

WASTEWATER CONTROL  
REPORT FOR THE  
Y -12 NATIONAL  
SECURITY COMPLEX  
OAK RIDGE, TENNESSEE  
NATIONAL POLLUTANT  
DISCHARGE  
ELIMINATION  
SYSTEM PERMIT  
TN0002968



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Environmental Compliance Department  
Environment, Safety and Health  
Month Year

**WASTEWATER CONTROL REPORT FOR THE  
Y -12 NATIONAL SECURITY COMPLEX  
OAK RIDGE, TENNESSEE  
NATIONAL POLLUTANT DISCHARGE ELIMINATION  
SYSTEM PERMIT TN0002968**

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Prepared by  
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Management & Operating Contractor  
for the  
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## ABBREVIATIONS

BCBG	Bear Creek Burial Grounds
CMTS	Central Mercury Treatment System
CNS	Consolidated Nuclear Security, LLC
CPCF	Central Pollution Control Facility
DOE	U.S. Department of Energy
DWPC	Division of Water Pollution Control
ECD	Environmental Compliance Department
EFPC	East Fork Poplar Creek
GWTF	Groundwater Treatment Facility
IBC	Intermediate Bulk Container
LSF	Liquid Storage Facility
LWMS	Y-12 Liquid Waste Management Services
NNSA	National Nuclear Security Administration
NPO	NNSA Production Office
PCB	Polychlorinated biphenyl
SW846	The Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium
TDEC	Tennessee Department of Environment and Conservation
WETF	West End Treatment Facility
WTC	Waste Treatment Coordinator
WTF	West Tank Farm
WTO	Waste Treatment Operations
Y-12	Y-12 National Security Complex

## **EXECUTIVE SUMMARY**

The Y-12 National Security Complex (Y-12 Complex) 2022 National Pollutant Discharge Elimination System (NPDES) Permit Part III-G requires the permittee to establish procedures and criteria used to determine which wastewaters are routed to each treatment system operated under the NPDES permit. To fulfill these requirements, Document Y/TS-1466/R4, Wastewater Control Report, addresses waste acceptance criteria used to determine the appropriate treatment system to receive the waste streams, and procedures used to control influent introduced into the wastewater treatment systems. Four wastewater treatment systems which discharge under the Y-12 Complex NPDES permit are currently in operation at the Y-12 Complex operated by personnel under subcontract to Consolidated Nuclear Security, LLC (CNS). Operating personnel at each treatment facility shall maintain operating logs to assure significant waste loads have not been added to the treatment system that would cause exceedance of design capacity and/or exceedance of the NPDES permit.

# 1. INTRODUCTION

## 1.1 CENTRAL POLLUTION CONTROL FACILITY (CPCF)

The CPCF is designed to treat non-nitrate-bearing industrial wastewaters and pre-treat nitrate-bearing industrial wastewaters generated throughout the Y-12 Complex and other Department of Energy (DOE) Oak Ridge Operations as approved by CNS within the scope of permit-by-rule allowance. Wastewater treated at the CPCF may be dilute wastewater (also called mop water), concentrated wastewater, and/or limited oily sludge. Dilute wastewater is typically generated by cleaning and rinsing operations performed at various Y-12 Complex production facilities and will usually have higher organic content and lower metal content than the concentrated wastewater. Concentrated wastewater is typically derived from chemical processes and usually not diluted before arriving at CPCF. This wastewater normally has a high level of dissolved metal, including various compounds of soluble uranium, and high acidity or alkalinity levels. Concentrated wastewaters may include nitric acid pickling, enriched uranium recovery, laboratory wastewater from analytical work, and hydrogen fluoride scrubber wastewaters. Since no treatment unit at CPCF removes nitrates, effluents from nitrate receipts are shipped to the West End Treatment Facility (see Section 1.2) for nitrate destruction. Both mop water and concentrated wastewater are transported to CPCF by 5,000-gallon tanker trucks, 300-gallon intermediate bulk containers (IBCs), and various small containers such as drums and carboys. The CPCF will batch treat unique wastewaters that do not meet acceptance requirements of other DOE or reservation treatment facilities, including enriched wastewaters that are treated by down-blending. The CPCF is set up to treat and discharge non-nitrate-bearing wastewaters, but the facility does not currently discharge wastewaters from Outfall 501. If discharges were re-started at CPCF, the effluent flow from CPCF would be approximately 50 gallons per minute (gpm) or less. If wastewaters were discharged at CPCF, the effluent would be monitored at NPDES Outfall 501 before being discharged to the storm drain and East Fork Poplar Creek (EFPC). Current operations in place transfer all treated water and sludge to the West End Treatment Facility/West Tank Farm for final treatment and discharge through an NPDES permitted outfall.

