

# General Operation and Maintenance of Sewage Systems

**References:** (a) Naval Ship's Technical Manual "Pollution Control" S9086-T8-STM-010/CH593  
(b) OPNAVINST 5090.1B  
(c) GEN SPECS Section 593

## Sanitary Waste Spaces

1. Water closets and urinals should be inspected daily during routine housekeeping and the following maintenance accomplished as required:

- A. Operate water closet/urinal flush handle. Ensure amount of flush water dispensed is:
  - a. between 0.8 to 1.5 gallons for urinals and between 3 to 5 gallons for water closets in gravity flow CHT systems.
  - b. 1 pint for urinals and 3 pints for water closets in vacuum CHT (VCHT) systems.
  - c. 1 pint for urinals and water closets on MCM and MSO Class ships.

(Refer to applicable MRC for procedures)

- B. Scale Prevention
  - a. Urinal Citric Acid Tablets. The primary product used for scale prevention is the urinal citric acid tablet. The chemical action of the acid delays the formation of calcium carbonate scale on the wall of soil piping.
  - b. Sulfamic Acid. Sulfamic acid described or toilet bowl cleaning compound may be used for removing scale deposits and stains from porcelain fixtures.
    - i. Conduct urinal drain pipe flushing weekly in accordance with applicable MRC.
    - ii. Replenish citric acid tablet in urinal when existing tablet is 90% depleted.

## Sewage System

Cycle sewage system valves quarterly. Ensure the valve is left properly aligned in accordance with the particular sewage system alignment (In-Port, Transit, or At-Sea).

## Sewage Pump Room

### WARNING

**SMOKING, EATING, OR DRINKING IS NEVER PERMITTED INSIDE THE SEWAGE SYSTEM SPACES (CHT/MSD PUMP ROOMS, COMMUNICATOR SPACES, ETC.) OR WHEN WORKING ON ANY SEWAGE SYSTEM COMPONENT.**

2. Dedicated sewage and waste water system pump room spaces have a sump surrounded by two (2) to four (4) inch coamings, which are equipped with flooding sensors. This sump has an

eductor or sump pump installed to evacuate contents. The operator must open the firemain supply valve in order to operate this eductor and must do so prior to operating the sink in the space. The operator should test the flooding alarm system sensors every 3 months in accordance with the applicable MRC.

### **WARNING**

#### **ACTIVATE SPACE EDUCTOR OR SUMP PUMP PRIOR TO USING SERVICE SINK. SECURE EDUCTOR OR SUMP PUMP BEFORE LEAVING SPACE.**

3. A hydrogen sulfide (H<sub>2</sub>S) alarm system is installed in the sewage pump room. The H<sub>2</sub>S alarm system is designed to continuously monitor for the presence of hydrogen sulfide, and provide a warning alarm in the pump room when H<sub>2</sub>S levels reach 10 parts per million (ppm) and an immediate danger alarm at 50 ppm. The operator must ensure the H<sub>2</sub>S sensing and alarm system is operational. Perform system operational test and calibrate H<sub>2</sub>S detector heads every 4 months in accordance with MRC. (Use approved calibration kit). Replace the H<sub>2</sub>S sensor assembly every 3 years.
4. In the event of a sewage spill, a spill kit is located in a locker at the entrance to the sewage system pump rooms.
5. Sewage pumps. Sewage pumps incorporate mechanical seals designed to minimize the possibility of leakage. For oil lubricated pumps, inspect transfer, ejection, and aspiration pump mechanical seal oil level monthly. Renew seal oil annually. The sewage transfer pumps may be outfitted with pressurized cartridge seals (CRANE Pumps & Systems, Inc.) or air seals (Eddy Pump Corp.) depending on their manufacturer and type (See Sewage System Machinery Alterations (MachAlts) section for additional information). If pressurized cartridge seals are installed, inspect the fluid level and pressure of the seal system every 3 months and prior to each start up. Add seal barrier fluid and pressurize to prescribed pressure as required. Renew seal barrier fluid annually. If Eddy Pumps are installed and an automatic seal lubricator is not installed, lubricate pump seals and pump bearings once every two months (Refer to MRC for specific maintenance procedures and schedules for your system).

