters. If such flow is absent, the permittee shall verify protection of water quality by taking instream temperature measurements.

### **Outfall 103**

This outfall is an internal monitoring point receiving low volume wastes. Thus the Low Volume Waste technology-based limitations apply.

#### Flow

Monitoring of flow quantifies the load of pollutants to the stream. Flow shall be reported in Million Gallons per Day (MGD) and monitored continuously by recorder.

#### pH

Technology-based BPT effluent limitations from 40 CFR, Part 423.12 (b) (1) establish a pH limitation of 6.0 to 9.0 for all discharges from this facility. Therefore a pH limitation of 6.0 to 9.0 shall apply. Sampling shall be once per month and sample type shall be grab.

#### Oil and Grease

An oil and grease limitation is applied to this outfall because of the significant presence of low volume wastes, which are subject to 40 CFR Part 423 guidelines. The limits are established at 15 mg/l monthly average and 20 mg/l daily maximum in accordance with BPT technology-based limits from 40 CFR Part 423.12 (b) (3).

The permit writer is selecting technology-based limits for oil and grease of 15 mg/L as a monthly average concentration and 20 mg/L as a daily maximum concentration. The mass limits shall not be retained. Sampling shall be once per month and sample type shall be grab.

#### Total Suspended Solids (TSS)

Total Suspended Solids is a general indicator of the quality of a wastewater and shall be limited in this permit. The technology-based limit of 30 mg/l monthly average and 100 mg/l daily maximum is taken from 40 CFR Part 423.12 (b) (3), the BPT limitations applicable to Low Volume Wastes. Sampling shall be once per month and sample type shall be grab.

### **Outfall 107**

This outfall is an internal monitoring point incorporated to evaluate compliance with guideline limitations for metal cleaning wastes. These wastes are subject to technology based BPT and BAT guidelines for metal cleaning wastes under 40 CFR Part 423.12(b)(5) and 423.13 (e).

### Flow

The flow from this outfall occurs as a controlled batch discharge from the Lined and Unlined Ponds. Flow duration is typically about 24 hours. Historical batch discharge frequency has been about 4 times per year. The flow is calculated by determining change in stage of the ponds.

Monitoring of flow quantifies the load of pollutants to the stream. Flow shall be reported in Million Gallons per Day (MGD) and monitored each time there is a batch discharge from the ponds through the outfall. Flow frequency shall be once per batch and type measurement shall be calculated.

### pH

Technology-based BPT effluent limitations from 40 CFR, Part 423.12 (b) (1) establish a pH limitation of 6.0 to 9.0 for all discharges from this facility. Ph shall be monitored once per batch and sample type shall be grab.

### Oil and Grease

An oil and grease limitation is applied to this outfall because of the significant presence of metal cleaning wastes. Concentration limits are established at 15 mg/l monthly average and 20 mg/l daily maximum in accordance with BPT technology-based limits from 40 CFR Part 423.12 (b) (5). The previous permit imposed a monthly average limit of 15 mg/L and a daily maximum limit of 15 mg/L.

Because the wastewater discharging to this outfall is batch treated, it is the permit writer's judgment that each batch can be treated to meet the 15 mg/L concentration. The average of monthly average values and the maximum value reported from the previous permit monitoring data (see Appendix 4) indicate a consistent value of <5.0 mg/l. Thus the 40 CFR guideline daily maximum limit of 20 mg/l shall not apply and the previous permit limit shall be retained at 15 mg/l monthly average and daily maximum. Sampling shall be once per batch discharge, and sample type shall be grab.

### Total Suspended Solids (TSS)

Total Suspended Solids is a general indicator of the quality of a wastewater and shall be limited in this permit. The technology-based limit of 30 mg/l monthly average and 100 mg/l daily maximum is taken from 40 CFR Part 423.12 (b) (3), the BPT limitations applicable to metal cleaning wastes.

The previous permit provided a monthly average concentration limit of 30 mg/L and a daily maximum concentration limit of 30 mg/L. Sampling frequency shall be once per batch and sample type shall be grab.

### Copper, Total Recoverable

Technology-based BAT limits are established for copper at 40 CFR Part 423, Subpart 423.13 (e). The limits are 1.0 mg/L as a monthly average and 1.0 mg/L as a

daily maximum. The previous permit contained concentration limits for copper at 1.0 mg/L as monthly average and as a daily maximum.

The new permit shall have a 1.0 mg/L total recoverable copper limit as both the monthly average and daily maximum in accordance with the technology-based guidelines. The mass limits shall not be retained the permit. Sampling frequency shall be once per batch. Because the wastewater comes from large ponds, which should have relatively good equalization of concentration, and to be consistent with other outfall sampling requirements, the sample type shall be grab.

#### Iron, Total Recoverable

Technology-based BAT limits are established for iron at 40 CFR Part 423.13 (e). The limits are 1.0 mg/L as a monthly average and 1.0 mg/L as a daily maximum. The previous permit contained concentration limits for iron at 1.0 mg/L as monthly average and as a daily maximum.

The new permit shall have a 1.0 mg/L total recoverable iron limit as both the monthly average and daily maximum in accordance with the technology-based guidelines. Because the wastewater comes from large ponds, which should have relatively good equalization of concentration and to be consistent with other outfall sampling requirements, the sample type shall be grab.

#### Phosphorus, Total

Phosphorus is not limited by technology-based guidelines, however it is of water quality concern because of its potential to be used in metal cleaning and its ability to contribute to nuisance aquatic growth in receiving water bodies. The previous permit established a 1.0 mg/L monthly average and a 1.0 mg/L daily maximum concentration and required that phosphorus be monitored once per week only during periods when phosphate cleaning solutions are used. During the past five- year permit period, no phosphorus monitoring was reported at the facility. Because phosphate and phosphate chemicals are listed in the permit application as chemicals added to wastewaters reaching Outfall 107 the limits in the previous permit shall be retained.

Phosphorus analysis of a single sample from this Outfall was reported in the permit application at 0.04 mg/L. Monitoring frequency shall be once per batch discharge only during periods when phosphate cleaning solutions are added. Because the wastewater comes from large ponds, which should have relatively good equalization of concentration and to be consistent with other outfall sampling requirements, the sample type shall be grab.

#### **Outfall 111**

This outfall represents an internal monitoring point to assure proper operation and maintenance of the sewage treatment plant. The plant treats all sanitary wastes generated at the facility except during outages when a significant worker population could be on site, then portable toilets may be used. Wastes from these additional [temporary] facilities are sent to a local publically owned treatment works by the vendor from which they are rented. To assure proper operation, the plant must be under the supervision of a Class 1 Certified Operator for sewage treatment plants in the State of Tennessee.

Flow

Flow from the sanitary wastewater treatment plant shall be monitored continuously using a flow recorder.

BOD5

Biochemical Oxygen Demand (BOD5) is a standard test used to measure the effectiveness of sewage treatment plants in removing oxygen consuming organic matter from the waste being treated. The previous permit contained limits of 30 mg/L monthly average and 45 mg/L daily maximum. 40 CFR Part 423 guidelines for the Steam Electric Generating Point Source Category define Low Volume Wastes to include all facility wastes except those for which specific limitations are otherwise established. However, sanitary and air conditioning wastes are specifically excluded. Tennessee Guidelines, Rule 1200-4-5-.03, Effluent Limits for Effluent Limited Segments provide guidelines for domestic waste treatment plants. For BOD5 these guidelines specify a monthly average of 30 mg/L and a daily maximum of 45 mg/L.

Based on Tennessee Guidelines, the previous permit limits shall be retained. The sampling frequency shall be once per week and the sample type shall be grab.

Total Suspended Solids

TSS is also a test used to measure the effectiveness of sewage treatment plants. Tennessee Guidelines, Rule 1200-4-5-.03 provide TSS limits for domestic wastewater treatment plants. The limits are 30 mg/L monthly average and 45 mg/L daily maximum. These are the limits in the previous permit and they shall be retained in the new permit. Sampling frequency shall be once per week and sample type shall be grab.

Settleable Solids

This test provides a measure of solids in a wastewater that are heavier than water and will settle within 1-hour under quiescent conditions. The test results can be used to judge the effectiveness of the sewage treatment process and the impacts of the effluent on receiving streams. Tennessee Rules, 1200-4-5-.03 establishes a limit of 1.0 ml/L for settleable solids from domestic wastewater treatment plants. This limit as a daily maximum was established in the previous permit and shall be retained in the new permit. Sampling frequency shall be twice per week and sample type shall be grab.

E. Coli

Tennessee Water Quality Criteria specify an instream maximum concentration for *escherichia coli* (*E. Coli*) organisms in order to protect streams designated for recreational use. The instream criteria state that the concentration shall not exceed 126 per 100 ml as a geometric mean. The previous permit did not contain an effluent limitation for *E. Coli*. In order to protect the receiving stream during periods of critical low flow the new permit shall contain an *E. Coli* concentration limit of 126 per 100 ml. Sampling frequency shall be once per week and the sample type shall be grab.

Analytical test procedures of *E. Coli* are discussed in the permit under Part 1, Section B. Monitoring Procedures.

Chlorine, Total Residual

In order to achieve disinfection, many sewage treatment plants utilize chlorine for disinfection. The residual chlorine, if not controlled within limits, can be toxic to the downstream receiving streams. The previous permit contained a daily maximum limit of 2.0 mg/L for total residual chlorine, which is consistent with Tennessee Rule 1200-4-5-.03 (2) Industrial Wastewater Treatment Plants.

The permittee has installed an ultra violet disinfection system at the sewage treatment plant at Watts Bar Nuclear Plant. This system should eliminate the use of chlorine for disinfection (except in emergencies). However, the maximum daily limit of 2.0 mg/L for chlorine shall be retained in the permit for the event that chlorine is needed as a backup system. TRC monitoring frequency language shall be changed to five times per week only when chlorine, bromine, or any other oxidants are added. Sample type shall be grab.

### **Outfall 112**

This outfall receives wastes from storm water, the effluent from the sanitary wastewater treatment plant, HVAC cooling water from the training center, high pressure fire protection system flushing water, and potable water leaks. These waste sources are not subject to 40 CFR Part 423 guidelines.

#### Flow

Under low flow conditions the discharge from this pond exits through four concrete pipes with v-notch weirs in their ends. Under high storm water flow conditions, the portion of the flow exceeding the capacity of the pipes exits via an overflow spillway. The previous permit required flow to be monitored once per week with sample type being estimate. This language shall be retained in the new permit.

#### pH

The Construction Runoff Holding Pond is subject to diurnal algal growth/decay, which causes fluctuations in pH. Photosynthesis causes the pH to rise during the day and decline during the night. Given that there will be buffering of the discharge pH in the stream, a pH limit of 6.0 to 9.0 is considered adequate to protect water quality. Monitoring frequency shall be once per week and sample type shall be grab.

#### Total Suspended Solids

The previous permit established limits for suspended solids based on the technology-based BPT guidelines from 40 CFR Part 423.12 (b) (3). A limit of 30 mg/L monthly average and 100 mg/l daily maximum was established in the permit. Evaluation of the current sources contributing to this outfall indicate that they are not subject to 40 CFR Part 423 guidelines. However, the previous permit limits of 30 mg/L monthly average and 100 mg/L daily maximum are considered adequate to protect water quality in the receiving stream. Therefore, the previous permit limits shall be retained. Sampling frequency shall be retained at once per week and sample type shall be grab.

#### Nitrogen, Ammonia Total

Ammonia is present in the treated sanitary wastewater from Outfall 111. This treated wastewater enters the Yard Runoff Construction Holding Pond prior to discharge to Outfall 112. Ammonia can impact the receiving stream, Yellow Creek, because of its toxicity and because its biological oxidation causes reduction in stream dissolved oxygen. The previous permit established a monthly average limit of 1.46 mg/L based on the criterion continuous concentration (CCC) and 2.46 mg/L based on the criterion maximum concentration (CMC). Preliminary modeling has indicated that these limits will also protect dissolved oxygen resources in the receiving stream.

For the present permit, water quality calculations have been made using updated criteria from the EPA publication entitled "1999 Update of Ambient Water Quality Criteria for Ammonia." The calculations, presented in Appendix 5c, show that the chronic criterion concentration (CCC), which is pH and temperature dependent in the receiving stream, is 1.24 mg/L of ammonia as N. Since the low flow of the receiving stream is zero, this CCC value must be met in the discharge as a monthly average. The calculations were made for a pH of 8.0 and a summer temperature of 25° C.

The new permit shall establish the maximum daily concentration for ammonia as twice the monthly average concentration. This ratio is considered appropriate for well-operated biological wastewater treatment plants. Thus a value of 2.48 mg/L shall be set as the daily maximum limit. Measurement frequency shall be once per week and sample type shall be grab.

#### Dissolved Oxygen, (DO)

Outfall 112 discharges wastewater containing organic matter and ammonia (from treated sanitary waste) to Yellow Creek, a stream with a minimum flow of zero. Tennessee water quality criteria for this stream requires that dissolved oxygen be 5.0 mg/L or greater. Thus the discharge from the Outfall must meet this criteria and a limit of 5.0 mg/l as a daily maximum was established in the previous permit. This limit shall be retained in the new permit. Monitoring frequency shall be once per week and sample type shall be grab.

#### Total Residual Chlorine (TRC)

The sewage treatment plant, Outfall 111 has been the primary source of TRC in Outfall 112. The treatment plant has been recently converted to ultraviolet disinfection and chlorine should no longer be a water quality issue at this outfall. Because of the possibility that chlorine may be used (as a backup during maintenance or emergencies) TRC limits shall be retained at Outfall 112. However, TRC monitoring shall be applicable when chlorine, bromine, or any other oxidants are added. Sampling frequency shall be once per week and sample type shall be grab.

The permit establishes a reportable limit of 0.05 mg/L for TRC that is higher than the monthly average limit of 0.011 mg/L and the daily maximum limit of 0.019 mg/L for TRC. Therefore the reporting of concentrations of TRC at <0.05 mg/L shall effectively be used to demonstrate compliance with the effluent limitations. It should also be noted that any TRC detected at or above the detection level shall constitute a violation of the permit.

It should be pointed out that the two previous permits defined a required quantitation level for TRC at 0.05 mg/L. Also listed were the acceptable methods for

detection, as specified in 40 CFR Part 136, the amperometric titration, DPD colorimetric, starch end point direct, and specific ion electrode. The facility, which is using the DPD colorimetric method, has requested that the minimum level of quantitation (ML) for TRC be established at 0.08 mg/L based on limited site specific test data developed at the plant using EPA approved test methods and procedures for determining Method Detection Limit (MDL) under 40 CFR Part 136, Appendix B and subsequent adjustment to obtain a Minimum Level of Quantitation (ML). The facility is also requesting that this ML value be established as the minimum reportable limit in the permit. The Division has not accepted the site specific ML developed by WBN as the required detection level for reporting purposes. The required analytical quantification level for TRC is the permit limit, or 0.05 mg/L whichever is lower. In cases where the permit limit is less than 0.05 mg/L, and the quantification level for TRC in the effluent is determined to be 0.05 mg/L, the reporting of TRC at < 0.05 mg/L shall be interpreted to constitute compliance with the permit limit.

#### Toxicity Testing

Raw water from mechanical draft HVAC cooling towers and fire protection system may be treated with corrosion control and biocide products. These products are discharged through Outfall 112. The chemical makeup of the products used can change during the permit period and the combined toxicity effect of the chemicals is not known. Thus it is not feasible to apply chemical specific effluent limits to the discharge and assure the control of toxicity. Toxicity testing (coupled with evaluation of new products before they are used) is a reasonable method to evaluate the toxicity impacts of the products in the effluent. Therefore toxicity testing shall remain in the permit.

The previous permit required chronic toxicity testing, IC25, at a dilution of 100% based on the presence of zero minimum flow in Yellow Creek. The new permit shall retain this test requirement. Measurement frequency shall be semi-annual and sample type shall be composite.

#### **Outfall 113**

Outfall 113 discharges Supplemental Condenser Cooling Water (SCCW), which is noncontact, once through cooling water. Once through cooling water is subject to BPT and BAT technology-based limitations under 40 CFR Part 423. A portion of the water discharged through Outfall 113 enters the plant through the intake pumping station (IPS) and is treated with corrosion inhibitors and biocide. The remaining portion is obtained by gravity flow through the intake for the old TVA - Watts Bar Fossil Plant, which withdraws water from Watts Bar Reservoir above Watts Bar Dam. The proportion of flow from the IPS ranges from approximately 40 to 70 MGD and the remaining portion from Watts Bar Reservoir varies from approximately zero to 110 MGD. The water withdrawn from Watts Bar Lake may be passed through the condensers as once through cooling water, or by using a bypass valve arrangement, may be routed directly to Outfall 113.

#### Flow

The previous permit required flow to be measured on a continuous basis using a recorder. This language shall be retained in the new permit. Should the continuous flow monitoring equipment fail or need to be taken off line for repairs or calibration, the flow shall be measured by staff gage as a backup method until the flow monitoring

system is brought back on line. The permittee shall take reasonable steps to restore the flow monitoring as soon as possible.

