

**Attachment 34 to**

**GNRO-2012/00039**

**ER Reference - MDEQ 2011a (NPDES Permit Rationale) Rationale for Reissuance**

**PERMIT RATIONALE FOR REISSUANCE**  
**Entergy Mississippi Inc, Grand Gulf Nuclear Station**  
**Claiborne County**  
**Port Gibson, Mississippi**  
**Water NPDES No. MS0029521**

April 27, 2011

**I. FACILITY INFORMATION**

**Facility Name:** Entergy Mississippi Inc, Grand Gulf Nuclear Station

**Facility Address:** 7003 Bald Hill Road

Port Gibson, MS 39150

**Permit No.:** MS0029521

**SIC:** 4911

**Permit Writer:** Thomas Kelly

**EPD Branch:** Energy and Transportation Branch

**II. NATURE OF BUSINESS**

Nuclear Powered Steam Electric Plant. The facility operations fall within SIC Code 4911-Steam Electric Power Generation. This facility is classified as a NPDES major source.

**III. EFFLUENT AND RECEIVING STREAM FLOW DATA**

**External Outfalls**

001 -- Discharged from the Mixing/Discharge Basin. Effluent from this outfall is combination of internal outfalls(s) 002, 004, 005, 006 and 011. This outfall has a maximum 30 day flow of 12.05MGD and discharges to the Mississippi River.

The Mississippi River is classified as "Fish and Wildlife". The 7Q10 flow is 82,082 MGD.

013 -- Discharged from Sediment Basin A - Effluent from this outfall consists of the combined discharge from the Bechtel Shop; Vehicle Maintenance Shop; Ice House Condensate; Standby Service Water Leakage; Construction and Site Runoff; Once Through Cooling; Site Processing Facility HVAC; Internal Outfall 010 (Sanitary); Internal Outfall 016 (Energy Service System). This outfall has a maximum 30 day flow of 0.8 MGD.

Outfalls 013 discharge to an unnamed creek thence to Hamilton Lake. The receiving stream is classified as "Fish and Wildlife" and has a 7Q10 flow of 0 MGD.

014 - Discharge from Sedimentation Basin B - This discharge is a combination of discharges from Outfall 007; Standby Service Water Leakage and Releases; Intermittent Circulation Water Basin Overflows; and Storm water Runoff. This outfall has a maximum 30 day flow of 0.07 MGD.

Outfall 014 discharges to an unnamed creek thence to Hamilton Lake. The receiving stream is classified as "Fish and Wildlife" and has a 7Q10 flow of 0 MGD.

#### Internal Outfalls

002 - (Categorical: Cooling Tower Blowdown) – Natural draft and auxiliary cooling Tower Blowdown. This outfall has a maximum 30 day flow of 11.64 MGD and discharges via Outfall 001.

004 - (Categorical: Cooling Tower Blowdown) – Unit One standby service water (SSW- A). This outfall has a maximum 30 day flow of 4.16 MGD and discharges via Outfall 001.

005 - (Categorical: Cooling Tower Blowdown) – Unit Two standby service water (SSW-B). This outfall has a maximum 30 day flow of 5.97 MGD and discharges via Outfall 001.

006 - (Categorical: Low Volume) – Low volume waste basin including demineralizer wastewater, carbon filter backwash, and water treatment building sump. This outfall has a maximum 30 day flow of 0.65 MGD and discharges via Outfall 001.

007 - (Categorical: Low Volume) – Miscellaneous Wastewaters discharged into Sedimentation Basin B comprised of Administrative Building Drains; Yard and Storm Drains; Fire Water Pump House; Oily Waste Sumps; Ionics Reject Water; Turbine Building Cooling Water Blowdown; HVAC Blowdown; Air Conditioner Once Through Cooling; Outage Air Compressor Once Through Cooling; Intermittent Standby Service Water and Plant Service Water leakage and small releases. This outfall has a maximum 30 day flow of 0.299 MGD and discharges via Outfall 014.

010 - Outfall 010 (Non-categorical) – Sanitary Wastewater. This outfall has an average flow of 0.012 MGD and discharges via Outfall 013.

011 - (Non-categorical) - Treated Liquid Rad Waste Water. This outfall has a maximum 30 day flow of 0.049 MGD and discharges via Outfall 001.

016 - (Non-categorical) - Miscellaneous Wastewaters from the Energy Services Center Inclusive of Water Softener Backwash, Air Conditioning Cooling Tower Blowdown and Storm Water Runoff. This outfall has a maximum 30 day flow of 0.0698 MGD and discharges via Outfall 013.

#### IV. 303(d) ISSUES

This is an existing discharger with no modifications occurring to the facility's operations therefore, there are no 303(d) concerns.

#### V. TYPE OF WASTEWATER TREATMENT:

##### Outfall

001 - Commingling of waste streams from Outfalls 002, 004, 005, 006, 011, and the cooling tower makeup bypass.

002 - No treatment.

004 - No treatment.

005 - No treatment.

006 - No treatment.

007 - Oil/Water separation provided for selected internal waste streams.

010 - Sanitary Wastewater Treatment Plant with treatment including activated sludge, aeration, chlorination and dechlorination.

011 - No treatment.

013 - Oil/Water separation provided for selected internal waste streams. Settling provided for commingled wastewaters.

014 - Oil/Water separation provided for selected internal waste streams. Settling provided for commingled wastewaters.

016 - No treatment.

#### VI. STATE APPLICABLE GUIDELINES

1. Wastewater Regulations for National Pollutant Discharge Elimination System (NPDES) Permits, Underground Injection Control (UIC) Permits, State Permits, Water Quality Based Effluent Limitations, and Water Quality Certification, hereafter referred to as WPC-1.

2. State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters (Adopted by Mississippi Commission on Environmental Quality: October 24, 2002), hereafter referred to as WPC-2.

VII. EPA APPLICABLE GUIDELINES

40 CFR Part 423 - Steam Electric Power Generation Point Source Category; Sections 423.12 (BPT-Best Practicable Control Technology Currently Available) and 423.13 (BAT-Best Available Technology Economically Available). See Attachment A.

VIII. DATA FROM APPLICATION FORM (2C, 2E):

External Outfalls:

Parameter	Maximum Daily Value		
	Outfall 001	Outfall 013	Outfall 014
BOD <sub>5</sub>	1.2 mg/l	1.2 mg/l	1.0 mg/l
COD	89 mg/l	32 mg/l	< 20.0 mg/l
TOC	8.3 mg/l	5.9 mg/l	4.4 mg/l
TSS	5 mg/l	24 mg/l	3.0 mg/l
Ammonia (as N)	0.1 mg/l	< 0.1 mg/l	0.12 mg/l
Flow	24.24 MGD	0.8 MGD	0.07 MGD
Temperature (Winter)	30.7 °C	14.5 °C	17.3 °C
Temperature (Summer)	44.9 °C	27.1 °C	28.6 °C
pH	8.31 S.U.	7.98 S.U.	8.64 S.U.
Bromide	0.74 mg/l	1.06 mg/l	0.25 mg/l
Chlorine, Total Residual	--	--	--
Fecal Coliform	180 col./100 ml	110 col./100 ml	110 col./100 ml
Fluoride	0.57 mg/l	--	0.17 mg/l
Nitrate-Nitrite	0.10 mg/l	--	--
Nitrogen, Total Organic (as N)	0.86 mg/l	0.48 mg/l	--
Phosphorus	0.97 mg/l	0.18 mg/l	0.28 mg/l
Sulfate (as SO <sub>4</sub> )	310 mg/l	--	18.3 mg/l
Barium, Total	0.25 mg/l	0.12 mg/l	0.07 mg/l
Boron, Total	0.15 mg/l	--	--
Iron, Total <sup>1</sup>	2.39 mg/L	0.27 mg/l	0.10 mg/l
Magnesium, Total	43.9 mg/l	24.0 mg/l	15.7 mg/l