### **WARNING**

#### **PERSONNEL SHALL NOT EAT, DRINK, OR SMOKE WHILE IN THE SEWAGE EQUIPMENT SPACE.**

### **CAUTION**

#### **WHEN HIGH LEVEL ALARM SOUNDS DIVERT UPPER DECK DRAINS OVERBOARD AND CLOSE ISOLATION VALVES ON DRAINS BELOW OVERBOARD DISCHARGE.**

## **WARNING**

### **HEALTH AND SANITARY PRECAUTIONS TO BE OBSERVED PRIOR TO, DURING, SEWAGE PLANT MAINTENANCE**

6. Operator must ensure that any valves in the overflow and tank vent are locked open.
7. Operator must ensure that the ventilation system provided in each equipment space is operational and that the Airflow Alarm System is functional before entering the pump room.
8. A firemain connection is provided for flushing and cleaning the CHT holding tank. Flushing water sprays the inside of the holding tank. A firemain connection is installed for flushing the pump discharge piping and the sewage transfer hose. Operator must accomplish flushing of the sewage hose and sewage pump discharge piping whenever the ship is preparing to disconnect the shore discharge line. A threaded firemain hose connection is also provided in the CHT pump room to permit attachment of a hose for rinsing the adjacent area as required. Test and inspect flushing water relief valve annually. Flush CHT tank weekly while in the in-port mode.
9. Level Sensors. Some ships have level sensors located at various levels in the sewage holding tank to activate pumps and/or alarm indicators (low level alarm, low (pump stop) level, duty pump on level, standby pump on level, high level alarm level). Some ships use tank top Radar Tank Level Indicators (RTLTI). See Ref (a) for a description of level sensor operation. Verify level sensor operation quarterly and test high and low level alarms semiannually in accordance with MRC.
10. CHT Pump Control. A controller provides for both manual and automatic sewage pump modes of operation. When the selector switches are set to AUTO, the pump controller performs functions as a result of signals generated by the level sensors in the CHT holding tank.
11. Aeration system air is supplied by a motor-driven blower, from ship's low-pressure air compressors, or from aspirator pumps. Operators must clean air filters and renew blower motor oil every three months. Refer to system MRC for additional information. An air aspiration system takes sewage from the holding tank, runs it thru an eductor, and injects it back into the tank as a high velocity air-sewage mixture. The operator must align this system to take suction from the CHT tank by opening suction and discharge valves in the aspiration system before starting the air aspirator pump. The operator must inspect and lubricate the air aspiration system valves semi-annually. Refer to system MRC for aspirator pump maintenance and additional information.
12. Operational Modes Descriptions. CHT systems are designed for three modes of operation: Transit Mode, In-Port Mode, and At-Sea Mode. Specific CHT system operating instructions for each one of these three modes and tailored for each ship are provided in the ship's SDOSS instructions.

13. Directly following alignment of the sewage system to the At-Sea Mode and while at sea, the CHT holding tank should be flushed and aerated once a week for 30 minutes (perform only if the CHT tank is used as an ejection tank during At-Sea Mode).

## **General Operation and Maintenance of Vacuum Collection, Holding and Transfer (VCHT) System**

1. Operation. There are two major types of VCHT systems used on operational fleet ships, the firemain powered eductor type (DD-963 Class, DDG-993 Class, DDG-51), and the sewage powered ejector type (DDG-52 and follow, PC-1 Class, MHC-51 Class).

I. The firemain powered eductor system generates vacuum in the holding tank and collection piping using an eductor with a flapper valve. The operator must open the firemain supply valve to the eductor before operating this type of VCHT system.

II. The sewage powered ejector system relies on pressure switches, which control the ejector pumps in order to maintain the prescribed vacuum. The ejector motor controller provides alarm indications and manual/automatic selector switches for operation.

A) VCHT System Maintenance. The operator should inspect eductor system valves annually. The operator should inspect ejector oil level and flush ejector monthly. Preventive maintenance procedures for the VCHT system shall be performed in accordance with the applicable MRCs.

## **Discharge Shore Connection**

1. Operation. Deck connections are typically installed on both the starboard and port sides of the ship. The deck connections include an isolation valve and a CAMLOCK quick disconnect fitting. Depending on the ship, the deck connection may also include an air fitting for hose blow back, a pressure gage or an in-line flowmeter. After disconnecting the shore connection hoses, wash down deck connection components and area with stock detergent and hose down with seawater or fresh water after each sewage system alignment from In-Port to Transit Mode.

### **CAUTION**

**DO NOT DISCONNECT SEWAGE HOSE WHILE  
IT IS PRESSURIZED. DEPRESSURIZE  
HOSE AND SECURE DISCHARGE CUT\_OFF  
VALVE PRIOR TO DISCONNECTING HOSE**