Sudden changes in thermal loading at the plant, i.e., start-up or shutdown, should not be made unless there is discharge from Watts Bar Dam (the exception being changes necessary due to concern for human safety or the environment).

#### pH

The discharge is covered under 40 CFR Part 423 guidelines, which require that the pH be maintained between 6.0 and 9.0. Calculations given in Appendix 5d show that pH within this range will protect the water quality of the Tennessee River. Thus pH limitations shall remain 6.0 to 9.0 in the new permit. Sampling frequency shall be once per month and sample type shall be grab.

#### Total Suspended Solids (TSS)

TSS was included in the previous permit as a monitoring only requirement on a once per month basis. There are no technology based limits or numeric water quality criteria for this parameter. According to Tennessee Water Quality Criteria for the protection of fish and aquatic life [Chapter 1200-4-3-.03(3)], there shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character that may be detrimental to aquatic life in the receiving stream. Monitoring of TSS was required during the previous permit period and the data (see Appendix 4) indicated that the long-term average was 4.0 mg/L. Because the facility is considering adding bentonite to this waste stream as a method of detoxifying biocides, suspended solids monitoring shall remain in the permit. Sampling frequency shall be once per month and sample type shall be grab.

#### Chlorine, Total Residual

Total chlorine residual was limited in the previous permit at 0.092 mg/L as a monthly average and 0.158 as a daily maximum. These limits were based on compliance with instream water quality criteria at a previous permit flow of 192 MGD. Water quality calculations (presented in Appendix 5b) were performed using the long-term average combined flow of Outfall 101 and 113 from the current permit application. These calculations indicate that a monthly average of 0.15 mg/l and a daily maximum of 0.259 mg/L are necessary to comply with water quality criteria. In the case of the daily maximum value, the 0.2 mg/L BAT limit is more restrictive. Monitoring data from the previous permit period indicates that the long-term average and the maximum TRC concentration have been well below the permit limit (see Appendix 4). The WBN plant does not add chlorine to the Supplemental Condenser Cooling Water, however chlorine/bromine is potentially present in the outfall due to commingling of cooling tower blowdown. The previous permit limits shall be retained in the permit to comply with the antibacksliding provisions of 40 CFR Part 122.44 (l) and as part of the justification for the exceedance of the 2 hour per day guideline maximum for discharge of TRC (see discussion in Rationale under Additional Limitations, Conditions and Monitoring Requirements). Monitoring frequency shall be retained at once per month and sample type shall be grab.

#### Dissolved Oxygen, (DO)

Outfall 113 discharges Supplemental Condenser Cooling Water (SCCW), which is noncontact, once through cooling water to the Tennessee River via a difuser a mile 529.2. State water quality criteria for this stream requires that dissolved oxygen be 5.0 mg/L or greater. However, because of the high flow of the discharge from this Outfall and the receiving stream the narrative limit to "Report the minimum DO" shall be retained in the new permit. Monitoring frequency shall be once per month and sample type shall be grab.

#### Toxicity Testing

The new permit limit calculations indicate required chronic toxicity testing, IC25, at a dilution factor of 12.6 and a new limit of 8%. Measurement frequency shall be retained at semi-annual and sample type shall be composite.

#### Temperature, General

Tennessee water quality criteria for temperature contains three parts, (1) the discharge shall not cause the temperature of the receiving waters to exceed 30.5 °C instream after mixing, (2) the discharge shall not cause an upstream to downstream temperature change of more than 3 °C, and (3) the discharge shall not cause a rate of temperature change more than 2 °C per hour. All of these conditions must be met at the edge of the mixing zone for the discharge. Further the extent of the mixing zone should be such that fish and aquatic life are not harmed by the discharge.

TVA, as part of a previous permit application process, presented dilution model results, which indicated that the mixing zone of this discharge would allow the free passage of fish while avoiding bottom dwelling species. During periods of Watts Bar dam releases, the heated plume is predicted to stay near the right bank (looking downstream) and extend downstream for a distance of approximately 1000 feet. During periods of dam shutoff, the heated plume is predicted to extend across the entire width of the river. Normally a "bank to bank" mixing zone is not allowable; however; in this case, only near the surface does the "passive" mixing zone extend across the width of the river.

#### Temperature and Area of Mixing Zone

The dynamic nature of the river operations in the vicinity of the Outfall 113 discharge and the fact that this channel is not a natural stream lead to issues with defining an appropriate mixing zone. It is recognized that the temperatures occurring in the Tennessee River at the location of the discharge are the result of a complex set of variables defining the mixing hydrodynamics and heat balance. Many of the variables, such as meteorological inputs, dam turbine releases, dam leakage, flow direction, and reservoir stage are beyond the control of the Watts Bar Nuclear Plant. It is further recognized that applying instantaneous criteria is problematic because of the dynamic nature of the receiving stream (barge traffic, dam operations, rapidly changing plume location, etc.). For this reason, the Division has determined that compliance with the temperature criteria should not be applied on an instantaneous basis instead compliance will be implemented with the following changes.

The approach to the mixing zone in this permit will be to define both an active and a passive mixing zone of approximately the same overall size. (See Mixing Zone Diagram, Appendix 5H.) In the passive mixing zone case, corresponding to dam shutoff, the mixing zone geometry will be defined as before. The passive mixing zone extends across the entire width of the river and extends downstream approximately 1000 feet. The active mixing zone will apply to other conditions where the plume tends to reside in the right hand side of the river (facing downstream). Monitoring to establish compliance for the active mixing zone will occur 2000 feet downstream of Outfall 113 in the right hand side of the river. This monitoring will utilize two stations that will be placed after determining the best locations to capture, as much as possible, the true temperature in the plume. Temperature recorder station # 33 will be relocated and the new recorder station #34 are shown in general locations on the mixing zone diagram. The data from the two stations will be reported as the average of the temperatures for the two stations. The additional monitor and the averaging of the results will allow better tracking of the plume.

The modeling that predicted the previously described passive mixing zone will be [physically] verified by an instream thermal survey conducted semiannually. This passive mixing zone that was described in the previous permit has been verified by instream modeling and instream thermal surveys.

The permittee shall maintain the bottom temperature sensors in the Mussel Relocation Zone to ensure protection of bottom dwelling species and a zone of fish passage. The limit for the four existing monitors in the relocation zone will remain at 33.5°C (92.3°F) as the instantaneous maximum value previously established to protect those bottom dwelling species. The permittee will be allowed to remove the bottom velocity monitors in this area since correlation of directional flow with the operation of the dam has been established and further characterization is not needed. Measurement frequency shall be hourly and sample type shall be recorder. The permittee shall record this data on the DMRs, where exceedences of the limit will be considered a permit violation.

#### Temperature, Effluent

It is recognized that the temperature of the discharge, after use for cooling purposes, will be higher than that of the intake water. The previous permit did not establish a maximum effluent temperature but rather required reporting of effluent temperature. Sampling frequency was hourly and sample type was grab. This sampling requirement shall be retained in the new permit.

The temperature at the edge of the mixing zone must not exceed 30.5 °C as a daily maximum. Instream temperature monitors shall be employed at the downstream edge of the active mixing zone to demonstrate compliance. Measurement frequency shall be hourly and sample type shall be recorder.

#### Temperature, Rise Upstream to Downstream

In order to demonstrate compliance with the 3 °C maximum rise upstream to downstream, the permittee shall conduct automated instream temperature monitoring.

Monitoring locations shall include an upstream point (just below Watts Bar Dam) and a downstream point at the downstream edge of the mixing zone (as described above).

### **Additional Limitations, Conditions, and Monitoring Requirements**

In addition to the specific numerical limitations discussed above, there are a number of general requirements that shall apply to outfalls 101, 102, 103, 107, 111, 112, and 113. These requirements are discussed as follows:

40 CFR Part 423.12 (b) (2) (BPT) and Part 423.13 (a) (BAT) specify, "There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid." This requirement was in the previous permit and shall be retained in the new permit.

These requirements are potentially applicable to Outfalls 101, 102 and 113. Chlorine is not added to the Supplemental Condenser Cooling Water System (once through cooling water) at the Watts Bar Nuclear Plant; however, it is present in all Outfalls due to commingling of cooling tower blowdown. TVA has made a demonstration to the Division that the Watts Bar Nuclear Plant cannot operate under these "two hour per day" requirements without significant damage to the system potentially jeopardizing operational safety. No limit was placed on the hours of chlorine use in the previous permit and no such limit shall be included in the new permit.

40 CFR Part 423.12 (b) (8) (BPT requirements, non wastewater source specific) states that "Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available chlorine or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or State, if the State has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination."

40 CFR Part 423.13 (b) (2) (BAT requirements, specific to once through cooling water) also states that for plants with a rated electric generating capacity of 25 or more megawatts that "Total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to the permitting authority that discharge for more than two hours is required for microinvertebrate control. Simultaneous multi-unit chlorination is permitted."

40 CFR Part 423.13 (d) (2) (BAT requirements, specific to cooling tower blowdown) states "Neither free available nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or State, if the State has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination."

40 CFR Part 423.13 (d) (1), BAT requirements for cooling tower blowdown, establishes monthly average and daily maximum effluent limitations for the 126 Priority Pollutants. The monthly average limit and the daily maximum limit (except for chromium and zinc) for the 126 Priority Pollutants contained in chemicals added for cooling tower maintenance is "No

Detectable Amount.” However, Part 423.13 (d) (3) allows the permitting authority, at its discretion, to utilize engineering calculations which demonstrate that the regulated pollutants are not detectable in the final discharge by analytical methods in 40 CFR Part 136. This requirement is potentially applicable to outfall 101. TVA has provided data that demonstrates that priority pollutants will not be added to the system in quantities that will be detectable in cooling tower blowdown. Also the data provided with the Form 2C permit application indicates that the priority pollutants were not present in detectable amounts. The following general statement shall be added to the permit “Priority Pollutants contained in chemicals added for cooling tower maintenance except for zinc, shall not be discharged in cooling tower blowdown in amounts that are detectable by analytical methods in 40 CFR Part 136.” Monitoring for the Priority Pollutants shall not be required.

Bromine may be used at times in the raw water system. For purposes of measurement of Total Residual Chlorine (TRC) in the permit, analyses shall include residual bromine with the results reported as chlorine. Thus there is no separate test for residual bromine, but one test for situations where combinations of chlorine and bromine are being used.

The language in the previous permit shall be retained restricting start-up, shutdown and abrupt flow changes when the flow is below 3,500 cubic feet per second.

It is recognized that the permittee must use biocides and corrosion inhibitor products to protect plant piping systems and assure safety in the event of a shutdown. Because the chemicals in these products may be detrimental to fish and aquatic life in the receiving stream, there is a need to evaluate the nature of the chemicals, the dosage to be used, the duration of use, the effluent concentration, and the need for treatment prior to discharge. The previous permit required that a biocide treatment plan be submitted for approval by the Division and that subsequent changes to that plan during the permit period also be submitted for approval. It is also recognized that biocide and corrosion inhibitor products will change during the course of the NPDES permit period and that there is need for a mechanism to evaluate these changes relative to water quality impacts. Thus language has been incorporated into the permit to allow modification of the biocide and corrosion inhibitor plan based on pre-approval of the modifications by the Division.

## **VIII. METALS AND TOXICS**

The following procedure is used to calculate the allowable instream concentrations for permit limitations. If monitoring for a particular pollutant indicates that the pollutant is not present (i.e., consistently below detection level), then the division may drop the monitoring requirements in the reissued permit.

1. The most recent background conditions of the receiving stream segment are compiled. This information includes:
  - \* 7Q10 of receiving stream
    - \* Calcium hardness (measured ambient data, or 25 mg/L default)
    - \* Total suspended solids (measured ambient data, or 10 mg/L, default)
    - \* Background metals concentrations (measured ambient data, or ½ chronic water quality criteria)
    - \* Other dischargers impacting this segment
    - \* Downstream water supplies, if applicable
2. The chronic water quality criteria are converted from total recoverable metal at lab conditions to dissolved lab conditions for the following metals: cadmium, copper, lead, nickel and zinc. Then translators are used to convert the dissolved lab conditions to total recoverable metal at ambient conditions.
3. The acute water quality criteria is converted from total recoverable metal at lab conditions to dissolved lab conditions for the following metals: cadmium, copper, lead, nickel, zinc, silver and mercury. Then translators are used to convert the dissolved lab conditions to total recoverable metal at ambient conditions for the following metals: cadmium, copper, lead, nickel, silver and mercury.
4. The chronic criteria for Chromium (T) is given in the total recoverable form and is not converted to a dissolved lab condition or to the total recoverable ambient condition.
5. A standard mass balance equation determines the total allowable concentration (permit limit) for each pollutant. This equation also includes a percent stream allocation of 90%.

The following formulas are used to evaluate water quality protection:

$$C_m = \frac{Q_s C_s + Q_w C_w}{Q_s + Q_w}$$

where:

$C_m$  = resulting in-stream concentration after mixing  
 $C_w$  = concentration of pollutant in wastewater  
 $C_s$  = stream background concentration  
 $Q_w$  = wastewater flow  
 $Q_s$  = stream low flow

**to protect water quality:**

$$C_w \leq \frac{(S_A) [C_m (Q_s + Q_w) - Q_s C_s]}{Q_w}$$

where ( $S_A$ ) is the percent "Stream Allocation".

Calculations for this permit have been done using a standardized worksheet, titled "Water Quality Based Effluent Calculations." Division policy dictates the following procedures in establishing these permit limits:

1. The critical low flow values are determined using USGS data:

Fish and Aquatic Life Protection

7Q10 - Low flow under natural conditions

1Q10 - Regulated low flow conditions

Other than Fish and Aquatic Life Protection

30Q2 - Low flow under natural conditions

2. Fish & Aquatic Life water quality criteria for certain Metals are developed through application of hardness dependent equations. These criteria are combined with dissolved fraction methodologies in order to formulate the final effluent concentrations.
3. For criteria that are hardness dependent, chronic and acute concentrations are based on a Hardness of 25 mg/l and Total Suspended Solids (TSS) of 10 mg/l unless ambient stream data or water supply intake data substantiate a different value. Minimum and maximum limits on the hardness value used for water quality calculations are 25 mg/l and 400 mg/l respectively. The minimum limit on the TSS value used for water quality calculations is 10 mg/l.
4. Background concentrations are determined from the division database, results of sampling obtained from the permittee, and/or obtained from nearby stream sampling data. If this background data is not sufficient, one-half of the chronic "In-stream Allowable" water quality criteria for fish and aquatic life is used. If the measured background concentration is greater than the chronic "In-stream Allowable" water quality criteria, then the measured background concentration is used in lieu of the chronic "In-stream Allowable" water quality criteria for the purpose of calculating the appropriate effluent limitation (Cw). Under these circumstances, and in the event the "stream allocation" is less than 100%, the calculated chronic effluent limitation for fish and aquatic life should be equal to the chronic "In-stream Allowable" water quality criteria. These guidelines should be strictly followed where the industrial source water is not the receiving stream. Where the industrial source water is the receiving stream, and the measured background concentration is greater than the chronic "In-stream Allowable" water quality criteria, consideration may be given as to the degree to which the permittee should be required to meet the requirements of the water quality criteria in view of the nature and characteristics of the receiving stream.

The spreadsheet has fourteen (14) data columns, all of which may not be applicable to any particular characteristic constituent of the discharge. A description of each column is as follows:

**Column 1:** The "Stream Background" concentrations of the effluent characteristics.

**Column 2:** The "Chronic" Fish and Aquatic Life Water Quality criteria. For Cadmium, Copper, Lead, Nickel, and Zinc, this value represents the criteria for the dissolved form at laboratory conditions. The Criteria Continuous Concentration (CCC) is calculated using the equation:

$$CCC = (\exp \{ m_C [ \ln (\text{stream hardness}) ] + b_C \} ) (CCF)$$

CCF = Chronic Conversion Factor

This equation and the appropriate coefficients for each metal are from Tennessee Rule 1200-4-3-.03 and the EPA guidance contained in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996). Values for other metals are in the total form and are not hardness dependent; no chronic criteria exists for silver. Published criteria are used for non-metal parameters.

**Column 3:** The "Acute" Fish and Aquatic Life Water Quality criteria. For Cadmium, Copper, Lead, Nickel, Silver, and Zinc, this value represents the criteria for the dissolved form at laboratory conditions. The Criteria Maximum Concentration (CMC) is calculated using the equation:

$$CMC = (\exp \{ m_A [ \ln (\text{stream hardness}) ] + b_A \} ) (ACF)$$

ACF = Acute Conversion Factor

This equation and the appropriate coefficients for each metal are from Tennessee Rule 1200-4-3-.03 and the EPA guidance contained in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996). Values for other metals are in the total form and are not hardness dependent; no acute criteria exists for Total Chromium. Published criteria are used for non-metal parameters.

