health hazards to operators and the surrounding community.

2. Medical department representatives must be alert to any increase in disease incidence among treatment plant operators or members of the surrounding community which may be attributed to exposure to human wastes.

Section III. WASTEWATER TREATMENT AND DISPOSAL AFLOAT

7-16. Introduction

1. The overboard discharge of untreated sewage within the navigable waters of the U.S. and territorial seas (within 3 nautical miles of shore) is prohibited. Navy vessels are equipped with marine sanitation devices (MSDs) which either treat sewage before discharge, or collect and hold it until it can be properly disposed of through dockside sewer connections or pumped overboard in unrestricted waters.

2. MSDs on Navy ships increase the potential for contamination of berthing and working spaces with raw sewage. Therefore, the medical department representative (MDR) must be familiar with the sewage disposal system and the procedures necessary to ensure the health and safety of the ship's crew.

3. There are three different types of marine sanitation devices including zero discharge systems with full volume flush (FVF), zero discharge systems with controlled volume flush (CVF) and flow through treatment systems.

a. The zero discharge system with FVF is a system which uses a standard 3-5 gallon flush and is able to store sewage in holding tanks until it can be properly discharged. The Collection Holding and Transfer (CHT) System is a zero discharge, FVF system.

b. Zero discharge systems with CVF collect, treat, and/or store sewage from toilets and urinals until it can be properly discharged over the side or otherwise disposed of through dockside facilities. They differ from the FVF system in that they minimize the volume of wastewater. This is accomplished in various ways including reduction of the flushing medium followed by evaporation of the excess water, using a controlled volume vacuum flush system and incinerating the wastes, or recirculating the flushing medium. Examples of this type system include the GATX Evaporative Toilet System, the JERED VACU-BURN System and the KOELHER-DAYTON Recirculating Flush System. Some newer ship classes (e.g., DDG 51) use a vacuum collection CVF system without incineration.

c. The flow through treatment system treats wastewater to acceptable limits and discharges the effluent into receiving waters. The Pall-Trinity Biological Treatment System is the only example of this type currently authorized.

7-17. Marine Sanitation Device Systems Descriptions

1. *Collection Holding and Transfer System*

a. CHT systems have been installed on the majority of Navy ships. The systems are designed to operate in three modes; in restricted waters, sewage is collected and stored in holding tanks while gray water is discharged overboard via diverter valves; at sea, all sewage and gray water, including any stored in the holding tanks, is diverted or discharged overboard; and in port, sewage and gray water are collected in holding tanks and discharged into a sanitary sewer or ship waste off-load barge (SWOB).

b. The CHT system is composed of three fictional elements:

(1) The collection element consisting of soil drains (from toilets and urinals), gray waters drains (from showers, laundries, and galleys) and diverter valves which direct the wastewater over the side or to the holding tanks.

(2) The holding element, consisting of tanks, retains sewage during transit of restricted waters for eventual disposal. These tanks are normally sized for a 12-hour holding period depending on individual ship constraints. Holding tanks of 2,000 gallon (Figure 7-13) capacity and over are designed with comminutors to macerate solids passing into the tanks and an aeration system to prevent sludge from settling and becoming anaerobic. Smaller tanks, on the other hand, (Figure 7-14) incorporate strainers which prevent solids from entering tanks.

(3) The transfer element includes sewage pumps, overboard and deck connection discharge piping and associated diverter valves and check valves. Each tank is equipped with two sewage pumps which are connected in parallel to discharge sewage and gray water to a receiving facility, SWOB, or directly overboard.

c. The CHT system can be operated in a manual mode in which the pumps are actuated independent of the level of wastewater in the holding tanks or in a fully automatic mode. When operating in a manual mode, an option is available which will deactivate the pumps automatically when the low liquid level of the tanks reaches approximately 10% of the tank volume in order to maintain pump suction. In the fully automatic mode, the following functions are accomplished:

(1) Duty pump alternation.