Parameter	Maximum Daily Value		
	Outfall 001	Outfall 013	Outfall 014
Manganese, Total	0.37 mg/l	0.28 mg/l	--
Antimony, Total	<0.0005 mg/l	< 0.005 mg/l	< 0.005 mg/l
Arsenic, Total <sup>1</sup>	0.008 mg/l	0.012 mg/l	0.015 mg/l
Beryllium, Total	<0.001 mg/l	< 0.001 mg/l	< 0.001 mg/l
Cadmium, Total	< 0.005 mg/l	< 0.005 mg/l	< 0.005 mg/l
Chromium, Total	< 0.002 mg/l	< 0.002 mg/l	< 0.002 mg/l
Copper, Total	< 0.010 mg/l	< 0.010 mg/l	0.010 mg/l
Lead, Total	< 0.001 mg/l	< 0.001 mg/l	< 0.001 mg/l
Mercury, Total <sup>1</sup>	6.3e-6 mg/l	2.0e-6 mg/l	2.3e-6 mg/l
Nickel, Total	< 0.02 mg/l	< 0.02 mg/l	< 0.02 mg/l
Selenium, Total	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l
Silver, Total	<0.0003 mg/l	<0.0003 mg/l	<0.0003 mg/l
Thallium, Total	<0.001 mg/l	<0.001 mg/l	<0.001 mg/l
Zinc, Total <sup>1</sup>	0.356 mg/l	<0.01 mg/l	<0.01 mg/l
Bis (2-Ethyl-hexyl) Phthalate <sup>1</sup>	0.017 mg/l	--	--

Internal Outfalls:

Parameter	Maximum Daily Value			
	Outfall 002	Outfall 004	Outfall 005	Outfall 006
BOD <sub>5</sub>	< 1.0 mg/l	< 1.0 mg/l	1.2 mg/l	1.5 mg/l
COD	30 mg/l	55 mg/l	36 mg/l	< 20.0 mg/l
TOC	10 mg/l	11.7 mg/l	12.2 mg/l	4.6 mg/l
TSS	< 1.00 mg/l	5 mg/l	4 mg/l	16 mg/l
Ammonia (as N)	< 0.10 mg/l	0.17 mg/l	0.23 mg/l	< 0.10 mg/l
Flow	13.06 MGD	6.66 MGD	5.97 MGD	0.65 MGD
Temperature (Winter)	17.4 °C	16.1 °C	18.8 °C	18.9 °C
Temperature (Summer)	28.1 °C	26.2 °C	22.6 °C	29.2 °C
pH	8.35 S.U.	7.51 S.U.	6.96 S.U.	8.51 S.U.
Bromide	0.76 mg/l	14.4 mg/l	12.1 mg/l	0.52 mg/l
Chlorine, Total Residual	0.17 mg/l	--	--	--
Fecal Coliform	180 col./100 ml	--	--	--
Fluoride	0.66 mg/l	0.32 mg/l	0.33 mg/l	0.35 mg/l
Nitrate-Nitrite	1.10 mg/l	0.28 mg/l	0.63 mg/l	--
Nitrogen, Total Organic	0.75 mg/l	1.27 mg/l	1.05 mg/l	0.40 mg/l
Phosphorus	1.09 mg/l	2.86 mg/l	3.48 mg/l	3.38 mg/l
Sulfate	388 mg/l	202 mg/l	257 mg/l	3370 mg/l
Aluminum, Total	--	--	--	5.46 mg/l

Parameter	Maximum Daily Value			
	Outfall 002	Outfall 004	Outfall 005	Outfall 006
Barium, Total	0.32 mg/l	0.09 mg/l	0.09 mg/l	0.04 mg/l
Boron, Total	0.23 mg/l	0.12 mg/l	0.11 mg/l	--
Cobalt, Total	--	--	0.01 mg/l	--
Iron, Total	2.61 mg/l	2.47 mg/l	3.16 mg/l	48.6 mg/l
Magnesium, Total	53.5 mg/l	24.7 mg/l	25.9 mg/l	54.3 mg/l
Manganese, Total	0.34 mg/l	0.08 mg/l	0.22 mg/l	1.47 mg/l
Arsenic, Total	0.008 mg/l	0.006 mg/l	--	0.012 mg/l
Cadmium, Total	--	--	--	0.0008 mg/l
Chromium, Total	--	--	--	0.125 mg/l
Copper, Total	--	0.039 mg/l	0.113 mg/l	0.098 mg/l
Lead, Total	--	--	--	0.003 mg/l
Mercury, Total	3.9e-6 mg/l	1.23e-5 mg/l	2.98e-5 mg/l	5.5e-6 mg/l
Nickel, Total	0.008 mg/l	0.16 mg/l	0.13 mg/l	0.136 mg/l
Selenium, Total	--	--	--	0.007 mg/l
Zinc, Total	0.78 mg/l	0.59 mg/l	0.62 mg/l	0.270 mg/l
4-Nitrophenol	--	0.283 mg/l	--	--
Benzidine	--	1.51 mg/l	--	--
4-Bromophenyl Phenyl Ether	--	0.006 mg/l	--	--

Parameter	Maximum Daily Value			
	Outfall 007	Outfall 011	Outfall 016	Outfall 010
BOD <sub>5</sub>	3.0 mg/l	< 2.0 mg/L	< 1.0 mg/L	11.70 mg/l
COD	< 20.0 mg/l	< 4.32 mg/L	80 mg/L	< 20 mg/l
TOC	4.30 mg/l	< 0.33 mg/l	10.1 mg/l	3.30 mg/l
TSS	47 mg/l	1.55 mg/L	11 mg/L	23.00 mg/l
Ammonia (as N)	< 0.1 mg/l	0.042 mg/L	< 0.1 mg/L	< 0.1 mg/L
Flow	0.5472 MGD	0.0762 MGD	0.0698 MGD	0.06 MGD
Temperature (Winter)	20.6 °C	31.2 °C	15.8 °C	22.20 °C
Temperature (Summer)	28.1 °C	31.0 °C	29.6 °C	28.90 °C
pH	8.79 s.u.	7.75 s.u.	8.80 s.u.	8.32 s.u.
Fecal Coliform	--	--	12000 col./100 ml	20 col./100 ml
Bromide	--	--	5.29 mg/l	--
Chloride, Total Residual	--	--	0.21 mg/l	0.16 mg/l
Fluoride	0.30 mg/l	--	0.30 mg/L	--