## 1.2 WEST END TREATMENT FACILITY (WETF) and WASTE TANK FARM (WTF)

The WETF and associated WTF are operated by a CNS subcontractor staff and designed to treat nitrate-bearing wastewater from Y-12 Complex production operations. Typical waste streams treated by the WETF include nitric acid wastewater, mixed acid wastes, nitrate-bearing rinsewaters, mopwaters, caustic wastewaters, hydrogen fluoride scrubber wastewaters, coolants, various rinsewaters, caustic solutions from metal-cleaning operations, decontaminating solutions, sodium nitrate solutions from electropolishing operations, nitrate-containing mop water, concentrated wastewater from washing/pickling components with nitric acid, and dilute plating wastewater containing nitrates. Wastewater is delivered in 5,000-gallon tanker trucks, 300-gallon IBCs, and various small containers such as drums and carboys. Wastewater is processed through one or all of the following treatment steps: the Head End Treatment System, bionitrification, and biooxidation at the WTF. Waste is then processed through the Effluent Polishing System (EPS) prior to discharge. Typically, effluent flow from the WETF is about 75 gpm, and is monitored at NPDES Outfall 502 before being discharged to the storm drain system and EFPC.

## 1.3 GROUNDWATER TREATMENT FACILITY (GWTF) AND LIQUID STORAGE FACILITY (LSF)

The GWTF treats contaminated groundwater seeps and leachate from the Bear Creek Burial Grounds (BCBG) after the groundwaters are partially treated to remove oils and then collected in holding tanks at LSF. The water may be contaminated with various volatile and nonvolatile organic compounds, as well as beryllium. The oil phase of the collected seep water is contaminated with polychlorinated biphenyls

(PCBs). The collected seep water is processed through an oil/water separator at the LSF to remove the oil from the water. The water is transported by 5,000-gallon tanker trucks to the GWTF where it is treated to remove volatile and nonvolatile organic compounds, PCBs and iron. The GWTF can also provide treatment of seep water, groundwater from locations other than BCBG, and small quantities of groundwater well purge waters, if approved by Environmental Compliance Department (ECD) personnel and is within the NPDES permit allowances. Wastewater is transported to the GWTF by 5,000-gallon tanker trucks or various bulk, small containers (such as IBCs), and drums from groundwater well locations other than BCBG. The treated water is collected in a 6,000-gallon effluent tank. The GWTF discharges at an approximate rate of 20 to 35 gpm. Effluent is monitored at NPDES Outfall 512 before being discharged to the storm drain system and EFPC.

#### **1.4 CENTRAL MERCURY TREATMENT SYSTEM (CMTS)**

The CMTS is located in Building 9623 (which also houses the CPCF) and is designed to remove mercury from groundwater collected in the basement sumps of building 9201-4. Wastewater collected from Building 9204-4 which meets the WETF Waste Acceptance Criteria (WAC) is taken to the WETF for treatment. There is no appreciable source of mercury-contaminated wastewater in Building 9204-4; the water which is collected for treatment at WETF does not demonstrate a high concentration of mercury. The groundwater, contaminated with mercury from the historical spills that occurred in building 9201-4, is either typically piped directly to the CMTS. Effluent from the CMTS is monitored and sampled, consistent with the NPDES permit, at NPDES Outfall 551 as it is discharged to the storm drain system and EFPC.