(2) The low liquid level stops the pump when the level reaches approximately 10% of its capacity in order to keep the pumps primed.

(3) At 30% liquid level, a sensor signals the duty pump to activate.

(4) At 60% liquid level, a sensor signals the standby pump to activate.

(5) At 80% liquid level, a visual and audible high level alarm is activated.

2. *GATX Evaporative Toilet System*

a. This system is a modular system suitable for small vessels. It is designed to operate in two modes. In restricted waters, the volume of wastewater generated is minimized by a reduction in flushing medium using CVF water closets and urinals. In restricted waters, the liquid portion of the wastewater is vaporized leaving a concentrated sludge residue which can be stored for

approximately two weeks, if required. In unrestricted waters, wastewater can be diverted overboard, and pier side it may be discharged directly into a shore receiving facility.

b. The GATX System (Figures 7-15 and 7-16) is comprised of CVF urinals and water closets, macerator/transfer (M/T) pumps, a stream jacketed evaporator with electrical heaters, an odor treatment system, sludge pump, system controls, and associated plumbing.

c. Bodily wastes enter the system through the CFV urinals and water closets and are fed directly to the M/T pump where they are reduced to a slurry. The slurry is either pumped directly overboard or to the evaporator tank. The evaporator tank is team heated to 2300 F causing the liquid portion of the wastewater to vaporize. The remaining sludge accumulates at the bottom of the tank until it can be discharged into a port receiving facility or into unrestricted waters. The evaporator tank is designed to accommodate approximately two weeks' accumulation of sludge.

d. The vapor treatment system eliminates the malodors caused by the vaporization of wastewater. This is accomplished when the vapors are heated to 500° F and passed through a catalyst where the malodorous components of the vapor are oxidized and thus destroyed.