**Column 4:** The "Fraction Dissolved" converts the value for dissolved metal at laboratory conditions (columns 2 & 3) to total recoverable metal at in-stream ambient conditions (columns 5 & 6). This factor is calculated using the linear partition coefficients found in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996) and the equation:

$$\frac{C_{\text{diss}}}{C_{\text{total}}} = \frac{1}{1 + \{ [K_{\text{po}}] [ss^{(1+a)}] [10^{-6}] \}}$$

ss = in-stream suspended solids concentration [mg/l]

Linear partition coefficients for streams are used for unregulated (7Q10) receiving waters, and linear partition coefficients for lakes are used for regulated (1Q10) receiving waters. For those parameters not in the dissolved form in columns 2 & 3 (and all non-metal parameters), a Translator of 1 is used.

- Column 5:** The "Chronic" Fish and Aquatic Life Water Quality criteria at in-stream ambient conditions. This criteria is calculated by dividing the value in column 2 by the value in column 4.
- Column 6:** The "Acute" Fish and Aquatic Life Water Quality criteria at in-stream ambient conditions. This criteria is calculated by dividing the value in column 3 by the value in column 4.
- Column 7:** The "Chronic" Calculated Effluent Concentration for the protection of fish and aquatic life. This is the chronic limit.
- Column 8:** The "Acute" Calculated Effluent Concentration for the protection of fish and aquatic life. This is the acute limit.
- Column 9:** The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Organism Consumption (Recreation).
- Column 10:** The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Water and Organism Consumption. These criteria are only to be applied when the stream use classification for the receiving stream includes both "Recreation" and "Domestic Water Supply."
- Column 11:** The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Domestic Water Supply.
- Column 12:** The Calculated Effluent Concentration associated with Organism Consumption.
- Column 13:** The Calculated Effluent Concentration associated with Water and Organism Consumption.
- Column 14:** The Calculated Effluent Concentration associated with Domestic Water Supply.

The most stringent water quality effluent concentration from Columns 7, 8, 12, 13, and 14 is applied if the receiving stream is designated for domestic water supply. Otherwise, the most stringent effluent concentration is chosen from columns 7, 8, and 12 only.

The calculations are presented in Appendix 5b. One calculation has been made for the Tennessee River and one for Yellow Creek. Because of the close proximity of the outfalls and large flow of the discharges, Outfalls 101 and 113 have been combined for purposes of the water quality calculations in the Tennessee River. Background water quality in the Tennessee River has been taken from the Division of Water Pollution Control monitoring station at river mile 529.5. This data is presented in Appendix 5a.

Separate water quality calculations are presented for ammonia and pH in Appendix 5c and 5d respectively. In the case of ammonia, Outfalls 101 and 113 were combined for purposes of determining the discharge concentration allowable for the Tennessee River. Based on the calculations it was determined that limiting ammonia to prevent toxicity was not necessary.

**Storm Water**

The following table gives a summary of storm water discharges at the TVA  
 - Watts Bar Nuclear Plant:

Storm Water Outfall Summary					
E/SW PPP Area No.	Drainage Area acres	Impervious Area acres	Pond(s) Included in Drainage Area	Outfall Designation	Permit Coverage
1	42	34	YHP	101	NPDES
2	49	47	YHP	101	NPDES
3	144	5	None	To be re-evaluated for TMSP	
4	92	3	None	SW-1	TMSP
5	37	22	YHP	101	NPDES
6	29	1	None	SW-5	TMSP
7	18	7	LVWP+	103	NPDES
8	27	8	None	SW-2	TMSP
9	45	11	None	SW-3	TMSP
10	41	4	None	To be covered under TMSP	
11	77	18	None	To be covered under TMSP	
12	163	1	None	SW-4	TMSP
13	166	35	CRHP	To be re-evaluated for TMSP	
14	42	30	CRHP	To be re-evaluated for TMSP	
15	8	0	None	No industrial activity	
Total	980	226			

Outfalls that contain only storm water and other discharges allowed by the TMSP have been permitted under the Tennessee Storm Water Multi-Sector General Permit for Industrial Activities (TMSP). Outfalls SW-1 through SW-5 fall into this category and thus are not addressed in this individual permit. Outfalls that contain storm water commingled with process and/or cooling wastewater are covered under this individual NPDES permit. This includes Outfalls 101(or 102), and 112. The total flow from Outfall 101 (and 102 when in use) contains approximately 2.1% storm water based on the average annual flow. Storm runoff pollutants from this discharge shall be controlled via the Storm Water Pollution Prevention Plan (SWPPP) required by this permit (see Part IV of the Permit).

The Construction Yard Runoff Holding Pond (Outfall 112) receives drainage from approximately 208 acres of which 65 acres is impervious surfaces. Also this Outfall contains a large percentage (88% of annual average) of storm water. Storm runoff pollutants from this discharge shall be controlled via the Storm Water Pollution Prevention Plan (SWPPP) required by this permit. However, the division is evaluating the need for storm water discharges occurring through outfall 112 to require a separate permit application (Form 2F) and separate outfall designation, limitations, and monitoring requirements. The division is not assigning separate parameters and limits for stormwater discharges from outfalls 101 or 103 at this time.

It is the intent of the Division that the permittee institute a Storm Water Pollution Prevention Plan (SWPPP) in order to minimize the discharge of pollutants from storm water outfalls. It is the opinion of the Division that the best method for dealing with potential pollution associated with storm water discharges from the TVA-Watts Bar Nuclear Plant facility is through

implementation of an aggressive SWPPP coupled with discharge monitoring to verify SWPPP effectiveness.

In order to assist the permittee in the evaluation of the effectiveness of the SWPPP, benchmark values developed for the Tennessee Storm Water Multi-Sector General Permit for Industrial Activities are provided herein for comparison. These benchmark values (cut-off concentrations) were developed by the EPA and the State of Tennessee and are based on data submitted by similar industries for the development of the multi-sector general storm water permit. The cut-off concentrations are target values and should not be construed to represent permit limits.

Parameters of Concern	Cut-Off Concentration [mg/L]
<b>Total Suspended Solids (TSS)</b>	<b>200</b>
<b>Oil &amp; Grease</b>	<b>15</b>
<b>Iron, TOTAL</b>	<b>5.0</b>
<b>pH (range)</b>	<b>5.0 - 9.0</b>

Note: Sample values are from the Tennessee Storm Water Multi-Sector General Permit for Industrial Activities, Rationale, Part III, Table III-A: *Parameter Benchmark Values*.

The previous permit contained a requirement that a Storm Water Pollution Prevention Plan (SWPPP) be developed and maintained to regulate storm water runoff. This requirement shall be retained in the new permit. The SWPPP is meant to ensure that runoff from the facility site is not a significant source of pollution to the receiving stream. The discharger shall develop, document and maintain the SWPPP pursuant to the requirements as set forth in the Tennessee's Storm Water Multi-Sector General Permit for Industrial Activities, Sector O, "*Storm Water Discharges Associated with Industrial Activity from Steam Electric Power Generating Facilities, Including Coal Handling Areas*", Part 3, "*Storm Water Pollution Prevention Plan Requirements*", is available at <http://www.state.tn.us/environment/wpc/stormh2o/pmt-o.pdf> for this permit. The effectiveness of this SWPPP may be investigated by requiring storm water monitoring of the combined process/storm water discharges and requiring that the results of the storm water runoff monitoring be submitted. Should the required monitoring results so dictate, the Division maintains the authority to institute specific numeric limitations for the monitored parameters.

#### IX. BIOMONITORING REQUIREMENTS, CHRONIC

The discharge of industrial wastewater from Outfall 101, 102, 112, and 113 may contain several different pollutants, the combined effect of which has a reasonable potential to be detrimental to fish and aquatic life. The Tennessee Water Quality Standards criteria stipulate that "*The waters shall not contain toxic substances, whether alone or in combination with other substances, which will produce toxic conditions...*".

Since the permittee discharges to streams with low critical flow conditions, there is a concern for toxicity effects of the discharge on the receiving stream that is relatively unknown. Biomonitoring will provide information relative to the toxicity of the discharge. Chronic biomonitoring is designed to evaluate extended exposure effects of toxicants to growth and/or reproduction of sensitive aquatic species. Calculations of chronic toxicity limits are as follows:

For situations where water is withdrawn from the stream and then discharged back to the stream

$$DF = \frac{Q_s}{Q_w}$$

and for situations where water is not withdrawn from the stream

$$DF = \frac{Q_s + Q_w}{Q_w} = \text{Dilution Factor,}$$

Where **Q<sub>w</sub>** is the wastewater flow and **Q<sub>s</sub>** is a receiving stream low flow (7Q<sub>10</sub> or 1Q<sub>10</sub>),. Please refer to Appendix 5e for details regarding facility wastewater flow and receiving stream low flow. Where the calculated dilution factor is less than 100:1, and assuming immediate and complete mixing, protection of the stream from chronic effects requires:

$$IWC \leq 1.0 \times IC_{25}; \text{ or,}$$

$$\text{INHIBITION CONCENTRATION, } 25\% \geq IWC,$$

Where IWC is Instream Waste Concentration and is calculated as a percent of the total flow using the following formula:

For situations where water is withdrawn from the stream and then discharged back to the stream

$$IWC = \frac{Q_w}{Q_s} \times 100$$

and for situations where water is not withdrawn from the stream

$$IWC = \frac{Q_w}{Q_s + Q_w} \times 100$$

The following table gives the calculated chronic test values for the four outfalls:

Calculation of Chronic Biomonitoring Requirements								
Outfall	Receiving Stream	Rec. Stream Flow, Q <sub>s</sub> mgd	Outfall Waste Flow, Q <sub>w</sub> mgd	Withdrawing from Rec. Strm.	Dilution Factor, DF		Instream Wastewater Conc. (IWC)	
					Withdrawing Q <sub>s</sub> /Q <sub>w</sub>	Not Withdrawing (Q <sub>s</sub> + Q <sub>w</sub> )/Q <sub>w</sub>	Withdrawing (Q <sub>w</sub> /Q <sub>s</sub> )	Not Withdrawing (Q <sub>w</sub> /(Q <sub>w</sub> +Q <sub>s</sub> ))
Chronic Requirements, if DF $\leq$ 100								
101	TN River	2062	67.43	Yes	30.6		3.27%	
102	TN River	2062	67.43	Yes	30.6		3.27%	
112	Yellow Creek	0	0.38	No		1.0		100.00%
113	TN River	2062	178.38	No		12.6		7.96%

As seen from the table, WET testing shall be required on all four Outfalls. If toxicity is demonstrated in any of the effluent samples specified above, this shall constitute a violation of this permit.

The toxicity tests specified herein shall be conducted semi-annually for Outfalls 101, 102, 112, and 113 and begin no later than 60 days from the effective date of this permit.

#### **X. ANTIDegradation**

Tennessee's Antidegradation Statement is found in the Rules of the Tennessee Department of Environment and Conservation, Chapter 1200-4-3-.06. This statement outlines the criteria for the two types of high quality waters. Outstanding National Resource Waters (ONRWs), as designated by the Water Quality Control Board, are commonly referred to as Tier 3 waters. Other high quality waters, as identified by the division, are commonly referred to as Tier 2 waters. Other surface waters not specifically identified and/or designated as high quality are referred to as Tier 1 waters. Some Tier 1 waters may be identified by the Division as not meeting existing criteria.

The Division has made a stream tier determination of the receiving waters associated with the subject discharge(s) and has found the receiving stream to be neither a Tier 2 nor Tier 3 water. Additionally, this water is fully supporting its designated uses. The Department has maintained, and shall continue to assess, the water quality of the stream to assure that the water quality is adequate to protect the existing uses of the stream fully, and to assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

#### **XI. PERMIT DURATION**

The proposed limitations meet the requirements of Section 301(b)(2)(A), (C), (D), (E), and (F) of the Clean Water Act as amended. It is the intent of the division to organize the future issuance and expiration of this particular permit such that other permits located in the same watershed and group within the State of Tennessee shall be set for issuance and expiration at the same time. In order to meet the target reissuance date for the Tennessee River (Meigs & Rhea County) watershed and following the directives for the Watershed Management Program initiated in January 1996. This permit will expire in 2011.



**FACILITY DISCHARGES AND RECEIVING WATERS**

TVA - Watts Bar Nuclear Plant  
 TN0020168

OUTFALL 102	
LONGITUDE	LATITUDE
-84.791687	35.595833

FLOW (MGD)	DISCHARGE SOURCE
0.0000	Yard Holding Pond Overflow Weir (used only when Outfall 101 diffuser cannot be operated and Yard Holding Pond fills to point of overflowing). This discharge is typically not used.
<b>0.0000</b>	<b>TOTAL DISCHARGE</b>

RECEIVING STREAM DISCHARGE ROUTE			
Unnamed tributary entering Chickamauga Reservoir (Tennessee River Mile 527.2)			
STREAM LOW FLOW (CFS) *	7Q10	1Q10	30Q2
	4910	3190	8580
(MGD)	3173.3	2061.7	5545.3

STREAM USE CLASSIFICATIONS (WATER QUALITY)				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X	X			

Treatment: Biocide, sedimentation, neutralization, and oil skimming, mixing by submerged multipoint diffuser.

\* Reference: Flow Duration and Low Flows of Tennessee Streams through 1992 by George S. Law and Jess D. Weaver. Water Resources Investigations Report 95-4293 prepared by the U.S. Geological Survey in Cooperation with the Tennessee Department of Environment and Conservation and the Tennessee Valley Authority. Nashville, Tennessee, 1996, p.57.

**FACILITY DISCHARGES AND RECEIVING WATERS**

TVA - Watts Bar Nuclear Plant  
 TN0020168

OUTFALL 103	
LONGITUDE	LATITUDE
-83.20694	35.59722

FLOW (MGD)	DISCHARGE SOURCE
<b>Turbine Building Station Sump</b>	
0.1330	System Leakage and Maintenance
0.000	Con. Demineralizer Cleanup "A"
0.0001	Laboratory Wastes
0.0010	High Pressure Fire Protection Flushes
0.0001	Potable Water Line leaks
<b>Other Areas</b>	
0.0250	Alum Sludge Supernate
0.0500	Vendor Water Purification (RO reject water)
0.0100	Storm water Runoff
0.0001	Drum Dewatering
0.0000	Water Purification Plant
<b>0.219</b>	<b>TOTAL DISCHARGE</b>

RECEIVING STREAM DISCHARGE ROUTE			
Internal monitoring point that discharges through the Yard Holding Pond			
STREAM LOW FLOW (CFS) *	7Q10	1Q10	30Q2
	0.0	0.0	0.0
(MGD)	0.0	0.0	0.0

STREAM USE CLASSIFICATIONS (WATER QUALITY)				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X				

Treatment: Oil skimming, sludge thickening, and neutralization

\* No low stream flow assigned to the internal monitoring point which discharges to the Yard Holding Pond

**FACILITY DISCHARGES AND RECEIVING WATERS**

TVA - Watts Bar Nuclear Plant  
 TN0020168

OUTFALL 107	
LONGITUDE	LATITUDE
-84.7955	35.6048

FLOW (MGD)	DISCHARGE SOURCE
0.0310	Turbine Building Station Sump
0.0001	Drum Rinsing
0.0001	Diesel Generator Coolant
0.0001	Storm Water Runoff
<b>0.0313</b>	<b>TOTAL DISCHARGE</b>

RECEIVING STREAM DISCHARGE ROUTE			
Internal monitoring point which discharges through the Yard Holding Pond			
STREAM LOW FLOW (CFS) *	7Q10	1Q10	30Q2
(MGD)	0.0	0.0	0.0

STREAM USE CLASSIFICATIONS (WATER QUALITY)				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X				

Treatment: Oil skimming, sludge thickening, and neutralization

\* No low stream flow assigned to the internal monitoring point which discharges to the Yard Holding Pond

**FACILITY DISCHARGES AND RECEIVING WATERS**

TVA - Watts Bar Nuclear Plant  
 TN0020168

OUTFALL 111	
LONGITUDE	LATITUDE
-83.19583	35.60417

FLOW (MGD)	DISCHARGE SOURCE
0.0170	Sewage Treatment Plant
<b>0.0170</b>	<b>TOTAL DISCHARGE</b>

RECEIVING STREAM DISCHARGE ROUTE			
Internal monitoring point for treated sewage which discharges to the Construction Runoff Holding Pond			
STREAM LOW FLOW (CFS) *	7Q10	1Q10	30Q2
(MGD)	0.0	0.0	0.0

STREAM USE CLASSIFICATIONS (WATER QUALITY)				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X				

Treatment: Chemical oxidation, chemical precipitation, sedimentation, aerated lagoons, flocculation, ammonia stripping

\* No low stream flow assigned to the internal monitoring point which discharges to the Construction Runoff Holding Pond.