## **2. WASTEWATER ACCEPTANCE**

### **2.1 CPCF, WETF, and WTF**

The Wastewater Treatment Operations (WTO) Waste Treatment Coordinator (WTC), subcontracted to CNS, determines wastewater acceptance at the CPCF, WETF, and WTF in accordance with waste evaluation criteria detailed in Y-12 Complex procedures. The WTC makes acceptance decisions based on review of laboratory analyses, assigns wastewater to appropriate treatment facilities, field checks wastewater containers, and processes requests for disposal and shipment reports for transportation and disposal of wastewater. The WTC coordinates disposal of wastewater by interfacing between generators and CNS Waste Management personnel. The WTC also serves as a wastewater treatment facility representative for the receipt and treatment of wastewater from sites other than the Y-12 Complex. The WTC maintains records of all waste receipts at the treatment facilities, including pertinent analytical data.

### **2.2 GWTF and LSF**

Although the Wastewater Treatment subcontractor staff also operates the GWTF, the waste evaluation criteria used at the WETF/WTF and CPCF do not apply to the GWTF operations. The wastewater treated at the GWTF comes from contaminated groundwater seeps primarily in the BCBG. This water is collected at the LSF and transported to the GWTF for treatment. On an interim basis and as allowable under the existing NPDES permit and with approval of Y-12 personnel, leachate or seep water from other locations is transported to the GWTF for treatment. Under a Memorandum of Understanding between generator personnel and the GWTF Facility Engineer, the need for periodic sampling of the wastewater and provisions for laboratory reports to be submitted to the GWTF Facility Engineer are evaluated. Manifests and laboratory reports of special wastewaters are available from the GWTF Facility Engineer.



## 2.3 CMTS

Due to the nature of operations at the CMTS, wastewater is not evaluated prior to acceptance for treatment. Groundwater that flows into the building sumps in Building 9201-4 is piped directly to the treatment system. During removal of filters and/or carbon, sampling for characterization and confirmation of special waste allowance burial at the on-site landfill is completed per the special waste permit. The project staff has added Tc-99 to the sampling criteria during those sampling events.

## 3. RESTRICTIONS

### 3.1 WETF and WTF

The following are prohibited at the WETF: (1) waste containing less than 50 percent water; (2) U-, P-, or K-listed waste; (3) wastewater that contains Polychlorinated biphenyl (PCBs) at 50 parts per million (ppm) or greater (wastewater that contains PCBs greater than 0.1 but less than 50 ppm maybe accepted on a case-by-case basis); (4) wastewater derived from waste containing PCBs of 50 ppm or greater; (5) wastewater containing excessive oil and grease (greater than one inch of oil on any wastewater in containers); and (6) wastewater containing enriched uranium (>0.93 wt% Uranium-235). Receiving limits are also placed on cyanide, mercury, cadmium, chromium, nickel, and lithium. The WTC must approve deviations from these guidelines. Specific waste evaluation criteria for the wastewaters to be treated at WTO treatment facilities are detailed in WSMS-WM-001, Waste Acceptance Procedure for LWMS Facilities. Attachment A of the procedure is the WAC WW-01 for wastewaters. Further receiving guidelines for WETF/WTF are detailed in Procedure Y50-41-09.21, HETS (Head End Treatment System) – Receive and Unload Waste, and in Procedure Y50-41-WT-03.21, West Tank Farm Waste Receiving Operations.

### 3.2 CPCF

The following are prohibited at the CPCF: (1) waste containing less than 50 percent water; (2) waste containing U-, P-, or K-listed hazardous waste; (3) wastewater that contains PCBs at 50 ppm or greater (wastewater that contains PCBs greater than 0.1 ppm but less than 50 ppm may be accepted on a case-by-case basis); (4) wastewater derived from waste containing PCBs of 50 ppm or greater; and (5) uranium-235 concentrations no greater than those specified by Nuclear Criticality Safety personnel. Specific waste evaluation criteria for the wastewaters to be treated at WTO treatment facilities are detailed in WSMS-WM-001, Waste Acceptance Procedure for LWMS Facilities. Attachment A of the procedure is the WAC WW-01 for wastewaters. Specific waste evaluation criteria are detailed in Procedure Y50-41-WT-08.02, CPCF – Receive and Unload Waste. The Facility Engineer and WTC must approve deviations from these criteria.