Parameter	Maximum Daily Value			
	Outfall 007	Outfall 011	Outfall 016	Outfall 010
Nitrate-Nitrite	0.85 mg/l	--	0.99 mg/L	--
Nitrogen, Total Organic (as N)	0.22 mg/l	0.042 mg/l	0.52 mg/L	--
Chlorine, Total Residual	1.43 mg/l	0 mg/l	--	--
Oil and Grease	<6.7 mg/l		--	< 2.4 mg/l
Phosphorus	0.24 mg/l	0.74 mg/L	0.17 mg/l	--
Alpha, Total	--	4.63 pCi/l	--	--
Beta, Total	--	725 pCi/l	--	--
Radium, Total	--	2.55 pCi/l	--	--
Radium 228, Total	--	1.05 pCi/l	--	--
Sulfate (as SO <sub>4</sub> )	35.6 mg/l	--	27.6 mg/l	--
Barium, Total	0.08 mg/l	--	0.42 mg/l	--
Boron, Total	0.04 mg/l	--	0.03 mg/l	--
Cobalt, Total	--	0.111 mg/l	--	--
Iron, Total	0.23 mg/l	39.5 mg/L	0.08 mg/L	--
Magnesium, Total	32.2 mg/l	--	146 mg/l	--
Molybdenum, Total	--	0.149 mg/l	--	--
Manganese, Total	--	--	0.06 mg/l	--
Arsenic, Total	--	--	0.027 mg/L	--
Chromium, Total	0.004 mg/l	--	0.006 mg/L	--
Copper, Total	0.012 mg/l	0.599 mg/L	--	--
Mercury, Total	8.7e-6 mg/l	--	2.3e-6 mg/L	--
Thallium, Total	--	0.336 mg/l	--	--
Zinc, Total	0.042 mg/l	--	0.013 mg/l	--

The parameters listed above were reported at a concentration greater than the appropriate minimum quantification level (MQL) listed in Exhibit D of the WPC-1 regulations. All other parameters listed on the Form 2C application are not shown due to one of the following reasons: (1) testing was not required, (2) the parameters were believed absent, (3) the reported concentrations were non-detect or less than the appropriate MQL for each parameter tested.

<sup>1</sup> These parameters have been included in the External Outfall 001 toxicity screening procedure provided in Attachment B.

#### VIII. WATER QUALITY LIMITATIONS BASED ON WASTELOAD ALLOCATION

None



# **IX. CATEGORICAL LIMITATION CALCULATIONS**

Not Applicable

# **X. TOXICITY SCREENING**

See Attachment B

# **XI. PROPOSED FINAL LIMITATIONS**

## **1. Outfall 001 - External**

Average Permit Limitations:

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
001	Flow (MGD)	--	--	Report	Report	Eng. Judgment
001	Temperature °F	--	--	Report	Report	Eng. Judgment
001	Chlorine, Free Available	0.2 mg/l		0.2 mg/l	0.2 mg/l	Categorical
001	pH	--	6.0 s.u.	6.5 s.u.	6.0 s.u.	WPC-2

Maximum Permit Limitations:

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
001	Flow (MGD)	--	--	Report	Report	Eng. Judgment
001	Temperature °F	--	--	Report	Report	Eng. Judgment
001	Chlorine, Free Available			0.5 mg/l	0.5 mg/l	Categorical
001	pH	--	9.0 s.u.	9.0 s.u.	9.0 s.u.	WPC-2

## **2. Outfall 002 - Internal**

Average Permit Limitations:

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
002	Flow (MGD)	--	--	Report	Report	Eng. Judgment
002	Chlorine, Free Available	0.2 mg/l	--	0.2 mg/l	0.2 mg/l	Categorical
002	Chlorination Duration	--	--	Report	Report	Eng. Judgment
002	Zinc, Total Recoverable	1.0 mg/l	--	1.0 mg/l	1.0 mg/l	Categorical

**Maximum Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
002	Flow (MGD)	--	--	Report	Report	Eng. Judgment
002	Chlorine, Free Available	0.5 mg/l	--	0.5 mg/l	0.5 mg/l	Categorical
002	Chlorination Duration	120 min	--	120 min	120 min	Categorical
002	Zinc, Total Recoverable	1.0 mg/l	--	1.0 mg/l	1.0 mg/l	Categorical

**3. Outfall 004 - Internal**

**Average Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
004	Flow (MGD)	--	--	Report	Report	Eng. Judgment
004	Chlorine, Free Available	0.2 mg/l	--	0.2 mg/l	0.2 mg/l	Categorical
004	Chlorination Duration	--	--	Report	Report	Eng. Judgment
004	Zinc, Total Recoverable	1.0 mg/l	--	1.0 mg/l	1.0 mg/l	Categorical

**Maximum Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
004	Flow (MGD)	--	--	Report	Report	Eng. Judgment
004	Chlorine, Free Available	0.5 mg/l	--	0.5 mg/l	0.5 mg/l	Categorical
004	Chlorination Duration	120 min	--	120 min	120 min	Categorical
004	Zinc, Total Recoverable	1.0 mg/l	--	1.0 mg/l	1.0 mg/l	Categorical

**4. Outfall 005 - Internal**

**Average Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
005	Flow (MGD)	--	--	Report	Report	Eng. Judgment
005	Chlorine, Free Available	0.2 mg/l	--	0.2 mg/l	0.2 mg/l	Categorical
005	Chlorination Duration	--	--	Report	Report	Eng. Judgment
005	Zinc, Total Recoverable	1.0 mg/l	--	1.0 mg/l	1.0 mg/l	Categorical

**Maximum Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
005	Flow (MGD)	--	--	Report	Report	Eng. Judgment
005	Chlorine, Free Available	0.5 mg/l	--	0.5 mg/l	0.5 mg/l	Categorical
005	Chlorination Duration	120 min	--	120 min	120 min	Categorical
005	Zinc, Total Recoverable	1.0 mg/l	--	1.0 mg/l	1.0 mg/l	Categorical

**5. Outfall 006 -- Internal**

**Average Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
006	Flow (MGD)	--	--	Report	Report	Eng. Judgment
006	Oil and grease	15 mg/l	--	15 mg/l	15 mg/l	Categorical
006	Solids (Total Suspended)	30 mg/l	--	30 mg/l	30 mg/l	Categorical

**Maximum Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
006	Flow (MGD)	--	--	Report	Report	Eng. Judgment
006	Oil and grease	20 mg/l	--	20 mg/l	20 mg/l	Categorical
006	Solids (Total Suspended)	100 mg/l	--	100 mg/l	100 mg/l	Categorical

**6. Outfall 007 - Internal**

**Average Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
007	Flow (MGD)	--	--	Report	Report	Eng. Judgment
007	Oil and grease	15 mg/l	--	15 mg/l	15 mg/l	Categorical
007	Solids (Total Suspended)	30 mg/l	--	30 mg/l	30 mg/l	Categorical
007	Chlorine, Total Residual	--	--	Report	Report	Eng. Judgment
007	pH	--	6.0 s.u.	6.5 s.u.	6.0 s.u.	WPC-2

**Maximum Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
007	Flow (MGD)	--	--	Report	Report	Eng. Judgment
007	Oil and grease	20 mg/l	--	20 mg/l	20 mg/l	Categorical
007	Solids (Total Suspended)	100 mg/l	--	100 mg/l	100 mg/l	Categorical
007	Chlorine, Total Residual	--	--	Report	Report	Eng. Judgment
007	pH	--	9.0 s.u.	9.0 s.u.	9.0 s.u.	WPC-2