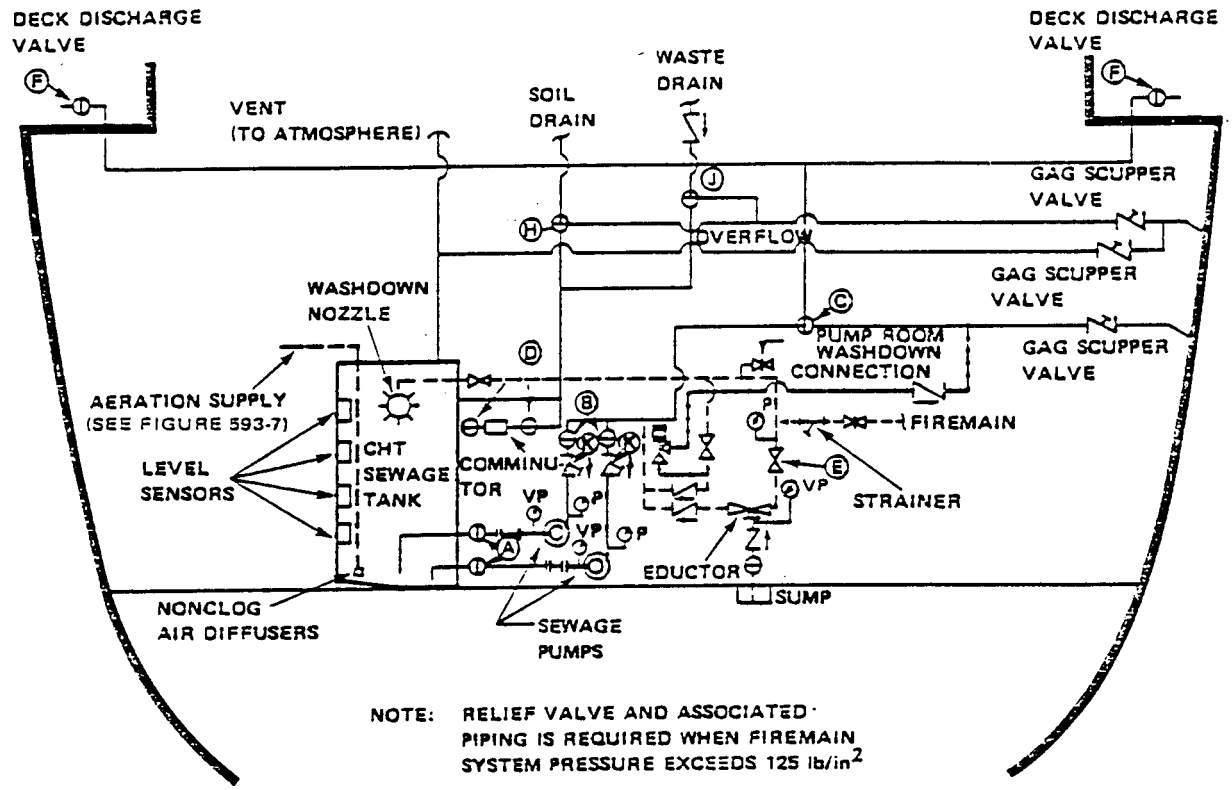
3. *JERED Vacu-Burn Treatment System*

a. The JERED Vacu-Burn System (Figure 7-17) is installed aboard ships of the DD 963 and DDG 993 class. The system employs CVF water closets and urinals, a vacuum collection tank (VCT), grinder pump, overboard discharge pump, incinerator feed pump, two vacuum pumps (or a fire main powered eductor for vacuum generation), a vortex incinerator and associated plumbing and controls.

b. Soil waters are introduced into the system via CVF water closets and urinals. The wastes are transported to the 240-gallon vacuum collection tanks under negative pressure of 14 to 20 inches of mercury. The negative pressure is maintained by two vacuum pumps or a fire main powered eductor. Upon reaching the VCT, the wastes are passed through a grinder pump which macerates the waste to 1/4 inch or less size particles.

c. There are four level sensors in the vacuum collection tank. The low level sensor deactivates the overboard incinerator and grinder pumps when the wastewater level drops below the 40-gallon level. The grinder pump will activate above this level. A sensor located at the 100-gallon level activates the incinerator feed pump, or the overboard discharge pump, whichever mode is selected. A high level alarm is positioned at the 175-gallon level which activates an alarm at the control panel. The warning signal indicates that there may be a casualty malfunction. A very high level alarm is located at the 200-gallon level. In addition to sending alarm signals, this sensor deactivates the wastewater collection system by deenergizing the vacuum pumps or fire main eductor. The system cannot be reactivated until the malfunction has been corrected and the wastewater level drops below the 200 gallon level.

d. During operation in restricted waters, the wastewater is incinerated at approximately 2,0000 F in a vortex incinerator. The resulting sterile ash is removed when the incinerator cools down and is disposed of as solid waste. Each incinerator is capable of treating 4,000 pounds of sewage per day.