### 3.3 GWTF

Wastewater from significant sources other than contaminated groundwater from the BCBG, LSF, groundwater well purge waters, and small quantities of seep water from the other locations will not be accepted for treatment without prior approval of Tennessee Department of Environment and Conservation (TDEC), Division of Water Pollution Control (DWPC), personnel; however, wastewater not specified in the procedures may be temporarily accepted on a case-by-case basis, with memorandums of understanding written to specify acceptance criteria, allowance within the NPDES permit, analytical parameters, and sampling frequency. Memorandums of understandings may be used when procedure revisions are impractical.

### 3.4 CMTS

Wastewater from significant sources other than the building 9201-4 sumps and water containing mercury collected from legacy mercury contaminated areas is not accepted for treatment without prior approval of TDEC DWPC personnel. However, wastewater not specified in the procedures may be temporarily accepted on a case-by-case basis, with memorandums of understanding written to specify acceptance criteria, analytical parameters, and sampling frequency. Memorandums of understanding will be used when procedure revisions are impractical. Transfer stations or similar areas are not present at the CMTS.

## 4. SAMPLING

### 4.1 WETF, WTF, and CPCF

All waste sampling is done following the SW846 protocol to ensure precision and accuracy. In the laboratory, the samples are analyzed using SW846 or comparable Environmental Protection Agency methods. Wastes, except some purged well waters with historical data demonstrating that the water is within acceptance standards, are typically analyzed for the following constituents:

- acidity\*
- PCBs
- cyanide
- mercury
- oil and grease
- volatile organics\*
- total uranium
- percent uranium-235 by weight
- duplicate total uranium and percent uranium-235 by weight (Criticality Safety Requirement)
- inductively coupled plasma metals
- total organic carbon
- nitrate
- chloride
- fluoride
- sulfate
- phenols\*
- pH
- other radionuclides (required for wastes from Oak Ridge National Laboratory and the K-25 Site or any wastes suspected of containing radionuclides other than uranium).

\* Not routinely required for accumulated storm water from secondary containment which has failed the screening criteria for discharge to EFPC.

Exempt from these sampling requirements are some small quantity shipments, usually 55 gallons or less, which are bulked and neutralized in a mixing tank before sampling. Also, the Waste Certification Program allows generators a mechanism for using validated process knowledge in lieu of some sampling requirements. Any exceptions to sampling requirements are made with the concurrence of the WTC.

## **4.2 GWTF**

Because waste streams entering the GWTF are consistent and normally shipped from the LSF, each shipment or unit of water to these facilities may not be analyzed. The waste streams from the LSF are consistent, and a thorough characterization of the source water has already been performed. Special shipments of leachate or contaminated groundwater from other locations will require sampling, acceptance, and notification requirements usually detailed in a memorandum of understanding and allowable within the existing NPDES permit conditions.

## **4.3 CMTS**

Because the waste streams entering the CMTS are consistent and directly piped to the facility, the wastewater is not normally sampled prior to acceptance. The CMTS has a compliance sampler operated by Y-12 Clean Water Compliance personnel located at the NPDES discharge point for CMTS which samples the discharged water.

# **5. DATA REVIEW AND TREATMENT FACILITY ASSIGNMENT**

## **5.1 WETF and CPCF**

The WTC reviews the analytical data for all wastewater. Acceptance and assignment to a treatment facility are determined by comparing analytical data with the waste evaluation criteria for the CPCF (Y50-41-WP-08.02), WETF (Y50-41-WT-09.21), and WTF (Y50-41-WT-03.21). Deviations from these guidelines, except those firm restrictions stated above, may be approved on a case-by-case basis if jar testing indicates that the wastewater can be treated successfully.

Based on analytical results and container size, wastes are routed by the WTC to one of three places: the WETF, CPCF (concentrated system or mop water system), or 500,000-gallon tanks at the WTF. As stated above, small quantity containers of 55 gallons or less are routinely received for bulking, neutralization, and sampling at either the CPCF or WETF. Wastewater containing nitrates must ultimately be denitrified at the WTF. If nitrate solutions require metals removal or neutralization prior to treatment at the WTF, then the wastewater must first undergo pretreatment at either the CPCF or WETF.