**7. Outfall 010 - Internal**

**Average Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
010	Flow (MGD)	--	--	Report	Report	Eng. Judgment
010	BOD (5-Day)	--	--	30 mg/l	30 mg/l	Domestic Guidelines
010	Solids (Total Suspended)	--	--	30 mg/l	30 mg/l	Domestic Guidelines
010	Chlorine, Total Residual	--	--	Report	Report	Eng. Judgment
010	Fecal Coliform, (summer)	--	200 col./100 ml	--	200 col./100 ml	WPC-2
010	Fecal Coliform, (winter)	--	2000 col./100 ml	2000 col./100 ml	2000 col./100 ml	WPC-2
010	pH	--	6.0 s.u.	6.5 s.u.	6.0 s.u.	WPC-2

**Maximum Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
010	Flow (MGD)	--	--	Report	Report	Eng. Judgment
010	BOD (5-Day)	--	--	45 mg/l	45 mg/l	Domestic Guidelines
010	Solids (Total Suspended)	--	--	45 mg/l	45 mg/l	Domestic Guidelines
010	Chlorine, Total Residual	--	--	0.5 mg/l	0.5 mg/l	Eng. Judgment
010	Fecal Coliform, (summer)	--	400 col./100 ml	--	400 col./100 ml	WPC-2
010	Fecal Coliform, (winter)	--	4000 col./100 ml	4000 col./100 ml	4000 col./100 ml	WPC-2
010	pH	--	9.0s.u.	9.0s.u.	9.0s.u.	WPC-2

8. Outfall 011 - Internal  
Average Permit Limitations:

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
011	Flow (MGD)	--	--	Report	Report	Eng. Judgment
011	Solids (Total Suspended)	--	--	Report	Report	Eng. Judgment

Maximum Permit Limitations:

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
011	Flow (MGD)	--	--	Report	Report	Eng. Judgment
011	Solids (Total Suspended)	--	--	30 mg/l	30 mg/l	Eng. Judgment

9. Outfall 013 - External  
Average Permit Limitations:

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
013	Flow (MGD)	--	--	Report	Report	Eng. Judgment
013	Solids (Total Suspended)	--	--	Report	Report	Eng. Judgment
013	pH	--	6.0 s.u.	6.5 s.u.	6.0 s.u.	WPC-2
013	Zinc, Total Recoverable	--	0.065 mg/l	--	Report	Eng. Judgment

Maximum Permit Limitations:

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
013	Flow (MGD)	--	--	Report	Report	Eng. Judgment
013	Solids (Total Suspended)	--	--	Report	Report	Eng. Judgment
013	pH	--	9.0 s.u.	9.0 s.u.	9.0 s.u.	WPC-2
013	Zinc, Total Recoverable	--	0.065 mg/l	--	0.065 mg/l	WPC-2

10. Outfall 014  
Average Permit Limitations:

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
014	Flow (MGD)	--	--	Report	Report	Eng. Judgment
014	Solids (Total Suspended)	--	--	Report	Report	Eng. Judgment
014	Zinc, Total Recoverable	--	--	--	Report	Eng. Judgment
014	pH	--	6.0 s.u.	6.5 s.u.	6.0 s.u.	WPC-2

**Maximum Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
014	Flow (MGD)	--	--	Report	Report	Eng. Judgment
014	Solids (Total Suspended)	--	--	Report	Report	Eng. Judgment
014	Zinc, Total Recoverable	--	0.065 mg/l	--	0.065 mg/l	WPC-2
014	pH	--	9.0 s.u.	9.0 s.u.	9.0 s.u.	WPC-2

**11. Outfall 016**

**Average Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
016	Flow (MGD)	--	--	Report	Report	Eng. Judgment
016	Chlorine, Total Residual	--	--	Report	Report	Eng. Judgment
016	pH	--	6.0 s.u.	6.5 s.u.	6.0 s.u.	WPC-2

**Maximum Permit Limitations:**

Outfall	Parameter	Categorical Limitation	Water Quality Limitation	Present Permit Limitation	Proposed Permit Limitation	Basis
016	Flow (MGD)	--	--	Report	Report	Eng. Judgment
016	Chlorine, Total Residual	--	--	0.5 mg/l	0.5 mg/l	Eng. Judgment
016	pH	--	9.0 s.u.	9.0 s.u.	9.0 s.u.	WPC-2

**Total Recoverable Iron**

Total Recoverable Iron shall be monitored at Outfall 013 on a monthly basis, utilizing 24-hour composite sampling, until 12 monthly samples have been collected. Sampling should begin following the effective re-issuance date of this permit and shall be representative of all 4 seasons upon completion. Total Recoverable Iron shall be analyzed using EPA method 200.8 or an approved equivalent method with a MQL of 10 micrograms/L.

**Total Recoverable Arsenic**

Total recoverable Arsenic shall be monitored at Outfall 014 on a monthly basis, utilizing 24-hour composite sampling, until 12 monthly samples have been collected. Sampling should begin following the effective re-issuance date of this permit and shall be representative of all 4 seasons upon completion. Total Recoverable Arsenic shall be analyzed using EPA method 200.8 or an approved equivalent method with a MQL of 0.5 micrograms/L.

### Total Recoverable Copper

Total Recoverable Copper shall be monitored at Outfall 014 on a monthly basis, utilizing 24-hour composite sampling, until 12 monthly samples have been collected. Sampling should begin following the effective re-issuance date of this permit and shall be representative of all 4 seasons upon completion. Total Recoverable Arsenic shall be analyzed using EPA method 200.8 or an approved equivalent method with a MQL of 1.0 micrograms/L.

Once the monitoring for Total Recoverable Iron, Total Recoverable Arsenic and Total Recoverable Copper has been completed, a report shall be submitted to MDEQ listing the analytical result and date of all sampling events. This report shall be sent the Environmental Permits Division and should not be combined with the Discharge Monitoring Report (DMR) submittal. The NPDES permit may be modified if data indicates a violation of water quality standards.

### MONITORING TYPE AND FREQUENCY

- "Total residual Chlorine (TRC)" shall be measured at Outfalls 007 and 010 twice per month utilizing grab sampling and reported on a monthly basis. TRC shall be measured at Outfall 016 twice per quarter utilizing grab sampling and reported on an annual basis.
- "Free Available Chlorine (FAC)" shall be monitored at Outfall 001 during outages when the Natural Draft and Auxiliary Cooling Towers have no load and the Plant Service Water (PSW) bypasses the tower and discharges directly to the Discharge Basin through outfall serial no. (OSN) 001, which shall be monitored continuously with multiple grab samples taken every 30 minutes following commencement of the bypass until no chlorine is detectable; Outfall 002 continuously utilizing multiple grab samples and reported on a monthly basis. Multiple grab sampling shall consist of a series of grab samples taken every 30 minutes following startup of blowdown following chlorine addition until not chlorine is detectable; Outfall 004 and 005 once per batch discharge during operation utilizing multiple grab samples and reported on a monthly basis. Monitoring shall be performed daily whenever a batch is discharged. Initiation of discharge shall not occur until a series of instantaneous reading indicate the discharge shall be in compliance with permit limitations. Multiple grab sampling shall consist of a series of grab samples taken every 30 minutes following startup of blowdown following chlorine addition until not chlorine is detectable.
- "Chlorination duration" shall be monitored at Outfalls 001, 002, 004, 005 daily and reported on a monthly basis.
- "Flow" shall be monitored at Outfalls 001 continuously utilizing pump logs and reported on a monthly basis; Outfall 002 twice per month utilizing instantaneous sampling and reported on a monthly basis; Outfalls 004, 005 and 006 once per batch discharge during operation using instantaneous sampling and reported on a monthly basis; Outfall 007 twice per month utilizing instantaneous sampling and reported on a monthly basis; Outfall 010 continuously utilizing a continuous recorder and reported on a monthly basis; Outfall 011 continuously utilizing a pump log and reported on a monthly basis; Outfall 013 quarterly utilizing instantaneous sampling and reported on an annual basis; Outfall 014 quarterly utilizing instantaneous sampling and reported on an annual basis.