**FACILITY DISCHARGES AND RECEIVING WATERS**

TVA - Watts Bar Nuclear Plant  
 TN0020168

OUTFALL 112	
LONGITUDE	LATITUDE
-84.803056	35.601111

RECEIVING STREAM DISCHARGE ROUTE			
Unnamed tributary to Mile 1.3 of Yellow Creek embayment of Chickamauga Reservoir			
STREAM LOW FLOW (CFS) *	7Q10	1Q10	30Q2
(MGD)	0.0	0.0	0.0

FLOW (MGD)	DISCHARGE SOURCE
<u>Construction Runoff Holding pond</u>	
0.0170	Sewage Treatment Plant
0.0010	Training Center HVAC cooling water
0.0100	High Pressure Fire Protection System flushing
0.0010	Potable Water leaks
0.2180	Storm Water Runoff
<b>0.2470</b>	<b>TOTAL DISCHARGE</b>

STREAM USE CLASSIFICATIONS (WATER QUALITY)				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X				

Treatment: Sedimentation and Oil Skimming

\* No low stream data could be found for this stream. Because of the relatively small drainage area, low flow was estimated to be zero.

**FACILITY DISCHARGES AND RECEIVING WATERS**

TVA - Watts Bar Nuclear Plant  
 TN0020168

OUTFALL 113	
LONGITUDE	LATITUDE
-84.785833	35.593333

RECEIVING STREAM DISCHARGE ROUTE			
Discharge via diffuser to Chickamauga Reservoir (Tennessee River Mile 529.2)			
STREAM LOW FLOW (CFS) *	7Q10	1Q10	30Q2
(MGD)	4910	3190	8580
	3173.3	2061.7	5545.3

FLOW (MGD)	DISCHARGE SOURCE
129.0	Supplemental Condenser Cooling Water (Noncontact)
<b>129.0</b>	<b>TOTAL DISCHARGE</b>

STREAM USE CLASSIFICATIONS (WATER QUALITY)				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X	X			

Treatment: Thermal Mixing

\* Reference: Flow Duration and Low Flows of Tennessee Streams through 1992 by George S. Law and Jess D. Weaver. Water Resources Investigations Report 95-4293 prepared by the U.S. Geological Survey in Cooperation with the Tennessee Department of Environment and Conservation and the Tennessee Valley Authority. Nashville, Tennessee, 1996, p.57.

**FACILITY DISCHARGES AND RECEIVING WATERS**

TVA - Watts Bar Nuclear Plant  
 TN0020168

OUTFALL 114	
LONGITUDE	LATITUDE
-83.21667	35.62083

RECEIVING STREAM DISCHARGE ROUTE			
Discharge via Tennessee River @ mile 529.8			
STREAM LOW FLOW (CFS) *	7Q10	1Q10	30Q2
	4910	3190	8580
(MGD)	3173	2062	5545

FLOW (MGD)	DISCHARGE SOURCE
0.019	Supplemental Condenser Cooling Water (Intake screen backwash)
<b>0.019</b>	<b>TOTAL DISCHARGE</b>

STREAM USE CLASSIFICATIONS (WATER QUALITY)				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X	X			

Treatment: Screens

\* Reference: Flow Duration and Low Flows of Tennessee Streams through 1992 by George S. Law and Jess D. Weaver. Water Resources Investigations Report 95-4293 prepared by the U.S. Geological Survey in Cooperation with the Tennessee Department of Environment and Conservation and the Tennessee Valley Authority. Nashville, Tennessee, 1996, p.57.

**APPENDIX 2**

**APPLICABLE EFFLUENT LIMITATIONS GUIDELINES**

**SIC GROUP 4911, 40 CFR PART 423  
 STEAM ELECTRIC POWER GENERATING CATEGORY GUIDELINES**

<b>LOW VOLUME WASTE SOURCES</b>				
<b>EFFLUENT CHARACTERISTIC</b>	<b>BPT</b>		<b>BAT</b>	
	<b>MONTHLY</b>	<b>DAILY</b>	<b>MONTHLY</b>	<b>DAILY</b>
	<b>AVG. CONC. (mg/L)</b>	<b>MAX CONC. (mg/L)</b>	<b>AVG. CONC. (mg/L)</b>	<b>MAX CONC. (mg/L)</b>
Total Suspended Solids	30	100	--	--
Oil and Grease	15	20	--	--
pH	6.0-9.0		--	--
Polychlorinated Biphenyl Compounds	No Discharge Allowed		No Discharge Allowed	

<b>METAL CLEANING WASTES</b>				
<b>EFFLUENT CHARACTERISTIC</b>	<b>BPT</b>		<b>BAT</b>	
	<b>SUBPART 423.12</b>		<b>SUBPART 423.13</b>	
	<b>MONTHLY</b>	<b>DAILY</b>	<b>MONTHLY</b>	<b>DAILY</b>
	<b>AVG. CONC. (mg/L)</b>	<b>MAX CONC. (mg/L)</b>	<b>AVG. CONC. (mg/L)</b>	<b>MAX CONC. (mg/L)</b>
Total Suspended Solids	30	100	--	--
Oil and Grease	15	20	--	--
pH	6.0-9.0		--	--
Copper, Total	1.0	1.0	1.0	1.0
Iron, Total	1.0	1.0	1.0	1.0
Polychlorinated Biphenyl Compounds	No Discharge Allowed		No Discharge Allowed	

**APPLICABLE EFFLUENT LIMITATIONS GUIDELINES**

**SIC GROUP 4911, 40 CFR PART 423  
 STEAM ELECTRIC POWER GENERATING CATEGORY GUIDELINES**

<b>COOLING TOWER BLOWDOWN</b>				
<b>EFFLUENT CHARACTERISTIC</b>	<b>BPT</b>		<b>BAT</b>	
	<b>SUBPART 423.12</b>		<b>SUBPART 423.13</b>	
	<b>MONTHLY</b>	<b>DAILY</b>	<b>MONTHLY</b>	<b>DAILY</b>
	<b>AVG. CONC. (mg/L)</b>	<b>MAX CONC. (mg/L)</b>	<b>AVG. CONC. (mg/L)</b>	<b>MAX CONC. (mg/L)</b>
Chlorine, Free Available*	0.2	0.5	0.2	0.5
pH	6.0-9.0		--	--
Chromium, Total	--	--	0.2	0.2
Zinc, Total	--	--	1.0	1.0
Priority Pollutants (126) contained in chemicals added for cooling tower maintenance, except Chromium and Zinc			No Detectable Amount	
Polychlorinated Biphenyl Compounds	No Discharge Allowed		No Discharge Allowed	

<b>ONCE THROUGH COOLING WATER</b>				
<b>EFFLUENT CHARACTERISTIC</b>	<b>BPT</b>		<b>BAT</b>	
	<b>SUBPART 423.12</b>		<b>SUBPART 423.13</b>	
	<b>MONTHLY</b>	<b>DAILY</b>	<b>MONTHLY</b>	<b>DAILY</b>
	<b>AVG. CONC. (mg/L)</b>	<b>MAX CONC. (mg/L)</b>	<b>AVG. CONC. (mg/L)</b>	<b>MAX CONC. (mg/L)</b>
Chlorine, Free Available	0.2	0.5	--	--
Chlorine, Total Residual*	--	--	--	0.2
pH	6.0-9.0		--	--
Chromium, Total	--	--	0.2	0.2
Zinc, Total	--	--	1.0	1.0
Polychlorinated Biphenyl Compounds	No Discharge Allowed		No Discharge Allowed	

\* Limitation applies to once through cooling water from plants with a total rated electric generating capacity of 25 or more megawatts.

**APPENDIX 3**

**PREVIOUS PERMIT LIMITS AND MONITORING REQUIREMENTS**

<b>PERMIT LIMITS</b>						
<b><u>TVA-Watts Bar Nuclear</u></b>						
<b>OUTFALL 101</b>						
<b>Cooling Water, Storm Water and Process Wastewater</b>						
<b>EFFLUENT CHARACTERISTIC</b>	<b>EFFLUENT LIMITATIONS</b>				<b>MONITORING REQUIREMENTS</b>	
	<b>MONTHLY</b>		<b>DAILY</b>		<b>MSRMNT. FRQNCY.</b>	<b>SAMPLE TYPE</b>
	<b>AVG. CONC. (mg/l)</b>	<b>AVG. AMNT. (lb/day)</b>	<b>MAX. CONC. (mg/l)</b>	<b>MAX. AMNT. (lb/day)</b>		
<b>FLOW</b>	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		Continuous	Recorder <sup>1</sup>
<b>Certification of Instream Flow of 3,500 cfs when required</b>	--		Report as Yes/No		1/Month	Operation Records
<b>pH <sup>2</sup></b>	Range 6.0 - 9.0				2/Month	Grab
<b>TOTAL SUSPENDED SOLIDS (TSS)</b>	30.0	--	100.0	--	1/Month	Grab
<b>OIL &amp; GREASE</b>	15.0	--	20.0	--	1/Month	Grab
<b>CHROMIUM, TOTAL</b>	2.0		2.0		WAVED <sup>6</sup>	Grab
<b>ZINC, TOTAL</b>	1.0		1.0	--	2/Month	Grab
<b>CHLORINE, TOTAL RESIDUAL (TRC) <sup>2,3</sup></b>	0.10	--	0.10	--	5/Week	Grab <sup>2,3</sup>
<b>TEMPERATURE, Effluent <sup>4</sup></b>	--	--	35 °C	--	Continuous	Recorder
<b>IC25 <sup>5</sup></b>	25% Inhibition Concentration shall be ≥2.4% effluent				Semi-annual	Composite <sup>5</sup>

**There shall be no discharge of PCBs.**

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD). In the event that the continuous flow monitor is out of service, flow monitoring shall be estimated by intake pump logs.

<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> The acceptable methods for detection and reporting of total residual chlorine are referenced in Part I, Section B. Monitoring Procedures, subsection 3. Test Procedures, paragraph b.

<sup>4</sup> When the temperature monitoring equipment fails, monitoring will be done once per day. Reasonable and timely effort will be made to restore the temperature recorder to operation as soon as possible. See Part III for further temperature requirements.

<sup>5</sup> See Part III for methodology.

<sup>6</sup> Monitoring for chromium is waived per 40 CFR 122.44 (a)(2)(i). See Rationale for more comments.

**PERMIT LIMITS**

**TVA-Watts Bar Nuclear**

**OUTFALL 102**

**Cooling water, Stormwater runoff and Process Wastewater**

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX CONC. (mg/l)	MAX AMNT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		1/Day	Instantaneous
Certification of Instream Flow of 3,500 cfs when required	-		Report as Yes/No		1/Month <sup>5</sup>	Operation Records
pH <sup>2</sup>	Range 6.0 - 9.0				2/Month <sup>5</sup>	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	100.0	--	1/Month <sup>6</sup>	Grab
OIL & GREASE	15.0	--	20.0	-	1/Month <sup>6</sup>	Grab
CHROMIUM, TOTAL	2.0		2.0		WAIVED <sup>6</sup>	Grab
ZINC, TOTAL	1.0	--	1.0	--	2/Month <sup>6</sup>	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>2,3</sup>	0.10	--	0.10	--	5/Week	Grab <sup>2,3</sup>
TEMPERATURE, Effluent	--	--	35° C	--	1/Day	Grab
IC25 <sup>4</sup>	25% Inhibition Concentration shall be ≥2.4% effluent				Semi-annual <sup>4</sup>	Composite <sup>4</sup>

**There shall be no discharge of PCBs.**

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD).

<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> The acceptable methods for detection and reporting of total residual chlorine are referenced in Part I, Section B. Monitoring Procedures, subsection 3. Test Procedures, paragraph b.

<sup>4</sup> Sampling and analysis required only if discharge is operated 30 days or more during the semi-annual periods January through June or July through December and if all toxicity testing requirements have not already been completed for Outfall 101. See Part III for methodology.

<sup>5</sup> Certification shall be made during any month that a discharge occurs from this outfall.

<sup>6</sup> If there is discharge during 1 or more days from this outfall, sampling is required to comply with the maximum daily limit. If there are two or more separate days of discharge, or a continuous discharge during 5 or more consecutive days from this outfall, 2 samples are required to comply with the measurement

<sup>6</sup> Monitoring for chromium is waived per 40 CFR 122.44 (a)(2)(i). See Rationale for more comments.

**PERMIT LIMITS**

**TVA-Watts Bar Nuclear**

**OUTFALL 111 (Internal Monitoring Point)**  
**Treated Sanitary Wastewater**

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		Continuous	Recorder
BOD5	30.0	--	45.0	--	1/Week	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	45.0	--	1/Week	Grab
SETTLABLE SOLIDS	--	--	1.0 mL	--	2/Week	Grab
E. COLI	See footnote <sup>3</sup>				1/Week	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>2,4</sup>	--	--	2.0	--	5/Week	Grab <sup>2,4</sup>

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD).

<sup>2</sup> TRC analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> The wastewater discharge for Outfall 111 must be disinfected to the extent that viable coliform organisms are effectively eliminated. The concentration of *E. coli* after disinfection shall not exceed 126 per 100 ml as the geometric mean based on a minimum of 10 samples, collected from a given sampling site over a period of not more than 30 consecutive days with individual samples being collected at intervals not less than 12 hours. For the purpose of determining the geometric mean, individual samples having an *E. coli* concentration of less than one (1) per 100 ml. shall be considered as having a concentration of one (1) per 100 ml. Where less than 10 samples are made per month, the permittee shall use an arithmetic mean rather than the geometric mean. In the absence of a method in 40 CFR, Part 136 for measuring *E. coli* in effluent matrices, the permittee shall use methods proposed or added to Part 136 for measuring *E. coli* in ambient water.

<sup>4</sup> TRC monitoring shall be applicable when chlorine, bromine, or any other oxidants are added. The acceptable methods for detection and reporting of total residual chlorine are referenced in Part I, Section B. Monitoring Procedures, subsection 3. Test Procedures, paragraph b.

**TVA-Watts Bar Nuclear**

**OUTFALL 112**  
**Construction Yard Holding Pond - Storm Runoff**

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		1/Week	Estimate <sup>1</sup>
pH <sup>2</sup>	Range 6.0 - 9.5				1/Week	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	100.0	--	1/Week	Grab
NITROGEN, AMMONIA TOTAL	1.24	--	2.48	--	1/Week	Grab
DISSOLVED OXYGEN (D.O.)	--	--	5.0 Min.	--	1/Week	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>2,3</sup>	0.011	--	0.019	--	1/Week	Grab
IC25 <sup>4</sup>	25% Inhibition Concentration shall be $\geq$ 100% Effluent				Semi-annual	Composite <sup>4</sup>

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD) and shall be estimated based on measurement at existing weir.

<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> TRC monitoring shall be applicable when chlorine, bromine, or any other oxidants are added. The acceptable methods for detection and reporting of total residual chlorine are referenced in Part I, Section B. Monitoring Procedures, subsection 3. Test Procedures, paragraph b.

<sup>4</sup> See Part III for methodology

**TVA-Watts Bar Nuclear**

**OUTFALL 113**

**Supplemental Condenser Cooling Water**

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		Continuous	Recorder
Certification of Instream Flow of 3,500 cfs when required	--		Report as Yes/No		1/Month	Operation Records
pH <sup>2</sup>	Range 6.0 - 9.0				1/Month	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	100.0	--	1/Month	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>2,3,6</sup>	0.092	--	0.158	--	1/Month <sup>6</sup>	Grab
DISSOLVED OXYGEN (D.O.)	--	--	Report Min.	--	1/Month	Grab
TEMPERATURE, Effluent	Report Effluent Temperature <sup>4</sup>				Hourly	Recorder <sup>7</sup>
TEMPERATURE, Edge of Mixing Zone	--	--	30.5 °C	--	Hourly	Recorder <sup>7</sup>
TEMPERATURE, Rise Upstream to Downstream	--	--	3 °C	--	Hourly	Calculated <sup>7</sup>
TEMPERATURE, Rate of Change, °C per hour	--	--	2 °C/Hour	--	Hourly	Calculated <sup>7</sup>
TEMPERATURE, Receiving Stream Bottom	--	--	33.5 °C	--	Hourly	Recorded
IC25 <sup>5</sup>	25% Inhibition Concentration shall be ≥7.6% effluent				Semi-annual	Composite <sup>5</sup>

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD).

<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> The acceptable methods for detection and reporting of total residual chlorine are referenced in Part I, Section B. Monitoring Procedures, subsection 3. Test Procedures, paragraph b.

<sup>4</sup> See text below table for requirements.

<sup>5</sup> See Part III for methodology

<sup>6</sup> Sampling for TRC shall be 5/Week during periods when the Supplemental Condenser Cooling Water (SCCW) system is in operation.

<sup>7</sup> See additional (bulleted) comments in permit. Begins on page 8 of 27.