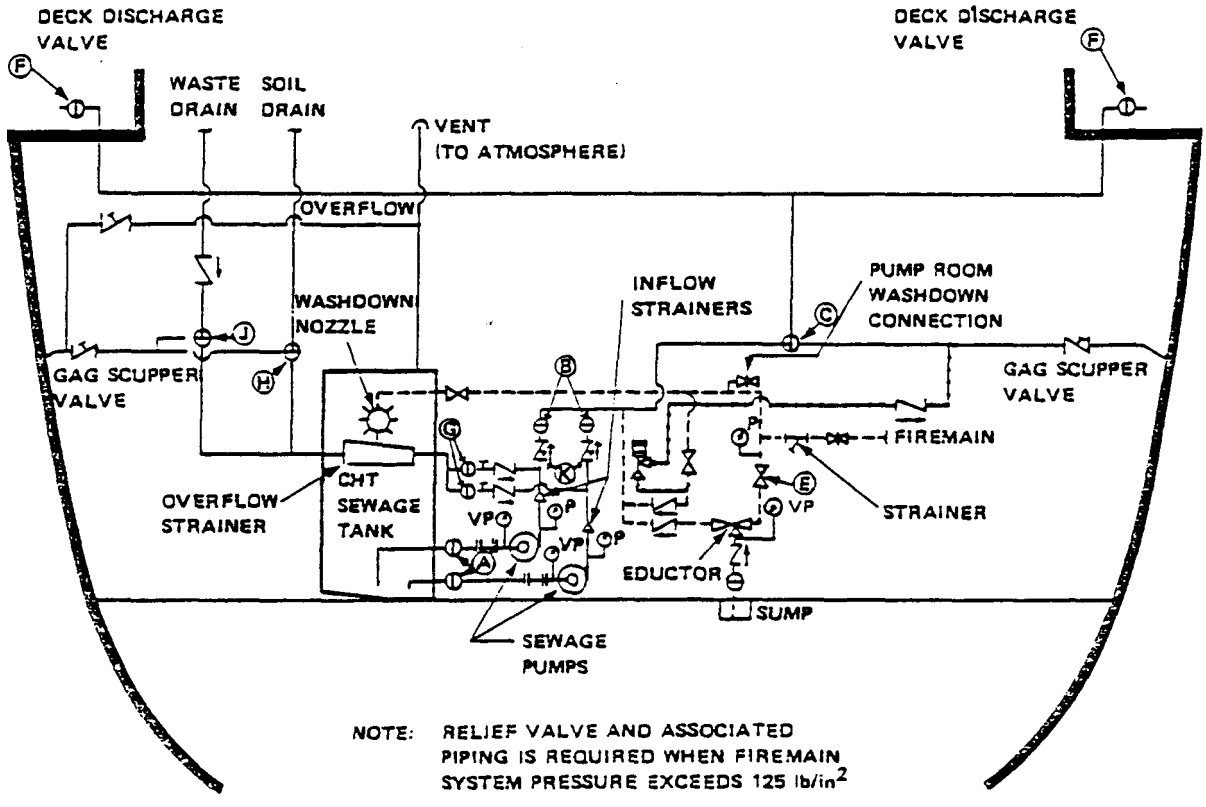
LEGEND:

- Ⓐ PUMP SUCTION VALVE
- Ⓑ PUMP DISCHARGE VALVE
- Ⓒ PUMP DISCHARGE DIVERTER VALVE
- Ⓓ COMMINUTOR ISOLATION VALVE
- Ⓔ EDUCTOR SUPPLY VALVE
- Ⓕ DECK DISCHARGE VALVE
- Ⓗ SOIL DRAIN DIVERTER VALVE
- Ⓙ WASTE DRAIN DIVERTER VALVE
- Ⓚ PUMP DISCHARGE CHECK VALVE

SYMBOLS KEY:

- SWING CHECK VALVE
- SWING CHECK VALVE (WITH HOLD-OPEN DEVICE)
- GATE VALVE
- P PRESSURE GAUGE
- VP VACUUM PRESSURE GAUGE
- SPOOL PIECE
- 3 WAY VALVE
- STRAINER
- GAG SCUPPER VALVE
- PLUG OR BALL VALVE
- GLOBE VALVE
- RELIEF VALVE

Figure 7-13. Comminutor type CHT System.



LEGEND

- Ⓐ PUMP SUCTION VALVE
- Ⓑ PUMP DISCHARGE VALVE
- Ⓒ PUMP DISCHARGE DIVERTER VALVE
- Ⓔ EDUCTOR SUPPLY VALVE
- Ⓕ DECK DISCHARGE VALVE
- Ⓖ INFLOW STOP VALVE
- Ⓗ SOIL DRAIN DIVERTER VALVE
- Ⓙ WASTE DRAIN DIVERTER VALVE
- Ⓚ PUMP DISCHARGE CHECK VALVE

SYMBOLS KEY:

- SWING CHECK VALVE
- SWING CHECK VALVE (WITH HOLD-OPEN DEVICE)
- GATE VALVE
- P PRESSURE GAUGE
- VP VACUUM PRESSURE GAUGE
- SPOOL PIECE
- 3 WAY VALVE
- STRAINER
- GAG SCUPPER VALVE
- PLUG OR BALL VALVE
- STRAINER FLUSHING CONNECTION
- GLOBE VALVE
- INFLOW STRAINER
- RELIEF VALVE

Figure 7-14. Strainer Type CHT System

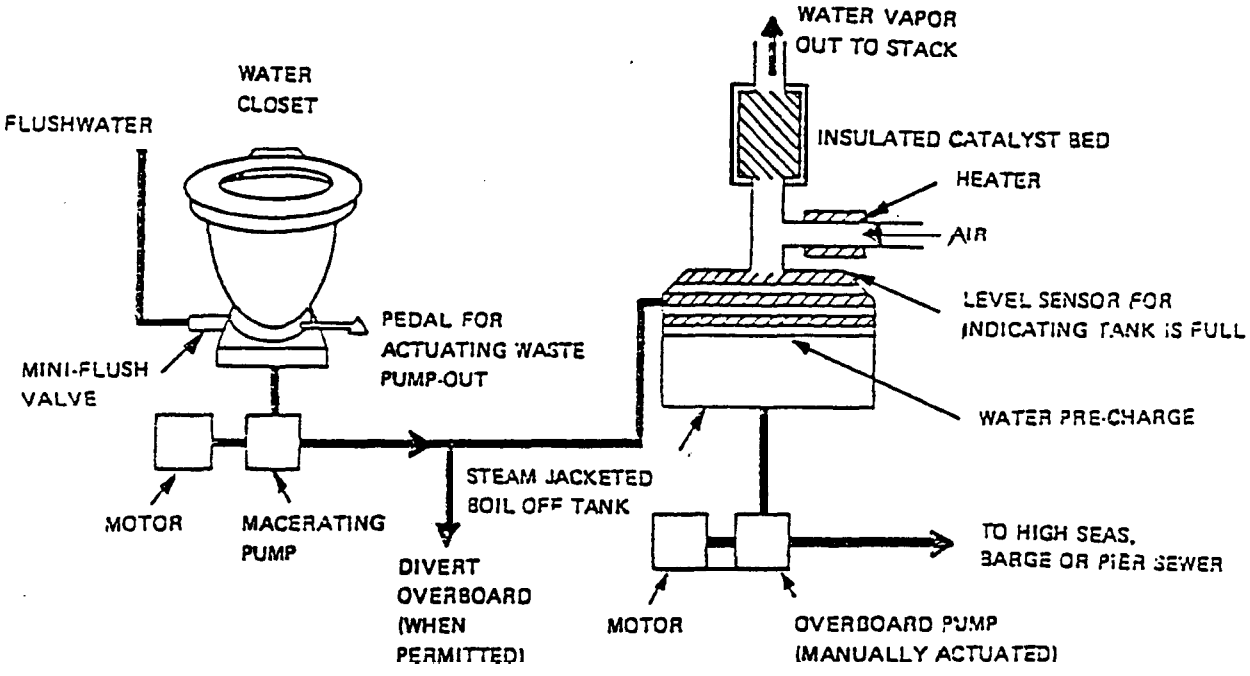


Figure 7-15. GATX Evaporative Toilet System

e. In unrestricted waters, wastewater is discharged directly overboard. In port, the wastes are incinerated or discharged directly into a shore collection facility or SWOB.