- "Total Recoverable Zinc" shall be monitored at Outfall 002 twice per month utilizing 24-hour composite sampling and reported on a monthly basis; Outfall 013 and 014 monthly utilizing 24-hour composite sampling and reported on a quarterly basis; Outfalls 004 and 005 once per batch discharge during operation utilizing composite sampling and reported on a monthly basis. If the basin has been re-circulated for a timeframe of no less than four (4) hours to allow for adequate mixing with each quadrant, a composite will be defined as the combined sample of the four (4) grab samples from each quadrant of the basin. If the basin is not re-circulated for a sufficient period of time to allow for adequate mixing within the quadrants, a composite will be defined as the combined sample of the three (3) individual samples collected at the beginning, middle, and end of the discharge for each batch discharge.
- "Total Recoverable Iron" shall be monitored at Outfall 013 monthly utilizing 24-hr composite sampling until 12 monthly samples have been collected. Upon completion of the monitoring, the monitoring results shall be submitted to MDEQ within 2 years from the effective issuance date of the permit.
- "Total Recoverable Copper" shall be monitored at Outfall 014 monthly utilizing 24-hr composite sampling until 12 monthly samples have been collected. Upon completion of the monitoring, the monitoring results shall be submitted to MDEQ within 2 years from the effective issuance date of the permit.
- "Total Recoverable Arsenic" shall be monitored at Outfall 014 monthly utilizing 24-hr composite sampling until 12 monthly samples have been collected. Upon completion of the monitoring, the monitoring results shall be submitted to MDEQ within 2 years from the effective issuance date of the permit.
- "Oil and Grease" shall be monitored at Outfall 006 once per batch discharge during operation utilizing grab sampling and reported on a monthly basis; Outfall 007 twice per month utilizing grab sampling and reported on a monthly basis.
- "PH" shall be monitored at Outfalls 001 weekly utilizing grab sampling and reported on a monthly basis; Outfall 010 twice per month utilizing grab sampling and reported on a monthly basis; Outfall 013 and 014 quarterly utilizing grab sampling and reported on an annual basis.
- "Temperature (Deg. F)" shall be monitored at Outfall 001 continuously utilizing a continuous recorder and reported on a monthly basis.
- "Fecal Coliform" shall be monitored at Outfall 010 twice per month utilizing grab sampling and reported on a monthly basis.
- "Biochemical oxygen demand, 5-day" shall be monitored at Outfall 010 twice per month utilizing 24-hour composite sampling and reported on a monthly basis.
- "TSS" shall be monitored at Outfall 007 twice per month utilizing grab sampling and reported on a monthly basis; Outfall 010 twice per month utilizing 24-hour composite sampling twice per quarter and reported on a monthly basis; Outfall 011 once per month utilizing grab sampling and reported on a monthly basis; Outfall 013 and 014 quarterly



utilizing grab sampling and reported on an annual basis.

## **XII. BASIS FOR PROPOSED PERMIT LIMITATIONS**

### **Total Suspended Solids (TSS)**

The average and maximum TSS limits of 30 mg/l and 45 mg/l are based on secondary treatment standards and engineering judgment. Secondary treatment standards describe the minimum effluent quality attainable by secondary treatment for sanitary wastewater [40 CFR 133.102].

At Outfall 011 the average and maximum TSS limits of "Report" and 30 mg/l are based on engineering judgment. At Outfalls 013 and 014 the average and maximum TSS limits of "Report" are based on engineering judgment.

### **Oil & Grease**

The average and maximum effluent limit of 15 mg/l and 20 mg/l are categorical limitations defined in 40 CFR 423.12 (BPT) for low-volume wastewater.

### **Total Residual Chlorine (TRC)**

The average and maximum TRC limits of "Report" and 0.5 mg/l placed on outfalls 010 and 016 are based on engineering judgment.

At Outfall 004, the average and maximum "Report" only limits is based on engineering judgment.

### **Chlorination Duration**

The duration of chlorination limit of 120 minutes per day per unit is a categorical limitation defined in 40 CFR 423.12 (BPT) and 40 CFR 423.13 (BAT).

### **Temperature (°F)**

The average and maximum temperature limit of "Report" only is based on engineering judgment.

### **Thermal Mixing Zone**

The receiving water shall not exceed a maximum water temperature change of 2.8 degrees Celsius (5.0 degrees Fahrenheit) relative to the upriver temperature, outside a mixing zone not exceeding a maximum width of 60 feet from the river edge

and a maximum length of 6,000 feet downstream from the point of discharge, as measured at a depth of 5 feet. The river edge shall be defined as being no further east than the mouth of the barge slip. The maximum water temperature shall not exceed 32.2 degrees Celsius (90 degrees Fahrenheit) outside the same mixing zone, except then ambient temperatures approach or exceed this value.

#### Thermal Modeling:

Thermal monitoring shall be performed any time the river stage is less than 0.5 feet (Vicksburg gauge) during winter months (November-April) or, is less than minus 1.2 feet (Vicksburg gauge) during the summer months (May-October). If these conditions occur and the plant is generating power, monitoring shall be performed upriver at PT.1 (surface/5 feet sub-surface), Discharge Outlet, Barge Slip Outlet, and down river at PT.7. However, once monitoring has been performed at river stages less than those cited (0.5 feet during the winter months and minus 1.2 feet during the summer months), the river stages which existed at the time of thermal modeling, will then become the standard river stage during which a subsequent monitoring exercise must be performed if the river falls below that stage. Thorough documentation shall be maintained on file of the river stage during each period of thermal monitoring. This policy is subject to modification if any data collected during a particular stage indicates temperature variations not previously measured. Additionally, thermal monitoring shall be performed during the winter of 2013/2014 and the summer of 2014. Results shall be included with the application for permit re-issuance. Agreement regarding specific conduct of the thermal monitoring shall be determined prior to implementation.

#### Biochemical Oxygen Demand – 5 day (BOD<sub>5</sub>)

The average and maximum BOD<sub>5</sub> limits of 30 mg/l and 45 mg/l are based on secondary treatment standards and engineering judgment. Secondary treatment standards describe the minimum effluent quality attainable by secondary treatment for sanitary wastewater [40 CFR 133.102].