**APPENDIX 4**

**HISTORICAL MONITORING DATA**

Monitoring period for Outfall 101	Flow DMax	pH Min	pH Max	TSS MAvg	TSS DMax	O&G MAvg	O&G DMax	Residual Chlorine, Total, MAvg	Residual Chlorine, Total, DMax	Zinc, Total, MAvg	Zinc, Total, DMax	Temperature, Effluent, Dmax
Permit limit	MGD	6.0	9.0	30	100	15	20	0.10	0.10	1.0	1.0	35°C
3/31/2005	67.008	7.8	7.9	6	6	5.0	5.0	0.02	0.04	0.14	0.51	16
4/30/2005	71.43	8	8.1	6	6	0.0	0.0	0	0	0.01	0.01	24
5/31/2005	59.951	8.2	8.5	8	8	5.0	5.0	0.02	0.02	0.01	0.01	27
6/30/2005	53.743	8.2	8.3	8	8	5.0	5.0	0.02	0.02	0.06	0.12	32
7/31/2005	60.412	7.8	8.2	8	8	5.0	5.0	0.02	0.03	0.48	0.94	32
8/31/2005	61.132	7.5	7.8	4	4	5.0	5.0	0.05	0.05	0.03	0.05	32
9/30/2005	41.22	8.1	8.6	6	6	5.0	5.0	0.05	0.05	0.04	0.04	31
10/31/2005	58.36	8.3	8.3	6	6	5.0	5.0	0.05	0.05	0.03	0.03	30
11/30/2005	51.343	7.8	8.7	16	16	5.0	5.0	0.05	0.07	0.02	0.02	24
12/31/2005	42.205	7.1	8.2	4	4	5.0	5.0	0.05	0.06	0.01	0.01	19
1/31/2006	69.068	7.9	8.3	4	4	5.0	5.0	0.05	0.05	0.01	0.01	24
2/28/2006	80.965	7.9	8	4	4	5.0	5.0	0.05	0.05	0.02	0.03	18
3/31/2006	66.457	7.6	8.2	8	8	5.0	5.0	0.05	0.05	0.01	0.01	22
4/30/2006	62.959	8.4	8.4	8	8	5.0	5.0	0.05	0.09	0.01	0.01	24
5/31/2006	52.72	8.3	8.4	6	6	5.0	5.0	0.05	0.09	0.06	0.11	28
6/30/2006	70.547	6.9	8.5	8	9	5.0	5.0	0.05	0.07	0.13	0.15	26
7/31/2006	61.192	7.6	9	8	10	5.0	5.0	0.05	0.05	0.03	0.05	31
8/31/2006	65.049	7.3	8.7	10	13	5.0	5.0	0.05	0.05	0.02	0.03	31
9/30/2006	54.096	7.9	8.4	9	9	5.0	5.0	0.05	0.06	0.16	0.21	30
10/31/2006	71.951	7.4	7.4	8	8	5.0	5.0	0.05	0.08	0.10	0.19	24
11/30/2006	60.689	7.6	7.8	4	4	5.0	5.0	0.05	0.05	0.02	0.02	17
12/31/2006	50.744	7.6	7.8	5	5	5.0	5.0	0.05	0.06	0.02	0.02	18
1/31/2007	79.241	7.6	7.7	8	8	5.0	5.0	0.05	0.05	0.02	0.02	23
2/28/2007	72.709	7.7	7.8	3	3	5.0	5.0	0.05	0.05	0.01	0.01	19
3/31/2007	72.181	7	7.8	7	8	5.0	5.0	0.05	0.06	0.01	0.01	27
4/30/2007	56.033	7.7	7.9	6	6	6.0	6.0	0.05	0.05	0.02	0.03	25
5/31/2007	57.637	7.7	7.8	3	3	5.0	5.0	0.05	0.06	0.03	0.03	27
6/30/2007	56.487	7.7	7.8	5	5	5.3	5.3	0.05	0.05	0.09	0.14	31
7/31/2007	51.006	7.8	8	6	6	5.6	5.6	0.05	0.06	0.03	0.04	29
8/31/2007	53.287	7.7	7.8	6	6	5.4	5.4	BDL	BDL	0.07	0.09	32
9/30/2007	61.968	7.8	7.9	6	6	5.6	5.6	0.05	0.08	0.04	0.04	31
10/31/2007	53.567	7.9	8	8	8	BDL	BDL	BDL	BDL	0.03	0.04	29
11/30/2007	55.738	7.4	7.8	8	8	5.6	5.6	0.05	0.05	0.04	0.04	24
12/31/2007	68.589	7.7	7.9	15	15	5.3	5.3	BDL	BDL	BDL	BDL	23
1/31/2008	66.907	7.5	7.6	3	3	5.0	5.0	0.05	0.05	0.01	0.01	18
2/28/2008	71.093	7.9	8.4	9	9	1.9	1.9	0.05	0.05	0.02	0.02	24
3/31/2008	83.773	7.9	8.3	7	7	5.0	5.0	0.05	0.09	0.01	0.01	22
4/30/2008	84.775	7.7	8.1	9	9	5.0	5.0	0.05	0.05	0.03	0.03	26
5/31/2008	87.671	7.6	7.8	12	12	5.5	5.5	0.05	0.07	0.11	0.18	28
6/30/2008	94.131	8	8	4	4	5.3	5.3	0.05	0.06	0.06	0.07	32
7/31/2008	82.482	7.8	8	10	10	5.6	5.6	0.06	0.07	0.06	0.10	31
8/31/2008	102.937	7.6	7.9	7	7	5.2	5.2	0.05	0.07	0.12	0.12	32
9/30/2008	108.107	7.6	7.7	11	11	5.2	5.2	0.05	0.07	0.06	0.09	31
10/31/2008	93.129	7.8	7.9	4	4	5.0	5.0	0.05	0.05	0.14	0.20	28
11/30/2008	83.773	8	8.3	8	8	5.0	5.0	0.05	0.05	0.04	0.04	23
12/31/2008	73.519	7.8	8.4	4	4	5.5	5.5	0.05	0.05	0.04	0.05	23
1/31/2009	65.15	7.7	7.9	7	7	5.3	5.3	0.05	0.05	0.01	0.01	20
	Flow DMax	pH Min	pH Max	TSS MAvg	TSS DMax	O&G MAvg	O&G DMax	Residual Chlorine, Total, MAvg	Residual Chlorine, Total, DMax	Zinc, Total, MAvg	Zinc, Total, DMax	Temperature, Effluent, Dmax
Permit limit	MGD	6.0	9.0	30	100	15	20	0.10	0.10	1.0	1.0	35°C
Average	67.43	NA	NA	7.0	7.2	5.0	5.0	0.046	0.055	0.055	0.087	25.957
Minimum	NA	6.90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Maximum	108.107	NA	9.00	16	16	6	6	0.050	0.090	0.480	0.940	32.000
Exceedances	NA	0	0	0	0	0	0	0	0	0	0	0
Count	47	47	47	47	47	46	46	44	44	46	46	47



Monitoring period for Outfall 103	Flow DMax	pH Min	pH Max	TSS MAvg	TSS DMax	O&G MAvg	O&G DMax
Permit limit	MGD	6.0	9.0	30	100	15	20
3/31/2005	0.359	8.8	7.1	8	9	5.0	5.0
4/30/2005	0.312	8.8	7.9	4	4	BDL	BDL
5/31/2005	0.266	8.8	7.9	6	6	5.0	5.0
6/30/2005	0.185	8.8	7.5	7	8	5.0	5.0
7/31/2005	0.017	8.6	7.4	10	15	5.0	5.0
8/31/2005	0.02	8.7	8.1	4	5	5.0	5.0
9/30/2005	0.09	7.8	7.2	12	12	5.0	5.0
10/31/2005	0.208	8.9	7.4	10	15	5.0	5.0
11/30/2005	0.195	7.8	7.5	11	14	5.0	5.0
12/31/2005	0.163	8.4	7.1	8	8	5.0	5.0
1/31/2006	0.237	8.2	7.5	9	10	5.0	5.0
2/28/2006	0.17	8.8	7.3	12	19	5.0	5.0
3/31/2006	0.022	8.9	7.5	18	65	5.0	5.0
4/30/2006	0.022	8.4	7.7	9	12	5.0	5.0
5/31/2006	0.022	8	7.1	8	11	5.0	5.0
6/30/2006	0.022	8.8	7.2	7	9	5.0	5.0
7/31/2006	0.022	8.1	7	4	5	5.0	5.0
8/31/2006	0.022	8.6	8.2	8	10	5.0	5.0
9/30/2006	0.022	8.7	7	11	14	5.0	5.0
10/31/2006	0.013	7.4	8.6	7	8	5.0	5.0
11/30/2006	0.013	7.9	8.5	4	6	5.0	5.0
12/31/2006	0.013	7.7	8.3	3	4	5.0	5.0
1/31/2007	0.120	7.6	8.3	2	3	6.0	6.0
2/28/2007	0.021	7	8.2	6	10	5.0	5.0
3/31/2007	0.095	8.3	8.4	4	4	6.0	6.0
4/30/2007	0.022	8.2	8.5	6	7	5.0	6.0
5/31/2007	0.022	8.7	8.7	14	18	5.0	6.0
6/30/2007	0.022	7.9	8.5	7	8	5.4	5.6
7/31/2007	0.022	7.3	8.7	6	6	6.5	7.4
8/31/2007	0.022	7	8.8	9	12	5.2	5.3
9/30/2007	0.022	7.7	8.6	5	5	5.6	5.6
10/31/2007	0.022	7.3	7.8	5	5	5.9	5.9
11/30/2007	0.021	8.6	8.6	4	4	5.6	5.6
12/31/2007	0.013	8.7	8.7	6	6	5.3	5.3
1/31/2008	0.022	8.2	8.9	4	4	5.3	5.6
2/28/2008	0.021	7.2	8.6	7	7	3.6	5
3/31/2008	0.524	8.6	8.9	6	6	5	5
4/30/2008	0.375	8.3	8.8	10	14	5	5
5/31/2008	0.297	7.1	8.6	6	7	5.3	5.6
6/30/2008	0.311	7.6	8.3	6	6	5.5	5.6
7/31/2008	0.187	7.4	8.8	7	8	5.5	5.6
8/31/2008	0.229	7.6	8.4	8	10	5.3	5.3
9/30/2008	0.295	8.5	8.7	7	8	5.3	5.3
10/31/2008	0.273	8.3	8.8	6	6	5	5
11/30/2008	0.235	7.9	8.9	8	10	5.2	5.3
12/31/2008	0.238	8.2	8.9	7	9	5	5
1/31/2009	0.173	7.4	8.7	5	6	5	5
	Flow DMax	pH Min	pH Max	TSS MAvg	TSS DMax	O&G MAvg	O&G DMax
Permit limit	MGD	6.0	9.0	30	100	15	20
Average	0.13	NA	NA	7.2	9.8	5.2	5.3
Minimum	NA	7.00	NA	NA	NA	NA	NA
Maximum	0.524	NA	8.90	18	65	7	7
Exceedances	NA	0	0	0	0	0	0
Count	47	47	47	47	47	46	46

Outfall 107 discharges as a batch discharge. All data presented as historical data. Additional intermittent discharge from condenser tube cleaning wastewater. Filtered to 5 microns for asbestos.



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Monitoring period for Outfall 111	Flow DMax	BOD5, Mavg	BOD5, Dmax	TSS MAvg	TSS DMax	Set. Solids DMax	Residual Chlorine, Total, DMax	E.coli, Geo. Mean/10 samples
Permit limit	MGD	30.0	45.0	30	45	1.0 ml/L	2.0	126/100 ml
3/31/2005	0.023	9	15	6	7	0.1	Conditional Monitoring - Not Required This Period	2
4/30/2005	0.032	3	5	2	2	0.1		1
5/31/2005	0.019	2	3	4	4	0.1		1
6/30/2005	0.014	2	2	2	4	0.1		1
7/31/2005	0.022	2	2	2	2	0.1		1
8/31/2005	0.021	2	3	1	2	0.1		1
9/30/2005	0.015	2	2	2	2	0.1		3
10/31/2005	0.015	2	2	2	4	0.1		1
11/30/2005	0.019	3	7	6	12	0.1		1
12/31/2005	0.020	2	2	5	7	0.1	0.05	6
1/31/2006	0.032	2	2	10	17	0.1		1
2/28/2006	0.023	2	2	7	10	0.1		1
3/31/2006	0.020	2	2	11	14	0.1		4
4/30/2006	0.039	3	4	8	9	0.1		7
5/31/2006	0.022	2	2	4	8	0.1		2
6/30/2006	0.016	2	3	3	4	0.1		2
7/31/2006	0.015	2	2	3	4	0.1		2
8/31/2006	0.030	2	2	3	6	0.1		2
9/30/2006	0.048	7	12	5	11	0.1		2
10/31/2006	0.052	13	29	3	5	.1		3
11/30/2006	0.064	4	9	2	3	.1		1
12/31/2006	0.028	2	2	3	7	.1		1
1/31/2007	0.025	2	2	5	9	.1		1
2/28/2007	0.016	6	8	8	19	.1		1
3/31/2007	0.022	2	2	2	2	.1		1
4/30/2007	0.019	2	2	2	4	.1		1
5/31/2007	0.014	2	2	2	4	.1		2
6/30/2007	0.016	5	5	2	3	.1		1
7/31/2007	0.015	5	5	3	5	.1		2
8/31/2007	0.013	5	5	2	4	.1		2
9/30/2007	0.016	5	5	1	2	.1		2
10/31/2007	0.012	5	5	2	3	.1		1
11/30/2007	0.019	5	5	2	5	.1		1
12/31/2007	0.023	5	5	BDL	BDL	.1		1
1/31/2008	0.046	8	22	2	4	.1		1
2/28/2008	0.074	5	5	4	6	.1		2
3/31/2008	0.048	6	12	7	12	.1		2
4/30/2008	0.032	5	5	4	6	.3		13
5/31/2008	0.028	5	5	3	5	.3		11
6/30/2008	0.023	5	5	2	3	.1		18
7/31/2008	0.023	9	22	3	7	.2		3
8/31/2008	0.008	5	5	2	2	.1		10
9/30/2008							No Discharge	
10/31/2008							No Discharge	
11/30/2008							No Discharge	
12/31/2008							No Discharge	
1/31/2009							No Discharge	

	Flow DMax	BOD5 Mavg	BOD5 Dmax	TSS MAvg	TSS DMax	Set. Solids DMax	Residual Chlorine, Total, DMax	E.coli, Geo. Mean/10 samples
Permit limit	MGD	30.0	45.0	30	45	1.0 ml/L	2.0	126/100 ml
Average	0.03	NA	NA	3.7	6.0	0.1	0.1	2.905
Minimum	NA	2.00	NA	NA	NA	NA	NA	NA
Maximum	0.074	NA	29.00	11	19	0	0	18.000
Exceedances	NA	0	0	0	0	0	0	42
Count	42	42	42	41	41	42	1	42