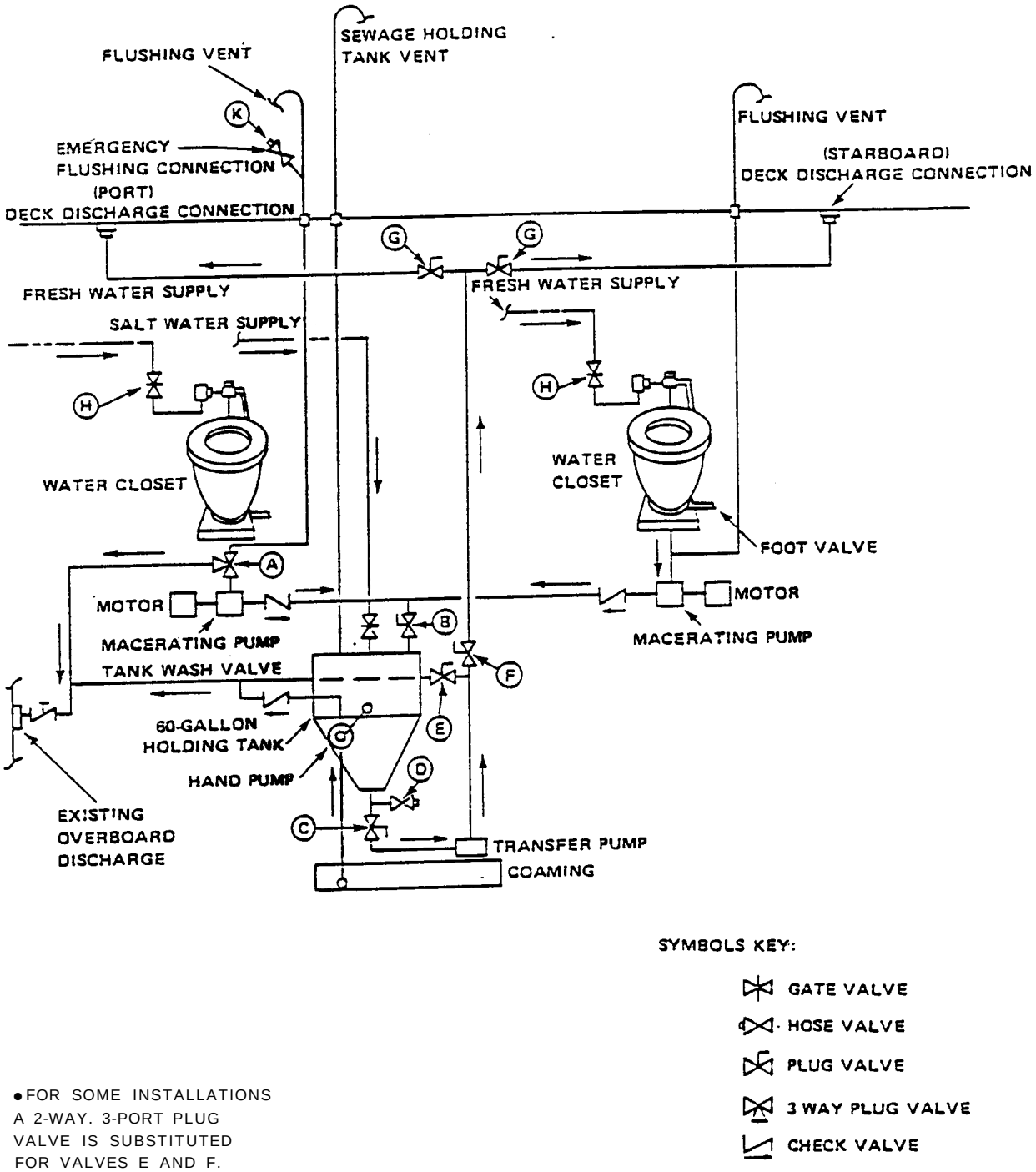
4. *KOEHLER-DAYTON (KD) Recirculating Flush System*

a. The Koehler-Dayton Recirculating Flush System is designed for small craft and ships whose mission requires extensive operations within the restricted zone.

b. This system consists of a recirculating flush toilet with a 20-gallon holding tank (KD unit), an electrical or manual recirculating pump, 30-gallon storage tank, and a macerator/transfer (M/T) pump for discharging both holding tanks, plus associated plumbing and controls.