## **5.2 GWTF and CMTS**

The acceptance and assignment to a treatment facility are determined by comparing analytical data with the waste evaluation criteria. These rules are not applicable to operations at the GWTF and CMTS; however, wastewater not specified in the procedures may be temporarily accepted on a case-by-case basis, with memorandums of understanding written to specify acceptance criteria, analytical parameters, and sampling frequency. Memorandums of understanding will be used when procedure revisions are impractical.

## **6. RECORD KEEPING AND DOCUMENTATION**

All documentation will be kept for a minimum of 3 years and will be made available to TDEC DWPC personnel within 15 days, if requested.

### **6.1 WETF and CPCF**

Wastewater transactions are maintained in the SAP Waste Program. In addition, hardcopies are maintained by wastewater treatment subcontractor personnel for each waste stream received at the WETF and CPCF. These forms include information such as description, quantity, source, analytical data, and designation of the treatment facility.

### **6.2 GWTF and LSF**

The GWTF Facility Engineer maintains records and documentation for wastewater received at GWTF and the LSF.

### **6.3 CMTS**

Records and documentation for wastewater received at the CMTS are maintained by WTO personnel, under subcontract to CNS.

## **7. TREATMENT SYSTEM INFLUENT CHANGES**

Significant waste streams, other than those described above, will not be added to the existing treatment systems without prior notification and approval by TDEC DWPC personnel. Significant waste streams will be added to the treatment systems only after review for treatability as described in the procedures above or by the Facility Engineer. If significant revisions are made to the waste acceptance criteria, a notification will be made to TDEC DWPC personnel.

Situations of emergency may arise involving generation of wastewater compatible with an on-site treatment facility, or wastewater similar to the current acceptance criteria, but not specifically approved. In such situations, CNS Y-12 ECD personnel may contact TDEC DWPC and/or City of Oak Ridge pretreatment or wastewater treatment personnel to determine conditions suitable for the handling, treatment, monitoring, and reporting of the wastewater discharge. This would be appropriate for non-routine, relatively small quantities of wastewater, where immediate attention is needed for safety, property protection, or protection

of the environment. Initiation of handling of the wastewater could occur before final TDEC DWPC permitting approvals are documented.

## **8. PREVENTIVE MAINTENANCE PROGRAMS**

### **8.1 WETF, CPCF, and GWTF**

The WETF, CPCF, and GWTF are operated in batch treatment mode. Failure of the treatment system should not cause untreated wastewater to be discharged; therefore, backup and auxiliary systems are not necessary to maintain compliance with the NPDES permit. There are no auxiliary or backup power systems at the WETF. Discharges from the WETF occur only after treatment through the EPS. The facility is manned when EPS treatment or discharge occurs. So if there is a power failure, operators follow abnormal operation procedures to shut down the EPS immediately until power is restored. In the event of a major mechanical failure, the system is shut down to make the repair or temporary modification. The LSF has a diesel generator that provides emergency power to the pumps and instruments at the lift station and collection points, and the discharge pump from the LSF oil/water separator. The backup power source prevents overflows of groundwater from the lift station to Tributary 8 during a power outage. The generator is tested once per month, and records of these tests are maintained by the project. If there is an equipment failure or loss of required utilities at the LSF, the operation is shut down immediately except for the leachate collection into the lift station and subsequent transfer of the water through the oil water separator and to the storage tanks which continues automatically (on emergency power if necessary). If a high-level alarm is received for the water level in the lift station, the steps in Procedure Y57-41-LSF-F550 Alarm Response Procedure for Trib 8 Lift Station F550, are followed to prevent overflows.

### **8.2 CMTS**

Backup and auxiliary systems are not in place at the CMTS. The discharges can be controlled; therefore, accidental discharges of non-treated wastewater should not occur. Because the facility cannot discharge without power to operate the discharge pumps, secondary power sources do not exist and accidental discharges are avoided.

## **9. BUILDING DRAINS**

As part of the wastewater control program, Y-12 Complex personnel maintain a site survey of buildings and area drains. The drain survey documentation, indicating connections to the storm drain system and the sanitary sewer collection system, are maintained through a process outlined in Procedure Y71-920, Modifications to Y-12 Storm Drain and Sanitary Sewer Systems. This procedure outlines responsibilities and establishes a uniform system for connection, modification, or restart of water discharges to the Y-12 Complex storm drain and sanitary sewer systems and steam condensate locations.

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