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Monitoring period for Outfall 112	Flow DMax	pH Min	pH Max	TSS MAvg	TSS DMax	Nitrogen Ammonia, Total, MAvg	Nitrogen Ammonia, Total, DMax	Dissolved Oxygen, Dmax	Residual Chlorine, Total, MAvg	Residual Chlorine, Total, DMax
Permit limit	MGD	6.0	9.5	30	100	1.24	2.48	5.0 (min.)	0.011	0.019
3/31/2005	0.654	7	7.8	16	24	0.04	0.07	7.8	Conditional Monitoring - Not Required This Period	
4/30/2005	0.654	6.9	7.4	10	12	0.09	0.16	8.2	Conditional Monitoring - Not Required This Period	
5/31/2005	0.457	6.9	8.3	16	24	0.21	0.58	7.0	Conditional Monitoring - Not Required This Period	
6/30/2005	0.367	8.1	9	23	33	0.18	0.56	5.7	Conditional Monitoring - Not Required This Period	
7/31/2005	0.100	7.7	8.7	9	11	0.15	0.22	5.2	Conditional Monitoring - Not Required This Period	
8/31/2005	0.364	8.1	8.6	15	24	0.08	0.12	7.1	Conditional Monitoring - Not Required This Period	
9/30/2005	0.653	8.4	8.8	8	11	0.22	0.26	5.5	Conditional Monitoring - Not Required This Period	
10/31/2005	0.035	8.7	9.2	9	14	0.18	0.34	6.5	Conditional Monitoring - Not Required This Period	
11/30/2005	0.066	7.2	7.6	8	10	1.38	1.9	5.3	Conditional Monitoring - Not Required This Period	
12/31/2005	0.186	6.6	8	14	18	0.08	0.19	9.0	Conditional Monitoring - Not Required This Period	
1/31/2006	0.654	7.1	8.3	16	20	0.04	0.05	8.1	Conditional Monitoring - Not Required This Period	
2/28/2006	0.654	7.4	8.4	25	36	0.01	0.01	14.3	Conditional Monitoring - Not Required This Period	
3/31/2006	0.233	7.3	8.9	22	38	0.02	0.06	9.7	Conditional Monitoring - Not Required This Period	
4/30/2006	0.654	6.9	7.3	8	10	0.26	0.32	5.7	Conditional Monitoring - Not Required This Period	
5/31/2006	0.285	7	7.7	12	18	0.1	0.21	5.3	Conditional Monitoring - Not Required This Period	
6/30/2006	0.039	7.9	7.9	22	22	0.06	0.06	5.3	Conditional Monitoring - Not Required This Period	
7/31/2006	0.01	7.1	8.9	17	22	0.08	0.13	5.1	Conditional Monitoring - Not Required This Period	
8/31/2006	0.291	6.9	7.5	15	18	0.3	0.34	5.1	Conditional Monitoring - Not Required This Period	
9/30/2006	0.654	6.9	7.4	12	15	0.29	0.32	5.2	Conditional Monitoring - Not Required This Period	
10/31/2006	0.65	7.0	7.4	15	42	0.25	0.51	6.7	Conditional Monitoring - Not Required This Period	
11/30/2006	0.40	7.0	7.2	9	14	0.08	0.13	8.1	Conditional Monitoring - Not Required This Period	
12/31/2006	0.38	7.0	8.6	18	28	0.03	0.07	8.8	Conditional Monitoring - Not Required This Period	
1/31/2007	0.65	6.9	8.4	9	14	0.04	0.10	8.3	Conditional Monitoring - Not Required This Period	
2/28/2007	0.22	7.4	8.2	10	12	0.13	0.25	10.2	Conditional Monitoring - Not Required This Period	
3/31/2007	0.38	6.9	8.3	8	10	0.21	0.55	5.2	Conditional Monitoring - Not Required This Period	
4/30/2007	0.65	6.9	7.6	13	15	0.22	0.59	6.1	Conditional Monitoring - Not Required This Period	
5/31/2007	0.13	6.9	8.4	22	30	0.14	0.20	6.2	Conditional Monitoring - Not Required This Period	
6/30/2007	0.39	7.2	9.0	16	30	0.22	0.54	5.2	Conditional Monitoring - Not Required This Period	
7/31/2007	0.07	8.4	8.8	12	17	0.20	0.51	5.2	Conditional Monitoring - Not Required This Period	
8/31/2007	0.11	7.9	8.4	23	38	0.14	0.19	5.3	Conditional Monitoring - Not Required This Period	
9/30/2007	0.07	7.1	8.3	8	11	0.20	0.38	5.1	Conditional Monitoring - Not Required This Period	
10/31/2007	0.26	7.9	8.7	9	11	0.16	0.22	6.8	Conditional Monitoring - Not Required This Period	
11/30/2007	0.65	6.9	8.5	10	22	0.45	0.93	5.1	Conditional Monitoring - Not Required This Period	
12/31/2007	0.08	6.6	7.8	10	16	0.28	0.41	7.0	Conditional Monitoring - Not Required This Period	
1/31/2008	0.31	6.9	7.0	7	8	0.14	0.23	8.4	Conditional Monitoring - Not Required This Period	
2/28/2008	0.65	6.9	7.0	7	14	0.26	0.40	8.3	Conditional Monitoring - Not Required This Period	
3/31/2008	0.65	7.0	7.4	7	10	0.19	0.36	8.3	Conditional Monitoring - Not Required This Period	
4/30/2008	0.65	7.2	7.8	10	17	0.13	0.15	6.0	Conditional Monitoring - Not Required This Period	
5/31/2008	0.36	7.5	9.0	21	36	0.14	0.21	7.4	Conditional Monitoring - Not Required This Period	
6/30/2008	0.34	8.7	9.2	20	26	0.26	0.06	3.9	Conditional Monitoring - Not Required This Period	
7/31/2008	0.35	8.1	9.1	13	29	0.47	1.00	5.7	Conditional Monitoring - Not Required This Period	
8/31/2008	0.65	7.0	9.1	8	9	0.24	0.32	5.4	Conditional Monitoring - Not Required This Period	
9/30/2008	0.61	7.8	7.9	13	13	0.10	0.10	5.1	Conditional Monitoring - Not Required This Period	
10/31/2008	0.41	7.8	8.7	15	24	0.10	0.10	7.2	Conditional Monitoring - Not Required This Period	
11/30/2008	0.07	7.1	8.6	20	37	0.27	0.61	6.9	Conditional Monitoring - Not Required This Period	
12/31/2008	0.45	7.1	8.5	11	17	0.15	0.33	7.7	Conditional Monitoring - Not Required This Period	
1/31/2009	0.45	7.1	7.5	4	5	0.34	0.83	8.4	Conditional Monitoring - Not Required This Period	
	Flow DMax	pH Min	pH Max	TSS MAvg	TSS DMax	Nitrogen Ammonia, Total, MAvg	Nitrogen Ammonia, Total, DMax	Dissolved Oxygen, Dmax	Residual Chlorine, Total, MAvg	Residual Chlorine, Total, DMax
Permit limit	MGD	6.0	9.5	30	100	1.24	2.48	5.0 (min.)	0.011	0.019
Average	0.38	NA	NA	13.3	19.9	0.2	0.3	6.8	NA	
Minimum	NA	6.60	NA	NA	NA	NA	NA	5.1	NA	
Maximum	0.654	NA	9.20	25	42	1.38	1.90	14.3	NA	
Exceedances	NA	0	0	0	0	1	0	0	NA	
Count	47	47	47	47	47	47	47	47	NA	

TVA-Watts Bar Nuclear Plant (Rationale)  
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Monitoring period for Outfall 113	Flow DMax	pH Min	pH Max	TSS MAvg	TSS DMax	Residual Chlorine, Total, MAvg	Residual Chlorine, Total, DMax	Dissolved Oxygen, Dmax	TEMPERATURE, Effluent	TEMPERATURE, Edge of Mixing Zone	TEMPERATURE, Rise Upstream to Downstream	TEMPERATURE, Rate of Change, # °C per hour	TEMPERATURE, Receiving Stream Bottom	
Permit limit	MGD	6.0	9.0	30	100	0.092	0.158	Rpt. (min.)	Report	30.5 °C	3 °C	2 °C/Hour	33.5 °C	
3/31/2005	49.49	Operation Shutdown								20	12.2	1	0	13.6
4/30/2005	193.64	8.2	8.2	5	5	BDL	BDL	7.9	28	16.9	1	0	16.9	
5/31/2005	190.62	8.2	8.2	4	4	0.02	0.03	7.2	30	21.5	1	1	22.1	
6/30/2005	207.92	8.4	8.4	4	4	0.02	0.02	7.3	32	25.1	1	1	25.3	
7/31/2005	199.98	8.3	8.3	4	4	0.02	0.04	7.0	34	26.4	1	1	26.6	
8/31/2005	206.55	8.1	8.1	1	1	0.05	0.05	7.2	34	28.1	1	1	28.4	
9/30/2005	207.89	8.1	8.1	2	2	0.05	0.05	7.3	32	27.3	0	0	28.0	
10/31/2005	198.01	8.2	8.2	5	5	0.05	0.05	9.0	30	25.2	0	1	26.0	
11/30/2005	186.29	8.1	8.1	6	6	0.05	0.05	9.3	27	18.5	1	1	19.1	
12/31/2005	155.17	6.5	8.5	2	2	0.05	0.05	9.2	24	12.8	2	1	14.4	
1/31/2006	152.36	8.3	8.3	3	3	0.05	0.05	8.7	25	9.4	2	1	10.9	
2/28/2006	133.75	8	8	6	6	0.05	0.05	8.3	24	9.8	1	2	10.7	
3/31/2006	128.03	8.2	8.2	5	5	0.05	0.05	9.0	28	13.1	1	1	13.2	
4/30/2006	137.66	8.3	8.3	4	4	0.05	0.05	7.6	29	19.7	2	1	19.9	
5/31/2006	140.74	7.8	7.8	3	3	0.05	0.05	7.9	31	21.1	1	1	21.4	
6/30/2006	117.31	8.4	8.4	5	5	0.05	0.05	7.4	32	26.3	1	1	26.7	
7/31/2006	222.97	8.3	8.3	4	4	0.05	0.05	7.2	34	28.1	1	1	28.5	
8/31/2006	235.77	8.4	8.4	3	3	0.05	0.05	6.5	34	28.7	1	0	29.2	
9/30/2006	233.66	8.2	8.2	3	3	0.05	0.05	6.0	32	27.9	0	0	28.4	
10/31/2006	28.99	7.6	7.6	1	1	0.05	0.05	7.2	25	22.8	0	0	22.9	
11/30/2006	182.73	7.6	7.6	3	3	0.05	0.05	11.7	22	16.7	1	0	16.9	
12/31/2006	189.48	7.6	7.6	4	4	0.05	0.07	9.0	26	12.6	2	1	13.1	
1/31/2007	169.02	7.4	7.4	4	4	0.05	0.05	10.3	26	11.3	1	1	12.1	
2/28/2007	143.74	7.7	7.7	2	2	0.05	0.05	8.1	25	7.8	1	1	10.1	
3/31/2007	188.17	7.5	7.7	4	4	0.05	0.07	7.7	29	13.8	2	1	14.4	
4/30/2007	189.71	7.4	7.4	5	5	0.05	0.06	9.2	29	16.0	1	1	16.7	
5/31/2007	205.98	7.7	7.8	5	5	0.05	0.05	7.4	30	21.9	1	1	21.9	
6/30/2007	213.74	7.8	7.8	4	4	0.05	0.05	6.4	32	26.3	1	1	26.4	
7/31/2007	220.48	7.9	7.9	6	6	0.05	0.05	7.3	32	26.7	1	1	27.0	
8/31/2007	222.11	7.9	7.9	3	3	BDL	BDL	7.2	34	28.3	1	1	28.5	
9/30/2007	216.97	8	8.0	2	2	0.05	0.05	7.7	32	27.9	1	0	27.9	
10/31/2007	211.44	7.7	7.7	3	3	BDL	BDL	8.4	31	26.5	1	1	26.1	
11/30/2007	212.83	7.6	7.6	7	7	0.05	0.05	8.8	28	21.6	1	1	20.8	
12/31/2007	174.73	8	8.0	5	5	BDL	BDL	9.1	28	14.1	1	1	13.7	
1/31/2008	164.88	7.6	7.6	3	3	0.05	0.05	7.9	26	12.4	2	1	10.2	
2/28/2008	175.61	7.6	7.6	4	4	0.05	0.05	8.4	28	10.6	1	1	8.4	
3/31/2008	157.60	7.2	7.2	9	9	0.05	0.05	7.9	26	12.3	1	1	14.9	
4/30/2008	166.35	8	8.0	4	4	0.05	0.05	7.8	29	18.2	1	1	17.2	
5/31/2008	194.86	8	8.0	3	3	0.05	0.05	7.6	31	20.9	1	1	21.1	
6/30/2008	193.15	7.9	7.9	3	3	0.05	0.05	7.6	33	26.3	1	2	26.3	
7/31/2008	190.01	8.1	8.1	3	3	0.05	0.05	8.0	34	27.2	1	0	27.3	
8/31/2008	185.68	7.9	7.9	3	3	0.05	0.05	7.4	34	28.3	1	0	28.2	
9/30/2008	187.03	8	8.0	5	6	0.05	0.05	8.0	32	26.6	1	1	26.2	
10/31/2008	184.67	7.9	7.9	6	6	0.05	0.05	8.1	30	25.1	1	0	24.8	
11/30/2008	174.79	8.4	8.4	5	5	0.05	0.05	9.2	20	26.0	1	0	18.3	
12/31/2008	162.15	8.4	8.4	4	4	0.05	0.05	9.0	13	26.0	1	1	11.6	
1/31/2009	171.26	8.0	8.0	5	5	0.05	0.05	9.8	25	10.1	1	0	8.9	

	Flow DMax	pH Min	pH Max	TSS MAvg	TSS DMax	Residual Chlorine, Total, MAvg	Residual Chlorine, Total, DMax	Dissolved Oxygen, Dmax	TEMPERATURE, Effluent	TEMPERATURE, Edge of Mixing Zone	TEMPERATURE, Rise Upstream to Downstream	TEMPERATURE, Rate of Change, # °C per hour	TEMPERATURE, Receiving Stream Bottom
Permit limit	MGD	6.0	9.0	30	100	0.092	0.158	Rpt. (min.)	Report	30.5 °C	3 °C	2 °C/Hour	33.5 °C
Average	178.38	NA	NA	4.0	4.0	0.0	0.0	8.091	28.723	20.477	1.043	0.766	20.243
Minimum	NA	6.50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Maximum	235.772	NA	8.50	9	9	0.05	0.07	11.700	34.000	23.700	2.000	2.000	29.200
Exceedances	NA	0	0	0	0	0	0	46	NA	0	0	0	0
Count	47	46	46	46	46	42	42	46	47	47	47	47	47

**APPENDIX 5a**

**AMBIENT MONITORING DATA**

AMBIENT MONITORING DATA  
 TENNESSEE RIVER MILE 529.5  
 WPC STATION ID TENNE529.5PH

Parameter	Units	Sampling Date												Avg.
		05-21-2007	3/7/2007	09-19-2006	05-09-2006	02-01-2006	11/9/2005	07-26-2005	02-05-2001	11-14-2000	01/19/2000	05-15-2000	02-15-2000	
pH	Std. Units	7.7	8.28	7.8	7.68	7.71	7.78	7.3	7.7	7.71	7.65	8.37	7.74	
Field Conductivity	umho	172	179	214	171	128	194	171.6	203	156.2	115	174	170	
DO	mg/L	6.35	15.83	6.58	6.83	11.74	8.65	12.9	8.4	6.42	7.12		8.58	
Temperature	°C	19.44	7.86	25.09	19.42	8.56	17.43	6.1	16.7	26.75	19.3	9.82	16.6	
E Coli	CFU/100ml			1 U	1 Q		1 Q	1 QU	1 QU	1 Q	1 Q	1 QU	1.00	
Suspended Residue	mg/L	10 U	10 U	12	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10.20	
Total Hardness	mg/L	86	29	92	71	44	107	79	72	86	103	74	79.4	
COD	mg/L	3 U	5.1	6.4	5 U	3 U	10	5 U	5 U	33.4	28.8	5 U	10.7	
Ammonia as N	mg/L	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.02 U	0.02 U	0.07	0.04	0.03	
Nitrate + Nitrite	mg/L	0.006 U	0.29	0.006 U	0.2	0.36	0.22	0.23	0.4	0.17	0.12	0.19	0.73	
Total Kjeldahl N	mg/L	0.15 U	0.15 U	0.15 U	0.15	0.52	0.15 U	0.15 U	0.23	0.18	0.1 U	0.25	0.21	
Total Phosphorus	mg/L	0.01 J	0.02	0.01 U	0.03	0.02 U	0.02 U	0.28	0.03	0.006	0.042	0.004 U	0.05	
Arsenic	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.00	
Cadmium	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.00	
Copper	ug/L	2.4	1 U	1 U	3	2	3	2	2	3	2	1 U	2.10	
Chromium	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.00	
Lead	ug/L	1 U	1 U	1 U	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.00	
Mercury	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.20	
Nickel	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10.0	
Zinc	ug/L	2.4 U	1 U	1 U	8	8	25	2	8	25	7	4	9.0	

Qualities:  
 Q = Received out of holding time  
 U = Analyte requested but not detected  
 J = Estimated value-result is less than sample quantitation limit but greater than zero

**APPENDIX 5b**

**WATER QUALITY BASED EFFLUENT CALCULATIONS**

**WATER QUALITY BASED EFFLUENT CALCULATIONS  
 OUTFALL 112**

FACILITY: Watts Bar Nuclear Plant  
 PERMIT #: TN0020168

Stream (7Q10)	Stream (30Q2)	Waste Flow	Ttl. Susp. Solids	Hardness (as CaCO3)	Stream Allocation
[MGD]	[MGD]	[MGD]	[mg/l]	[mg/l]	[%]
0.000	0.000	0.380	10	50	100

EFFLUENT CHARACTERISTIC	1	2		3	4	5		6	7	8
	Stream Conc.***	Fish/Aqua. Life Water Quality Criteria		Effluent Fraction	Dissolved [Fraction]	Fish & Aquatic Life Water Quality Criteria (7Q10)		Calc. Effluent Concentration		
	[ug/l]	Chronic	Acute	Chronic		Acute	Chronic	Acute		
<b>Cadmium *</b>	0.309	0.617	1.746	0.252	2.445	6.915	2.45	6.9		
<b>Copper *</b>	3.139	6.278	8.856	0.348	18.06	25.48	18.1	25.5		
<b>Lead *</b>	0.587	1.174	30.14	0.184	6.386	163.9	6.4	163.9		
<b>Nickel *</b>	43.72	87.45	787.4	0.432	202.3	1821	202.3	1821.4		
<b>Silver *</b>	0.000	NA	1.047	1.000	NA	1.047	N/A	1.0		
<b>Zinc *</b>	29.04	58.088	63.61	0.288	201.7	220.9	201.7	220.9		
<b>Mercury, (T) **</b>	0.025	0.908	1.690	1.000	0.908	1.690	0.91	1.7		
<b>Chromium (T) **</b>	50.00	100.0	NA	1.000	100.0	N/A	100.0	N/A		
<b>Cyanide (T) **</b>	2.60	5.200	22.00	1.000	5.200	22.000	5.2	22.0		
<b>Chlorine (T. Res.)</b>	0.000	11.000	19.00	1.000	11.00	19.000	11.0	19.0		

EFFLUENT CHARACTERISTIC	9	10	11	12	13	14
	Human Health Water Quality Criteria (30Q2)					
	Organisms	Water/Organisms	DWS	Organisms	Water/Organism	DWS
<b>Cadmium *</b>	NA	NA	5.0	NA	NA	5.0
<b>Copper *</b>	NA	N/A	NA	NA	NA	NA
<b>Lead *</b>	NA	NA	5.0	NA	NA	5.0
<b>Nickel *</b>	4600	610.0	100.0	4600.0	610.0	100.0
<b>Silver *</b>	NA	NA	NA	NA	NA	NA
<b>Zinc *</b>	NA	NA	NA	NA	NA	NA
<b>Mercury, (T) **</b>	0.051	0.05	2.0	0.1	0.1	2.0
<b>Chromium (T) **</b>	NA	NA	100.0	NA	NA	100.0
<b>Cyanide (T) **</b>	220000	700.0	200.0	220000	700.0	200.0
<b>Chlorine (T. Res.)</b>	NA	NA	NA	NA	NA	NA

\* Denotes metals for which Fish & Aquatic Life Criteria are expressed as a function of total hardness. The Fish & Aquatic Life criteria for this metal are in the dissolved form at laboratory conditions.