c. The KD unit is initially charged with 4 gallons of fresh water to which is added 4 ounces of chemical-containing deodorizers, coloring and wetting agents, a biocide, and, in the event of freezing temperatures, antifreeze. Whenever the unit holding tank is drained into the 30-gallon storage tank or discharged overboard, the unit must be recharged with flushing medium.

d. Wastes are carried to the 20-gallon unit holding tank in the recirculating flush medium. The flushing medium is pumped from the unit holding tank through a filter or baffle device, where the solids are removed, and back to the toilet bowl for reuse. The 20-gallon unit holding tank is designed to accommodate approximately 160 uses before it must be emptied; however, the manufacturer recommends the unit be drained into



• FOR SOME INSTALLATIONS A 2-WAY. 3-PORT PLUG VALVE IS SUBSTITUTED FOR VALVES E AND F.

Figure 7-16. GATX MK2 System

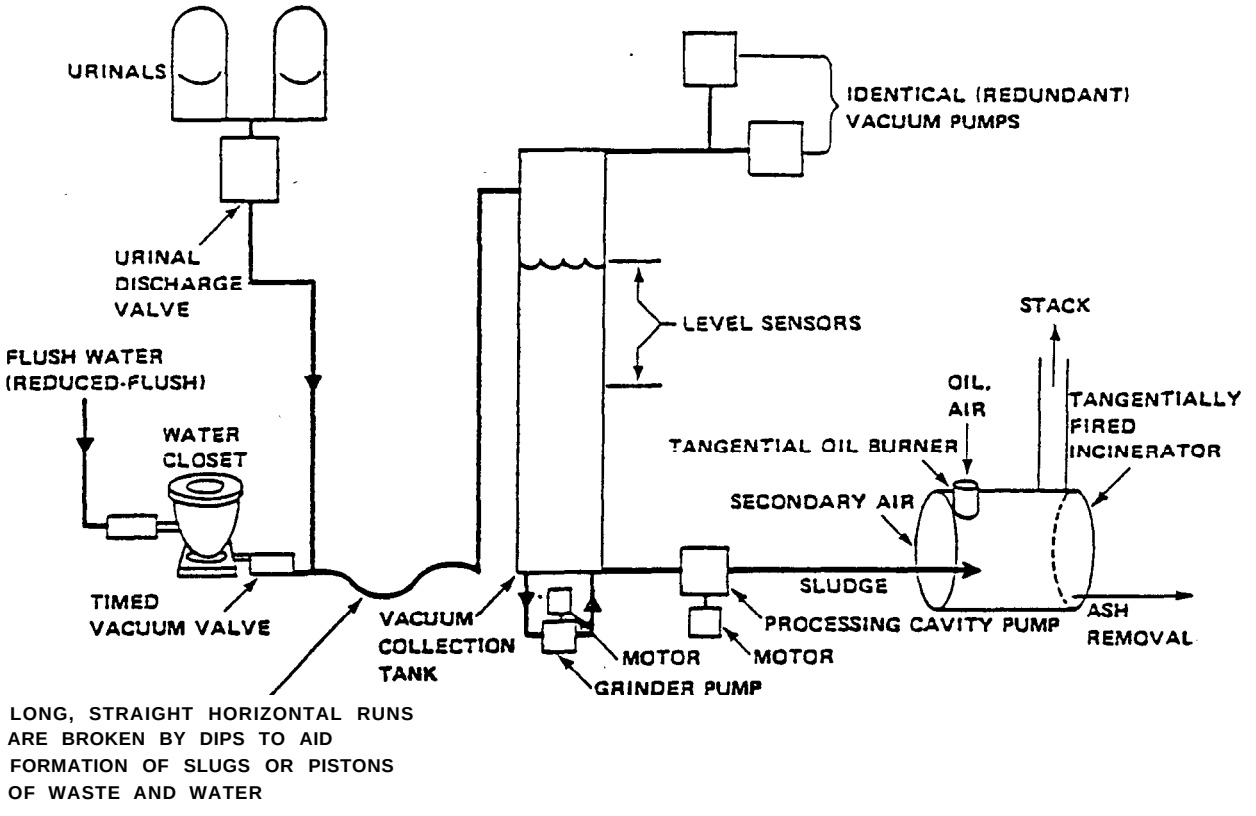


Figure 7-17. JERED Vacuum Collection and Incineration System

the storage tank or overboard as appropriate at two-day intervals, regardless of the number of usages, to assure odor-free operation.

e. The 30-gallon storage tank extends the amount of time the system can operate in restricted waters. When in port, the contents of the storage tank are discharged into the port receiving facility. In unrestricted waters the wastes are discharged directly overboard.

5. *Pall-Trinity Biological Treatment System*

a. The Pall-Trinity System (Figure 7-18) is a thermally accelerated, extended aeration activated sludge sewage treatment system on board LHA 1 class ships. It works on a principle similar to that described in Article 7-9.2b.

b. This system is comprised of FVF water closets and urinals, an influent box, bar screen, comminutor, aeration tank, aeration tank heater, air supply, sedimentation tank, sludge return lines, surface skimmer, effluent discharge pumps, chemical feed system, and associated plumbing and controls.

c. Sewage enters the treatment plant from FVF toilets and urinals through the influent box. From there, sewage passes through the comminutor into the aeration

tank. In the event the comminutor becomes clogged, sewage enters the aeration tank through the bar screen. Sewage is decomposed in the aeration tank by aerobic bacteria in an environment rich in oxygen and maintained between 85°F and 105° F by the aeration tank heater. The effluent leaving the aeration tank enters the sedimentation tank where sludge settles to the bottom and is conveyed back to the aeration tank by