#### Fecal Coliform

Fecal coliform limits are water quality based effluent limits (WQBELs) defined in section III.4 of WPC-2 for streams classified as "Fish and Wildlife". For the months of May through October (summer), fecal coliform shall not exceed an average concentration of 200 colonies per 100 ml and a maximum concentration of 400 colonies per 100 ml. For the months of November through April (winter), fecal coliform shall not exceed an average concentration of 2000 colonies per 100 ml and a maximum concentration of 4000 colonies per 100 ml.

#### Total Recoverable Zinc

The average and maximum total recoverable zinc limits of 1.0 mg/l are categorical limitations defined in 40 CFR 423.13 (BAT) for cooling tower blowdown.

The total recoverable zinc maximum limit of 0.065 mg/l is a WQBEL determined using the State of Mississippi Water Quality Criteria (WPC-2). This limit was established because the permittee failed the acute toxicity screen performed on zinc monitoring data provided in compliance with Part I condition B.I (a) of the current permit.

#### Total Recoverable Iron

The permittee failed the total iron acute toxicity screen because of a variability factor, i.e. only one sample was provided on the application. Based on engineering judgment, the applicant will be required to monitor Outfall 013 until 12 monthly effluent samples that are representative of all 4 seasons have been analyzed. If this data indicates a violation of water quality standards, the NPDES permit may be modified.

#### Total Recoverable Arsenic

The permittee failed the total arsenic acute toxicity screen because of a variability factor, i.e. only one sample was provided on the application. Based on engineering judgment, the applicant will be required to monitor Outfall 014 until 12 monthly effluent samples that are representative of all 4 seasons have been analyzed. If this data indicates a violation of water quality standards, the NPDES permit may be modified.

#### Total Recoverable Copper

Only one analysis was performed and reported on the renewal application for total copper. Using the reported concentration, Outfall 014 failed the acute and chronic toxicity screen. Instead of establishing a water quality based effluent limit (WQBEL) based on 1 analysis, the applicant will be required to monitor Outfall 014 until 12 monthly effluent samples that are representative of all 4 seasons have been analyzed. If this data indicates a violation of water quality standards, the NPDES permit may be modified.

#### pH

The minimum and maximum pH effluent limits of 6.0 s.u. and 9.0 s.u. are WQBELs that reflect the WPC-2 requirement for the normal pH of waters to be 6.0 to 9.0.

### **126 Priority Pollutants Certification**

The permittee shall certify, not less than once per year (with the DMR on January 28<sup>th</sup> of each year), that chemical products added for cooling tower maintenance, including such chemical used for corrosion inhibition, do not result in the discharge via cooling tower blowdown of any of the 126 priority pollutants (including but not limited to chromium and zinc) in detectable concentrations. Additionally, once for each product used for cooling system and/or boiler maintenance, compliance shall be demonstrated by submission of certification from the manufacturer that such product contains no priority pollutants

The addition of any chemical product to the cooling system and/or the boiler system other than those submitted with the application is prohibited unless prior written approval is obtained in accordance with condition S-9 on page 7 of this permit. Chemicals used for the maintenance of cooling water chemistry and boiler water chemistry, or otherwise to operate or maintain these systems, shall not cause a violation of the terms and conditions contained in condition S-1 on page 4 of this permit.

## ATTACHMENT A

### EPA APPLICABLE CATEGORICAL GUIDELINES

#### 423.12 Best Practicable Control Technology Currently Available (BPT)

- (1) The pH of all discharges shall be within the range of 6.0 - 9.0.
- (2) There shall be no discharge of polychlorinated biphenyl compounds.
- (3) The quantity of pollutants discharged from low volume waste sources (Outfalls 006 and 007) shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Pollutant or Pollutant Property	BPT effluent limitations	
	Maximum for any 1 day (mg/l)	Average of daily values for 30 consecutive days shall not exceed (mg/l)
TSS.....	100.0	30.0
Oil and grease.....	20.0	15.0

*(The facility does not generate bottom ash or fly ash. Therefore, 423.12(b)(4) does not apply)*

*(The facility does not generate metal cleaning wastes. Therefore, 423.12(b)(5) does not apply.)*

*(The facility does not have once-through cooling water. Therefore, 423.12(b)(6) does not apply.)*

- (4) The quantity of pollutants in cooling tower blowdown (Outfalls 002, 004 and 005) shall not exceed the quantity determined by multiplying the flow of once through cooling water sources times the concentration listed in the following table:

Pollutant or pollutant property	BPT effluent limitations	
	Maximum concentration (mg/l)	Average concentration (mg/l)
Free available chlorine.....	0.5 mg/L	0.2 mg/L

Pollutant or Pollutant Property	BAT effluent limitations	
	Maximum for any 1 day (mg/l)	Average of daily values for 30 consecutive days shall not exceed (mg/l)
The 126 priority pollutants contained in chemicals added for cooling tower maintenance, except:	No detectable amount	No detectable amount.
Chromium, total .....	0.2	0.2
Zinc, total.....	1.0	1.0

- (5) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day (120 min) 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.

*(This facility does not have coal pile, therefore 423.1(b)(9) and (10) do not apply.)*

- (6) At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as a concentration limitation instead of the mass based limitations of this section. Concentration limitations shall be those concentrations specified in this section.
- (7) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled shall not exceed the specified limitation for that waste source.

#### 423.13 Best Available Technology Economically Achievable (BAT)

- (8) There shall be no discharge of polychlorinated biphenyl compounds.

*(The facility does not have once-through cooling water. Therefore, 423.13(b) and (c) does not apply.)*

- (9) 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 a discharge for more than two hours is required for macro invertebrate control. Simultaneous multi-unit chlorination is permitted.
- (10) The quantity of pollutants discharged in cooling tower blowdown (Outfall 002, 004 and 005) shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown times the concentration listed in the following table:

Pollutant or Pollutant Property	BAT effluent limitations	
	Maximum concentration (mg/l)	Average concentration (mg/l)
Free available chlorine.....	0.5 mg/L	0.2 mg/L

- (11) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day (120 min) 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.
- (12) The quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of mass based limitations.
- (13) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled shall not exceed the specified limitation for that waste source.

## ATTACHMENT B

### TOXICITY SCREENING

Grand Gulf Nuclear Station has three external discharge points. Outfall 001 is a combination of internal outfalls 002, 004, 005, 006 and 011 that discharges directly into the Mississippi River. Outfall 013 consists of the combined discharge from the Bechtel Shop; vehicle maintenance shop; Ice House Condensate; Standby Service Water Leakage; Construction and Site Runoff; Once-through cooling water; site processing facility HVAC; Internal Outfall 010 (Sanitary); Internal Outfall 016 (Energy Service System) which discharges to Hamilton Lake. Outfall 014 consists of a discharge from sedimentation basin B which includes water from internal Outfall 007; standby service water leakage and releases; intermittent circulation water basin overflows; and stormwater runoff. Outfalls 004, 005 and 006 are internal outfalls that discharge through Outfall 002 which discharge to Hamilton Lake.