The in-stream allowable criteria and calculated effluent concentrations are in the total recoverable form.

\*\* The criteria for these parameters are in the total form.

\*\*\* Background concentrations are established from ambient stream data. Where ambient data is unavailable or insufficient, the background concentration is established as 1/2 of the chronic water quality criteria or 1/2 of the human health criteria, whichever is smaller.

NOTE: Water Quality criteria for stream use classifications other than Fish & Aquatic Life are based on the 30Q2 flow.

**WATER QUALITY BASED EFFLUENT CALCULATIONS  
 OUTFALLS 101 AND 113 COMBINED**

FACILITY: Watts Bar Nuclear Plant  
 PERMIT #: TN0020168

Stream (7Q10)	Stream (30Q2)	Waste Flow	Ttl. Susp. Solids	Hardness (as CaCO3)	Stream Allocation
[MGD]	[MGD]	[MGD]	[mg/l]	[mg/l]	[%]
2062.000	5545.000	162.820	8.4	80.6	90

EFFLUENT CHARACTERISTIC	1	2	3	4	5	6	7	8
	Stream Bckgmd. Conc.***	Fish/Aqua. Life Water Quality Criteria		Effluent Fraction Dissolved	Fish & Aquatic Life Water Quality Criteria (7Q10)			
	[ug/l]	In-Stream Allowable		[Fraction]	In-Stream Allowable		Calc. Effluent Concentration	
	[ug/l]	Chronic	Acute		Chronic	Acute	Chronic	Acute
Cadmium *	0.440	0.879	2.931	0.248	3.541	11.807	38.54	140.2
Copper *	1.600	9.440	13.887	0.358	26.38	38.81	306.2	459.1
Lead *	0.994	1.988	51.03	0.189	10.510	269.7	117.9	3305.5
Nickel *	10.00	130.98	1179.3	0.451	290.6	2617	3459.7	32064.1
Silver *	0.000	NA	2.381	1.000	NA	2.381	N/A	29.3
Zinc *	10.00	87.054	95.33	0.299	291.4	319.2	3470.2	3811.1
Mercury, (T) **	0.025	0.908	1.690	1.000	0.908	1.690	10.88	20.5
Chromium (T) **	1.00	100.0	NA	1.000	100.0	N/A	1218.4	N/A
Cyanide (T) **	2.60	5.200	22.00	1.000	5.200	22.000	34.3	240.9
Chlorine (T. Res.)	0.000	11.000	19.00	1.000	11.00	19.000	150.3	259.6

EFFLUENT CHARACTERISTIC	9	10	11	12	13	14
	Human Health Water Quality Criteria (30Q2)					
	In-Stream Criteria			Calc. Effluent Concentration		
	Organisms [ug/l]	Water/Organisms [ug/l]	DWS [ug/l]	Organisms [ug/l]	Water/Organisms [ug/l]	DWS [ug/l]
Cadmium *	NA	NA	5.0	NA	NA	144.3
Copper *	NA	NA	NA	NA	NA	NA
Lead *	NA	NA	5.0	NA	NA	127.3
Nickel *	4600	610.0	100.0	144825.4	18939.2	2848.5
Silver *	NA	NA	NA	NA	NA	NA
Zinc *	NA	NA	NA	NA	NA	NA
Mercury, (T) **	0.051	0.05	2.0	0.8	0.8	62.3
Chromium (T) **	NA	NA	100.0	NA	NA	3124.4
Cyanide (T) **	220000	700.0	200.0	6941011	22005.6	6230.4
Chlorine (T. Res.)	NA	NA	NA	NA	NA	NA

\* Denotes metals for which Fish & Aquatic Life Criteria are expressed as a function of total hardness. The Fish & Aquatic Life criteria for this metal are in the dissolved form at laboratory conditions.

The in-stream allowable criteria and calculated effluent concentrations are in the total recoverable form.

\*\* The criteria for these parameters are in the total form.

\*\*\* Background concentrations are established from ambient stream data. Where ambient data is unavailable or insufficient, the background concentration is established as 1/2 of the chronic water quality criteria or 1/2 of the human health criteria, whichever is smaller.

NOTE: Water Quality criteria for stream use classifications other than Fish & Aquatic Life are based on the 30Q2 flow.



**Outfalls 101 and 113 Combined  
 Ammonia as Nitrogen Calculations**

The State utilizes the EPA document, 1999 Update to Ambient Water Quality Criteria for Ammonia and assumed temperatures of 25°C and 15°C and stream pH of 8 to derive an allowable instream protection value. A mass balance with plant and stream flows and this allowable value determines the monthly average permit limit. Seasonal limits may also be allowed due to ambient temperature variations between the summer and winter seasons.

	Winter			Summer		
Temp (°C)=	15			25		
pH=	8			8		
Min (2.85, 1.45*10 <sup>-0.028*(25-T)</sup> )	2.76	2.85	2.76	1.45	2.85	1.45

$$CCC = \left( \frac{0.0577}{1+10^{(7.688-pH)}} + \frac{2.487}{1+10^{(pH-7.688)}} \right) * \text{Min}(2.85, 1.45*10^{-0.028*(25-T)})$$

CCC= 2.36

CCC= 1.24

CCC - Continuous Chronic Criterion Allowable instream NH3 concentration [mg/l]

$$CCC = \frac{(\text{Critical Low Flow [MGD]} * \text{Background Ammonia [mg/L]} + (\text{Design Flow [MGD]} * \text{Effluent Concentration [mg/L]})}{(\text{Critical Low Flow [MGD]} + (\text{Design Flow [MGD]})}$$

where: 3173.0 Critical Low Flow [MGD] (typically, a 7Q10 value)  
 0.1 Background Ammonia Concentration [mg/L]  
 162.7 Discharge long-term average flow [MGD]

For the case where the discharger withdraws water from the stream, The Allowable Effluent Concentrations and corresponding Amounts in winter and summer are:

Winter	Summer
44.2 Concentration [mg/L]	2230 Concentration [mg/L]
59921.1 Amount [lb/day]	30254.0 Amount [lb/day]

Calculation of the Criterion Maximum Concentration where salmonid fish are absent:  
 Note 1 - the CMC is independent of temperature and is based on a one hour average exposure concentration.

$$CMC = [0.411 / (1 + 10^{(7.204 - pH)})] + [(58.4 / (1 + 10^{(pH - 7.204)})]$$

pH= 8  
 CMC= 8.4 mg/L as N

A pH value of 8 (instead of historically used 7) was chosen for two reasons: 1.) ambient monitoring in west TN showed that a pH often exceeds 7.5, and is up to 8 sometimes 2.) this assumption is more conservative.

Allowable effluent Concentration is: 62.1 mg/l as N  
 21997.6 Amount [lbs/day]

Note 2 - Where the source of ammonia is a biological treatment plant, the permit writer may establish the maximum daily concentration at 2 times the 30 day average instead of the value calculated from the CMC. The factor of 2 is a ratio of daily maximum to monthly average considered typical for a well operated biological treatment plant.

**APPENDIX 5D**

**WATER QUALITY CALCULATIONS FOR PH**

**Calculation of Instream pH Resulting From  
 the Combined Discharges of Outfall 101 and 113**

(This spreadsheet may be used to calculate allowable discharge pH by trial and error)

Note: WPC/EPA policy requires all discharges to be within the range of 6.0 to 9.0  
 TN fish and aquatic life criteria require the stream pH to be within 6.5 to 9.0  
 This calculation is to determine if a discharge pH at 6.0 can cause the stream pH to fall below 6.5  
 The calculation is only applicable to cases where the discharge flow is significant relative to the stream flow

Enter stream background pH --->	---	7.3	minimum from ambient data (see Appendix 5a)
Enter stream flow in MGD --->	---	2062.0	use 1Q10
Enter discharger minimum pH --->	---	6.0	
Enter discharger flow, MGD --->	---	162.7	
Combined strm/discharge pH =		Unknown	
Combined strm/disch flow, MGD =		2224.7	

pH = -log [H+], where [H+] is the hydrogen ion concentration in moles per liter

[H+] = 10<sup>(-pH)</sup> = moles per liter of H+ (1 gram mole per liter of H+ is 1.0080 grams of hydrogen/liter)

Moles H+ (Combined) = Moles H+ (Background) + Moles H+ (Discharge)

**Note that this is a simple conservation of H<sup>+</sup> mass formula that does not account for any reactions or buffering that might occur when the discharge and stream mix.**

Stream background Moles/Liter H+ =	10 <sup>(-pH)</sup>	=	5.0119E-08
Discharger Moles/Liter H+ =	10 <sup>(-pH)</sup>	=	1.00E-06

Combined moles/L H+ = 
$$\frac{(\text{Strm moles/L H+}) \cdot (\text{Strm MGD}) + (\text{Disch moles/L H+}) \cdot (\text{Disch MGD})}{(\text{Stream MGD} + \text{Discharge MGD})}$$

Combined moles/L H+ = 1.196E-07

Combined Stream pH = 6.922

If this pH is below 6.5, the discharger minimum pH must be raised, therefore recalculate until 6.5 is reached

Because the calculated pH is above 6.5, a minimum discharge pH limit of 6.0 for Outfall 101 and 113 will allow compliance with water quality criteria in the Tennessee River.

**APPENDIX 5e**

**BIOMONITORING DILUTION FACTORS**

**Watts Bar Nuclear Plant  
 Calculation of Dilution Factors for Biomonitoring**

**Dilution factor when receiving stream  
 is the source of water at the facility**

**Outfall 101 and 102**

Stream Flow 1Q10 [MGD]	Wastewater Flow [MGD] <sup>1</sup>	Total Flow [MGD]
2062.0	67.43	2062
Dilution Factor		
	30.6	
LC50 >		
	10.9	% Conc.
IC 25 >		
	3.3	% Conc.

**Dilution factor when receiving stream  
 is not the source of water at the facility**

**Outfall 112**

Stream Flow 7Q10 [MGD]	Wastewater Flow [MGD]	Total Flow [MGD]
0.0	0.38	0.380
Dilution Factor		
	1.0	
LC50 >		
	333.3	% Conc.
IC 25 >		
	100.0	% Conc.

**Outfall 113**

Stream Flow 1Q10 [MGD]	Wastewater Flow [MGD] <sup>1</sup>	Total Flow [MGD]
2062.0	178.38	2240.4
Dilution Factor		
	12.6	
LC50 >		
	26.5	% Conc.
IC 25 >		
	8.0	% Conc.

<sup>1</sup> Because of the large volume of flow from these Outfalls and the criteria that chronic toxicity not exist instream during any 30 day period, the maximum historic 30 day average discharge flow was used to calculate dilution.

**APPENDIX 5f**

**COMPARISON OF DISCHARGE LIMITATIONS**

TVA-Watts Bar Nuclear Plant						
Outfall 101						
<b>Monthly Average</b>						
EFFLUENT CHARACTERISTIC	Effluent Guidelines		Previous Permit	Water Quality		New Permit
	BPT* (mg/L)	BAT* (mg/L)		Fish (mg/L)	Hum. Heal. (mg/L)	
TSS	30	--	30	NA	NA	30
OIL & GREASE	15	--	15	NA	NA	15
pH	6.0-9.0	--	--	6.5-9.0	6.0-9.0	6.0-9.0
Chromium, Total	--	0.2	--	1.22	3.13	**
Zinc, Total	--	1.0	--	3.47	NA	1.0
Total Chlorine Residual	--	--	0.1	0.150	NA	0.10
Free Available Chlorine	0.2	0.2	--	0.150	NA	--

<b>Daily Maximum</b>						
EFFLUENT CHARACTERISTIC	Effluent Guidelines*		Previous Permit	Water Quality		New Permit
	BPT (mg/L)	BAT (mg/L)		Fish (mg/L)	Hum. Heal. (mg/L)	
TSS	100	--	100	NA	NA	100
OIL & GREASE	20	--	20	NA	NA	20
pH	6.0-9.0	--	6.0-9.0	6.5-9.0	6.5-9.0	6.0-9.0
Chromium, Total	--	0.2	--	NA	16.4	**
Zinc, Total	--	1.0	--	3.814	NA	1
Total Chlorine Residual	--	0.2	0.1	0.260	NA	0.10
Free Available Chlorine	0.5	0.5	--	0.260	NA	NA

\* Outfall 101 primarily receives wastes characterized as low volume wastes and cooling tower blowdown. Thus this discharge is subject BPT/BAT limitations for all parameters applicable to these waste sources as presented in Appendix 2.

\*\* The use of water treatment chemicals containing chromium is prohibited.

**COMPARISON OF DISCHARGE LIMITATIONS**

**Outfall 112**

EFFLUENT CHARACTERISTIC	Monthly Average					
	Effluent Guidelines*		Previous Permit	Water Quality		New Permit
	BPT (mg/L)	BAT (mg/L)		Fish (mg/L)	Hum. Heal. (mg/L)	
TSS	30	--	30	NA	NA	30
OIL & GREASE	15	--	15	NA	NA	15
pH	6.0-9.0	--	--	6.5-9.0	6.0-9.0	6.0-9.0
Ammonia as N**	--	--	1.46	1.24	NA	1.24
Dissolved Oxygen	--	--	--	5.0 Min.	NA	--
Total Chlorine Residual	--	--	0.011	0.011	NA	0.011
Free Available Chlorine	--	--	--	0.011	NA	--

EFFLUENT CHARACTERISTIC	Daily Maximum					
	Effluent Guidelines*		Previous Permit	Water Quality		New Permit
	BPT (mg/L)	BAT (mg/L)		Fish (mg/L)	Hum. Heal. (mg/L)	
TSS	100	--	100	NA	NA	100
OIL & GREASE	20	--	--	NA	NA	20
pH	6.0-9.0	--	6.0-9.0	6.5-9.0	6.0-9.0	6.0-9.0
Ammonia, as N**	--	--	2.42	NA	NA	2.48
Dissolved Oxygen	--	--	5.0 Min.	5.0 Min.	NA	5.0 Min.
Total Chlorine Residual	--	--	0.019	0.019	NA	0.019
Free Available Chlorine	--	--	--	0.019	NA	--

\* Outfall 112 is composed of approximately 6.9% sanitary wastes which are characterized as low volume wastes subject to BPT/BAT limitations. The majority of other waste in this outfall is stormwater for which no BPT/BAT limitations apply.

\*\* Water quality criteria for monthly average ammonia is established based on EPA 30 day CCC criteria and is calculated as shown in Appendix 5c. Maximum daily value is established as twice the monthly average value based on good operation of a biological treatment plant.

**COMPARISON OF DISCHARGE LIMITATIONS**

**Outfall 113**

EFFLUENT CHARACTERISTIC	Monthly Average					
	Effluent Guidelines*		Previous Permit	Water Quality		New Permit
	BPT (mg/L)	BAT (mg/L)		Fish (mg/L)	Hum. Heal. (mg/L)	
TSS	NA	NA	Report	NA	NA	Report
OIL & GREASE	15	--	15	NA	NA	15
pH	6.0-9.0	--	--	6.5-9.0	6.0-9.0	6.0-9.0
Dissolved Oxygen (D.O.)	--	--	--	NA	NA	Report Min.
Total Chlorine Residual	--	--	0.092	0.154	NA	0.092
Free Available Chlorine	0.2	--	--	0.154	NA	--

EFFLUENT CHARACTERISTIC	Daily Maximum					
	Effluent Guidelines		Previous Permit	Water Quality		New Permit
	BPT (mg/L)	BAT (mg/L)		Fish (mg/L)	Hum. Heal. (mg/L)	
TSS	NA	NA	100	NA	NA	100
OIL & GREASE	NA	NA	20	NA	NA	20
pH	6.0-9.0	--	--	6.5-9.0	6.0-9.0	6.0-9.0
Total Chlorine Residual	--	0.2	0.158	0.260	NA	0.158
Free Available Chlorine	0.5	--	--	0.260	NA	--

\* Outfall 113 receives wastes characterized as once through cooling water. Thus this discharge is subject BPT/BAT limitations for all parameters applicable to once through cooling water sources as presented in Appendix 2.

**APPENDIX 5g**

**NEW PERMIT LIMITS**

<b>PERMIT LIMITS</b>						
<b>TVA-Watts Bar Nuclear</b>						
<b>OUTFALL 101</b>						
<b>Cooling Water, Storm Water and Process Wastewater</b>						
<b>EFFLUENT CHARACTERISTIC</b>	<b>EFFLUENT LIMITATIONS</b>				<b>MONITORING REQUIREMENTS</b>	
	<b>MONTHLY</b>		<b>DAILY</b>		<b>MSRMNT. FRQNCY.</b>	<b>SAMPLE TYPE</b>
	<b>AVG. CONC. (mg/l)</b>	<b>AVG. AMNT. (lb/day)</b>	<b>MAX. CONC. (mg/l)</b>	<b>MAX. AMNT. (lb/day)</b>		
<b>FLOW</b>	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		Continuous	Recorder <sup>1</sup>
<b>Certification of Instream Flow of 3,500 cfs when required</b>	--		Report as Yes/No		1/Month	Operation Records
<b>pH<sup>2</sup></b>	Range 6.0 - 9.0				2/Month	Grab
<b>TOTAL SUSPENDED SOLIDS (TSS)</b>	30.0	--	100.0	--	1/Month	Grab
<b>OIL &amp; GREASE</b>	15.0	--	20.0	--	1/Month	Grab
<b>CHROMIUM, TOTAL</b>	0.2		0.2		WAVED <sup>6</sup>	Grab
<b>ZINC, TOTAL</b>	1.0		1.0	--	2/Month	Grab
<b>CHLORINE, TOTAL RESIDUAL (TRC)<sup>2,3</sup></b>	0.10	--	0.10	--	5/Week	Grab <sup>2,3</sup>
<b>TEMPERATURE, Effluent<sup>4</sup></b>	--	--	35 °C	--	Continuous	Recorder
<b>IC25<sup>5</sup></b>	25% Inhibition Concentration shall be ≥3.3% effluent				2/year	Composite <sup>5</sup>

**There shall be no discharge of PCBs.**

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD). In the event that the continuous flow monitor is out of service, flow monitoring shall be estimated by intake pump logs.

<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> The acceptable methods for analysis of TRC are any methods specified in 40 CFR Part 136.

<sup>4</sup> When the temperature monitoring equipment fails, monitoring will be done once per day. Reasonable and timely effort will be made to restore the temperature recorder to operation as soon as possible. See Part III for further temperature requirement.

<sup>5</sup> See Part III for methodology.

<sup>6</sup> Monitoring for chromium is waived per 40 CFR 122.44 (a)(2)(i). See Rationale for more comments.

**PERMIT LIMITS**

**TVA-Watts Bar Nuclear**

**OUTFALL 102**

Cooling water, Stormwater runoff and Process Wastewater

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		1/Day	Instantaneous
Certification of Instream Flow of 3,500 cfs when required	--		Report as Yes/No		1/Month <sup>5</sup>	Operation Records
pH <sup>2</sup>	Range 6.0 - 9.0				2/Month <sup>6</sup>	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	100.0	--	1/Month <sup>6</sup>	Grab
OIL & GREASE	15.0	--	20.0	--	1/Month <sup>6</sup>	Grab
CHROMIUM, TOTAL	2.0	--	2.0	--	WAVED <sup>6</sup>	Grab
ZINC, TOTAL	1.0	--	1.0	--	2/Month <sup>6</sup>	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>2, 3</sup>	0.10	--	0.10	--	5/Week	Grab <sup>2, 3</sup>
TEMPERATURE, Effluent	--	--	35° C	--	1/Day	Grab
IC25 <sup>4</sup>	25% Inhibition Concentration shall be $\geq$ 3.3% effluent				2/year <sup>4</sup>	Composite <sup>4</sup>

**There shall be no discharge of PCBs.**

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD).

<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> The acceptable methods for analysis of TRC are any methods specified in 40 CFR Part 136.

<sup>4</sup> Sampling and analysis required only if discharge is operated 30 days or more during the semi-annual periods January through June or July through December and if all toxicity testing requirements have not already been completed for Outfall 101. See Pa

<sup>5</sup> Certification shall be made during any month that a discharge occurs from this outfall.

<sup>6</sup> If there is discharge during 1 or more days from this outfall, sampling is required to comply with the maximum daily limit. If there are two or more separate days of discharge, or a continuous discharge during 5 or more consecutive days from this outfall then one sample is required from that "batch" discharge.

<sup>6</sup> Monitoring for chromium is waived per 40 CFR 122.44 (a)(2)(i). See Rationale for more comments.

**PERMIT LIMITS**

**TVA-Watts Bar Nuclear**

**OUTFALL 103 (Internal Monitoring Point)  
 Low Volume Waste Holding Pond**

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
<b>FLOW</b>	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		Continuous <sup>1</sup>	Recorder
<b>pH<sup>2</sup></b>	Range 6.0 - 9.0				1/Month	Grab
<b>TOTAL SUSPENDED SOLIDS (TSS)</b>	30.0	--	100.0	--	1/Month	Grab
<b>OIL &amp; GREASE</b>	15.0	--	20.0	--	1/Month	Grab

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD).

<sup>2</sup> pH analyses shall be performed within fifteen (15) minutes of sample collection.

**PERMIT LIMITS**

**TVA-Watts Bar Nuclear**

**OUTFALL 107 (Internal Monitoring Point)  
 Metal Cleaning Wastewater**

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
<b>FLOW</b>	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		1/Batch <sup>1</sup>	Calculated
<b>pH<sup>2</sup></b>	Report		Report		1/Batch <sup>2</sup>	Grab
<b>TOTAL SUSPENDED SOLIDS (TSS)</b>	30.0	--	30.0	--	1/Batch	Grab
<b>OIL &amp; GREASE</b>	15.0	--	15.0	--	1/Batch	Grab
<b>COPPER, TOTAL RECOVERABLE</b>	1.0	--	1.0	--	1/Batch	Grab
<b>IRON, TOTAL RECOVERABLE</b>	1.0	--	1.0	--	1/Batch	Grab
<b>PHOSPHORUS, TOTAL<sup>3</sup></b>	1.0	--	1.0	--	1/Batch	Grab

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD) for each batch discharge. If a batch discharge extends for more than a 24-hour period, flow

<sup>2</sup> pH analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> Sampling for phosphorus is required only when metal cleaning chemicals containing phosphorus are being used.

**PERMIT LIMITS**  
**TVA-Watts Bar Nuclear**  
**OUTFALL 111 (Internal Monitoring Point)**  
**Treated Sanitary Wastewater**

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		Continuous	Recorder
BOD5	30.0	--	45.0	--	1/Week	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	45.0	--	1/Week	Grab
SETTLABLE SOLIDS	--	--	1.0 ml/L	--	2/Week	Grab
E. COLI	See footnote <sup>3</sup>				1/Week	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>2,4</sup>	--	--	2.0	--	5/Week	Grab <sup>2,4</sup>

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD).  
<sup>2</sup> TRC analyses shall be performed within fifteen (15) minutes of sample collection.  
<sup>3</sup> The wastewater discharge for Outfall 111 must be disinfected to the extent that viable coliform organisms are effectively eliminated. The concentration of *E. coli* after disinfection shall not exceed 126 per 100 ml as the geometric mean based on a minimum of 10 samples, collected from a given sampling site over a period of not more than 30 consecutive days with individual samples being collected at intervals not less than 12 hours. For the purpose of determining the geometric mean, individual samples having an *E. coli* concentration of less than one (1) per 100 ml. shall be considered as having a concentration of one (1) per 100 ml. Where less than 10 samples are made per month, the permittee shall use an arithmetic mean rather than the geometric mean. In the absence of a method in 40 CFR, Part 136 for measuring *E. coli* in effluent matrices, the permittee shall use methods proposed or added to Part 136 for measuring *E. coli* in ambient water.  
<sup>4</sup> Total Residual Chlorine (TRC) monitoring shall be applicable when chlorine, bromine, or any other oxidants are added. The acceptable methods for analysis of TRC are any methods specified in 40 CFR Part 136.

**PERMIT LIMITS**  
**TVA-Watts Bar Nuclear**  
**OUTFALL 112**  
**Construction Yard Holding Pond - S storm Runoff**

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		1/Week	Estimate <sup>1</sup>
pH <sup>2</sup>	Range 6.0 - 9.0				1/Week	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	100.0	--	1/Week	Grab
NITROGEN, AMMONIA TOTAL	1.24	--	2.48	--	1/Week	Grab
DISSOLVED OXYGEN (D.O.)	--	--	5.0 Min.	--	1/Week	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>2,3</sup>	0.011	--	0.019	--	1/Week	Grab
IC25 <sup>4</sup>	25% Inhibition Concentration shall be $\geq$ 100% Effluent				Semi-annual	Composite <sup>4</sup>

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD) and shall be estimated based on measurement at existing weir.  
<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.  
<sup>3</sup> Total Residual Chlorine (TRC) monitoring shall be applicable when chlorine, bromine, or any other oxidants are added. The acceptable methods for analysis of TRC are any methods specified in Title 40, CFR Part 136. The method detection level (MDL) for TRC shall not exceed 0.05 mg/L unless the permittee demonstrates that its MDL is higher. The permittee shall retain the documentation that justifies the higher MDL, and shall have that documentation available for review upon request. In cases where the permit limit is less than the MDL, the reporting of TRC at less than the MDL shall be interpreted to constitute compliance with the permit limit.  
<sup>4</sup> See Part III for methodology

**PERMIT LIMITS**

**TVA-Watts Bar Nuclear**

**OUTFALL 113**

**Supplemental Condenser Cooling Water**

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) <sup>1</sup>		Report (MGD) <sup>1</sup>		Continuous	Recorder
Certification of Instream Flow of 3,500 cfs when required	--		Report as Yes/No		1/Month	Operation Records
pH <sup>2</sup>	Range 6.0 - 9.0				1/Month	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30.0	--	100.0	--	1/Month	Grab
CHLORINE, TOTAL RESIDUAL (TRC) <sup>2,3,6</sup>	0.092	--	0.158	--	1/Month <sup>6</sup>	Grab
DISSOLVED OXYGEN (D.O.)	--	--	Report Min.	--	1/Month	Grab
TEMPERATURE, Effluent	Report Effluent Temperature <sup>4</sup>				Hourly	Recorder <sup>7</sup>
TEMPERATURE, Edge of Mixing Zone	--	--	30.5 °C	--	Hourly	Recorder <sup>7</sup>
TEMPERATURE, Rise Upstream to Downstream	--	--	3 °C	--	Hourly	Calculated <sup>7</sup>
TEMPERATURE, Rate of Change, °C per hour	--	--	2 °C/Hour	--	Hourly	Calculated <sup>7</sup>
TEMPERATURE, Receiving Stream Bottom	--	--	33.5 °C	--	Hourly	Recorded
IC25 <sup>5</sup>	25% Inhibition Concentration shall be ≥8% effluent				Semi-annual	Composite <sup>5</sup>

<sup>1</sup> Flow shall be reported in Million Gallons per Day (MGD).

<sup>2</sup> pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.

<sup>3</sup> The acceptable methods for analysis of TRC are any methods specified in 40 CFR Part 136.

<sup>4</sup> See text below table for requirements.

<sup>5</sup> See Part III for methodology

<sup>6</sup> Sampling for TRC shall be 5/Week during periods when the Supplemental Condenser Cooling Water (SCCW) system is in operation.

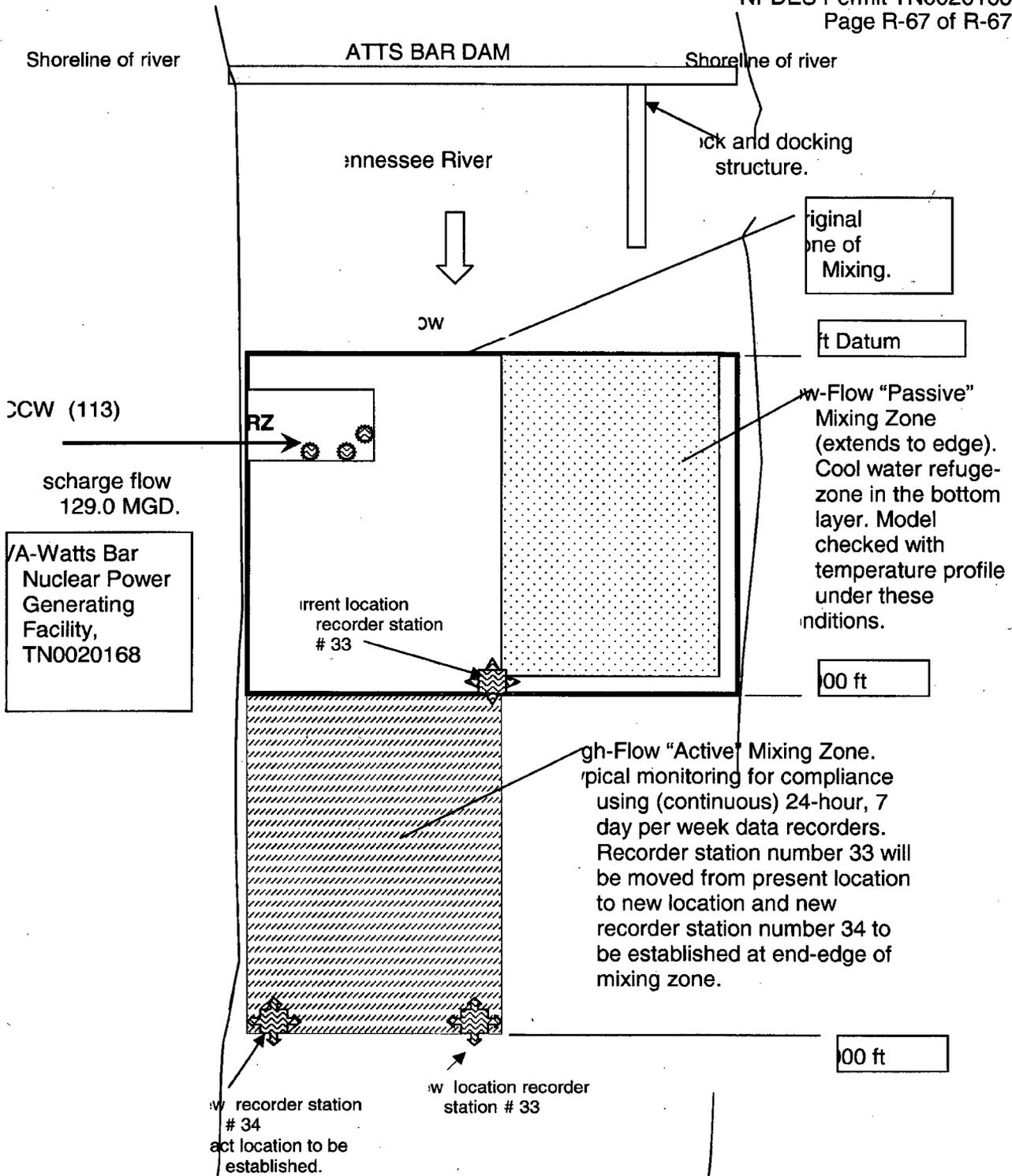
<sup>7</sup> See additional (bulleted) comments in permit. Begins on page 8 of 27.

**PERMIT LIMITS FOR OUTFALL 114**

**TVA-Watts Bar Nuclear**

**Supplemental Condenser Cooling Water Intake Screen Backwash water**

- 1.) No numerical monitoring limitations are applied to this outfall.
- 2.) Visual monitoring for debris and obstructions to the screens will be carried out on a weekly basis.



TVA-Watts Bar Nuclear Power Generating Facility, TN0020168

Original line of Mixing.

ft Datum

Low-Flow "Passive" Mixing Zone (extends to edge). Cool water refuge-zone in the bottom layer. Model checked with temperature profile under these conditions.

100 ft

High-Flow "Active" Mixing Zone. Typical monitoring for compliance using (continuous) 24-hour, 7 day per week data recorders. Recorder station number 33 will be moved from present location to new recorder station number 34 to be established at end-edge of mixing zone.

100 ft

Recorder station # 34 actual location to be established.

Recorder station # 33

Note: This diagram is a general description of how the mixing zone and temperature recorders are being relocated. It is not intended to be an actual, or physical representation of the shape or dynamics of the thermal plume.

**APPENDIX 5H, Diagram NOT TO SCALE**