#### **For Outfalls 001**

$$\begin{aligned} Q_r &= 7Q_{10} \text{ of receiving stream (Acute Screening)} \\ &= 82,082 \text{ MGD} \\ &= \text{Mean annual flow (Human Health Screening)} \\ &= 653,272.60 \text{ MGD} \end{aligned}$$

$$\begin{aligned} Q_w &= \text{Maximum 30 day value flow.} \\ &= 12.05 \text{ MGD} \end{aligned}$$

$$\begin{aligned} IWC &= 100 * Q_w / (Q_r + Q_w) \\ &= 100 * (12.05) / (82,082 + 12.05) = 0.01 \% \text{ (7Q}_{10}\text{)} \\ &= 100 * (12.05) / (653,272.7 + 12.05) = 0.002 \% \text{ (Mean Annual)} \end{aligned}$$

Because IWC is less than 1 percent, an acute and human health toxicity screen will be performed.

#### **For Outfalls 013**

$$\begin{aligned} Q_r &= \text{Receiving Stream Flow} \\ &= 0 \text{ MGD (7Q}_{10}\text{-Acute and Chronic Screening)} \\ &= 5.881 \text{ MGD (Mean Annual - Human Health Screening)} \end{aligned}$$

$$\begin{aligned} Q_w &= \text{Maximum 30 day value flow.} \\ &= 0.08 \text{ MGD (Outfall 013)} \end{aligned}$$

$$IWC (\%) = Q_w / (Q_r + Q_w) * 100$$



$$= 0.8/(5.881+0.8)*100 = 11.97 \% \text{ (Outfall 013) Mean}$$

$$= 0.8/(0+0.8)*100 = 100 \% \text{ (Outfall 013) 7Q10=0}$$

Because IWC is greater than 1 percent, an acute, chronic and human health toxicity screen will be performed.

### **For Outfalls 014**

$$Q_r = \text{Receiving Stream Flow}$$

$$= 0 \text{ MGD (7Q10-Acute and Chronic Screening)}$$

$$= 0 \text{ MGD (Mean Annual - Human Health Screening)}$$

$$Q_w = \text{Maximum 30 day value flow.}$$

$$= 0.07 \text{ MGD (Outfall 014)}$$

$$= 11.64 \text{ MGD (Outfall 002 via Outfall 014)}$$

$$\text{IWC (\%)} = Q_w/(Q_r + Q_w)*100$$

$$= 0.7/(5.881+0.8)*100 = 11.97 \% \text{ (Outfall 014) Mean}$$

$$= 0.7/(0+0.7)*100 = 100 \% \text{ (Outfall 014) 7Q10=0}$$

Because IWC is greater than 1 percent, an acute, chronic and human health toxicity screen will be performed.

### **For Outfall 002 when discharged to Outfall 007 and thence to Outfall 014**

During plant outages when the Circulating Water System is drained, there is a portion of the Circulating Water System that cannot be discharged via Outfall 002. This portion of effluent is manually pumped into the 100-year storm ditch and discharged via Outfall 007 (thence to Outfall 014). To predict if there would be a violation to water quality, a toxicity screen for this discharge was performed on those parameters that were reported at concentration above the minimum quantification levels (MQL's). Because this effluent is normally part of Outfall 002, a toxicity screen for this discharge was performed for using the data provided on the application for Outfall 002. Since this type of discharge will seldom occur, only an acute toxicity screen is applicable to this discharge option.

$$Q_r = \text{Receiving Stream Flow}$$

$$= 0 \text{ MGD (7Q10-Acute and Chronic Screening)}$$

$$= 0 \text{ MGD (Mean Annual - Human Health Screening)}$$

$$Q_w = \text{Maximum 30 day value flow.}$$

$$= 11.64 \text{ MGD (Outfall 002 via Outfall 014)}$$

$$\text{IWC (\%)} = Q_w/(Q_r + Q_w)*100$$

$$= 11.64/(0+11.64)*100 = 100 \% \text{ (Outfall 014) Mean}$$

$$= 11.64 / (0 + 11.64) * 100 = 100 \% \text{ (Outfall 014) } 7Q10=0$$

$X_r$  = Receiving stream concentration.

$X_w$  = Historical effluent data from the application.

$X_{wa}$  = Permit limits from previous permit or from effluent guidelines.

$X_{ia}$  = The calculated instream concentration based on existing permit limits or the calculated limit based on current effluent guidelines.

$X_i$  = The calculated instream concentration based on historical effluent data from the application

$$X_i = \frac{(Q_r * X_r) + (Q_w * X_w)}{(Q_r + Q_w)}$$

To calculate  $X_{ia}$  substitute  $X_{wa}$  for  $X_w$ .

Until 12 samples can be analyzed, the effluent is multiplied by 10 as seen in the following equation:

$$X_i = \frac{(Q_r * X_r) + (Q_w * X_w * 10)}{(Q_r + Q_w)}$$

To ensure that the each pollutant limitation would protect water quality, the pollutant limitations were evaluated in the toxicity screen as well. To view screening results, see the toxicity screening tables on the following pages.

## Outfall 001 Chemical Specific Screening

(Using data from the Form 2C Application)

$Q_r$  (river, mean annual) = 653272.70 MGD  
 $Q_r$  (river, 7Q10) = 82082.00 MGD  
 $Q_w$  (effluent) = 12.05 MGD

IWC:  $100 * [Q_w / (Q_r + Q_w)]$  %  
 IWC (mean) = 0.002 %  
 IWC (7Q10) = 0.01 %

### Water Quality Acute Screen: (Outfall 001)

$$X_t = [(Q_r \times X_r) + (Q_w \times X_w)] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

	Assuming $X_w \times 1$		Assuming $X_w \times 10$		WQ Criteria
	$X_t$ , where $Q_r = 7Q10$		$X_t$ , where $Q_r = 7Q10$		Acute
Parameter	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/L
Zinc, Total	0.052255	Pass	0.522547	Pass	65,000

### Water Quality Human Health Screen: (Outfall 001)

$$X_t = [(Q_r \times X_r) + (Q_w \times X_w)] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

	Assuming $X_w \times 1$		Assuming $X_w \times 10$		WQ Criteria
	$X_t$ , where $Q_r = \text{mean}$		$X_t$ , where $Q_r = \text{mean}$		Human Health
Parameter	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/L
Arsenic, Total	0.000037	Pass	0.000369	Pass	0.0780
Mercury, Total	0.000000	Pass	0.000001	Pass	0.151
Zinc, Total	0.006567	Pass	0.065665	Pass	5000.0000
Bis(2-ethylhexyl)phthalate	0.000000	Pass	0.000003	Pass	2.2

## Outfall 013 Chemical Specific Screening

(Using data from the Form 2C Application)

Qr (river, mean annual) = 5.881484 MGD  
 Qr (river, 7Q10) = 0.00 MGD  
 Qw (effluent) = 0.8 MGD

IWC:  $100 * [Qw / (Qr + Qw)]$  %  
 IWC (mean) = 11.97 %  
 IWC (7Q10) = 100.00 %

### Water Quality Acute Screen: (Outfall 013)

An acute screening could not be performed because there are no acute water quality standards available for the pollutants subject to the screening.

### Water Quality Chronic Screen: (Outfall 013)

$$X_t = [(Q_r \times X_r) + (Q_w \times (X_w))] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)		Xr	Xt, where Qr = 7Q10		Xt, where Qr = 7Q10		Acute
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/L
Iron, Total		270	0	270.000000	Pass	2700.000000	Fail	1000.0

### Water Quality Human Health Screen: (Outfall 013)

$$X_t = [(Q_r \times X_r) + (Q_w \times (X_w))] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)	Xw	Xr	Xt, where Qr = mean		Xt, where Qr = mean		Human Health
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/L
Arsenic, Total		12	0	1.436807	Pass	14.368066	Pass	24.0000
Mercury, Total		0.002	0	0.002000	Pass	0.020000	Pass	0.151
Zinc, Total		355	0	42.625261	Pass	426.252611	Pass	5000.0000
Bis(2-ethylhexyl)phthalate		0.017	0	0.002035	Pass	0.020355	Pass	2.2

# **Outfall 013 Chemical Specific Screening**

(Using August 1, 2004 Monitoring Submittal)

Qr (river, mean annual) = 5.881484 MGD  
 Qr (river, 7Q10) = 0.00 MGD  
 Qw (effluent) = 0.8 MGD

IWC:  $100 * [Qw / (Qr + Qw)]$  %  
 IWC (mean) = 11.97 %  
 IWC (7Q10) = 100.00 %

## **Water Quality Acute Screen: (Outfall 013)**

$$X_t = [(Q_r \times X_r) + (Q_w \times X_w)] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)	Xw	Xr	Xt, where Qr = 7Q10		Xt, where Qr = 7Q10		Acute
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/L
Zinc, Total		94	0	94.000000	Fail	--	--	65.0
Zinc, Total		0.066	0	0.065000	Pass	--	--	65.0

## **Water Quality Chronic Screen: (Outfall 013)**

$$X_t = [(Q_r \times X_r) + (Q_w \times X_w)] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)	Xw	Xr	Xt, where Qr = 7Q10		Xt, where Qr = 7Q10		Acute
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/L
Zinc, Total		8	0	8.000000	Pass	--	--	65.0
Zinc, Total (Limit)		65	0	65.000000	Pass	--	--	65.0

The following total zinc data was provided on the August 1, 2004 monitoring submittal:

Maximum Daily Value 94 ug/l  
 Maximum 30-day Value 94 ug/l  
 Long Term Average 8 ug/l

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)	Xw	Xr	Xt, where Qr = 7Q10		Xt, where Qr = 7Q10		Acute
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/l
Copper, Total		10	0	10.000000	Fail	100.000000	Fail	7.000
Copper, Total (Limit)		7	0	7.000000	Pass	-	-	7.000

#### **Water Quality Chronic Screen: (Outfall 014)**

$$X_t = [(Q_r \times X_r) + (Q_w \times (X_w))] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)	Xw	Xr	Xt, where Qr = 7Q10		Xt, where Qr = 7Q10		Acute
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/l
Copper, Total		10	0	10.000000	Fail	100.000000	Fail	5.0
Copper, Total (Limit)		5	0	5.000000	Pass	-	-	5.0
Iron, Total		100	0	100.000000	Pass	1000.000000	Pass	1000.0

#### **Water Quality Human Health Screen: (Outfall 014)**

$$X_t = [(Q_r \times X_r) + (Q_w \times (X_w))] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)	Xw	Xr	Xt, where Qr = mean		Xt, where Qr = mean		Human Health
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/l
Arsenic, Total		15	0	15.000000	Pass	150.000000	Fail	24.0000
Copper, Total		10	0	10.000000	Pass	100.000000	Pass	1000.0000

## Outfall 014 Chemical Specific Screening

(Using August 2004 Monitoring Submittal)

Qr (river, mean annual) = 0.00 MGD  
 Qr (river, 7Q10) = 0.00 MGD  
 Qw (effluent) = 0.07 MGD

IWC:  $100 * [Qw / (Qr + Qw)]$  %  
 IWC (mean) = 100.00 %  
 IWC (7Q10) = 100.00 %

### Water Quality Acute Screen: (Outfall 014)

$$X_t = [(Q_r \times X_r) + (Q_w \times (X_w))] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)	Xw	Xr	Xt, where Qr = 7Q10		Xt, where Qr = 7Q10		Acute
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/L
Zinc, Total		69	0	69.000000	Fail	—	—	65.0
Zinc, Total (Limit)		0.065	0	0.065000	Pass	—	—	65.0

### Water Quality Chronic Screen: (Outfall 014)

$$X_t = [(Q_r \times X_r) + (Q_w \times (X_w))] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)	Xw	Xr	Xt, where Qr = 7Q10		Xt, where Qr = 7Q10		Chronic
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/L
Zinc, Total		9	0	9.000000	Pass	—	—	65.0
Zinc, Total (Limit)		0.065	0	0.065000	Pass	—	—	65.0

### Water Quality Human Health Screen: (Outfall 014)

$$X_t = [(Q_r \times X_r) + (Q_w \times (X_w))] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)	Xw	Xr	Xt, where Qr = mean		Xt, where Qr = mean		Human Health
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/L
Zinc, Total		9	0	9.000000	Pass	—	—	5000.0

The following total zinc data was provided on the August 1, 2004 monitoring submittal:

Maximum Daily Value 69 ug/l  
 Maximum 30-day Value 69 ug/l  
 Long Term Average 9 ug/l

# **Outfall 002 When Portions Are Drained to Outfall 007 thence 014**

Ir (river, mean annual) = 0.00 MGD  
 Qr (river, 7Q10) = 0.00 MGD  
 Qw (effluent) = 11.64 MGD

IWC:  $100 * [Qw / (Qr + Qw)]$  %  
 IWC (mean) = 100.00 %  
 IWC (7Q10) = 100.00 %

## **Water Quality Acute Screen: (Outfall 014)**

$$X_t = [(Q_r \times X_r) + (Q_w \times (X_w))] / (Q_r + Q_w)$$

Conc. in ug/l, unless otherwise stated.

				Assuming Xw x 1		Assuming Xw x 10		WQ Criteria
	Xw (less than)	Xw	Xr	Xt, where Qr = 7Q10		Xt, where Qr = 7Q10		Acute
Parameter	(Conc. In Effluent)	(Conc. In Effluent)	(Conc. In River)	(Conc. After Mixing)	Pass/Fail	(Conc. After Mixing)	Pass/Fail	ug/L
Zinc, Total		780	0	780.000000	Fail	7800.000000	Fail	65.000
Nickel, Total		8	0	8.000000	Pass	80.000000	Pass	280.000

During plant outages when the Circulating Water System is drained, there is a portion of the Circulating Water System that cannot be discharged via Outfall 002. This portion of effluent is manually pumped into the 100-year storm ditch and discharged via Outfall 007 (thence to Outfall 014). To predict if there would be a violation to water quality, a toxicity screen for this discharge was performed on those parameters that were reported at concentration above the minimum quantification levels (MQL's). Because this effluent is normally part of Outfall 002, a toxicity screen for this discharge was performed for using the data provided on the application for Outfall 002.

An acute toxicity screen could not be performed on Iron, Magnesium, Arsenic and Mercury because there are no acute water quality criteria available for these parameters. Because this type of discharge is not routine, there should not be any chronic or human health impacts. Therefore, a chronic and human health screen will also not be performed for the aforementioned parameters.