the sludge return lines for further treatment. When the sludge accumulation in the sedimentation tank reaches 40% of the tank capacity, it is pumped out and discharged overboard in unrestricted waters or to a shore receiving facility. The scum, which forms at the top of the sedimentation tank, is removed by the surface skimmer and returned to the aeration tank. The clarified effluent from the sedimentation tank enters the effluent holding tank where chlorine is added to disinfect the treated wastewater before it is discharged overboard.

7-18. Inspection of Marine Sanitation Device:

1. *Labeling and Color Coding*

a. On the interior of the ship, MSD valve handles and operating levers (excluding handwheels of gauge valves located on gaugeboards) must be color coded gold (Paint Chip 17043). Exterior deck discharge stations must be painted the same color as the surrounding structure.

b. Deck discharge stations must be clearly labeled to include hose handling procedures and sanitary health precautions as described in GENSPECS 593.

2. MSD components must be regularly inspected for leaks by appropriate engineering personnel responsible for the compartment in which the MSD components are located. These inspections should include the following:

a. Soil and waste drains, discharge lines, flanges, joints, access plates, and clean out plugs.

b. Gate and ball valves

c. Plug valves

d. Comminutors and motors

e. Automatic pump starters

f. Sewage pumps, including housings and seals

g. Tank penetrations and manholes

h. Air compressors

i. Drip pans

j. When operating in “port” mode, include sewage transfer hoses and riser connections

3. The “paper towel” test can be used to pinpoint small leaks from pumps, comminutors and pressurized sections of the piping system. This test entails opening a paper towel and holding it suspended 2 to 3 inches from the units for several minutes while they are operating. The source of even the finest spray can be detected by the paper towel becoming spotted or wet.

4. The ventilation system installed in the MSD room must be inspected and the space sump (if present) must be checked for sewage accumulation.

5. All leaks, spills or other sources of contamination observed during these inspections or at any time must be promptly reported to the executive officer, engineering officer/ damage control officer, and the senior medical department representative. Appropriate action must be taken to arrest the leak and properly clean and, when appropriate, disinfect the contaminated area as described in Article 7-20.

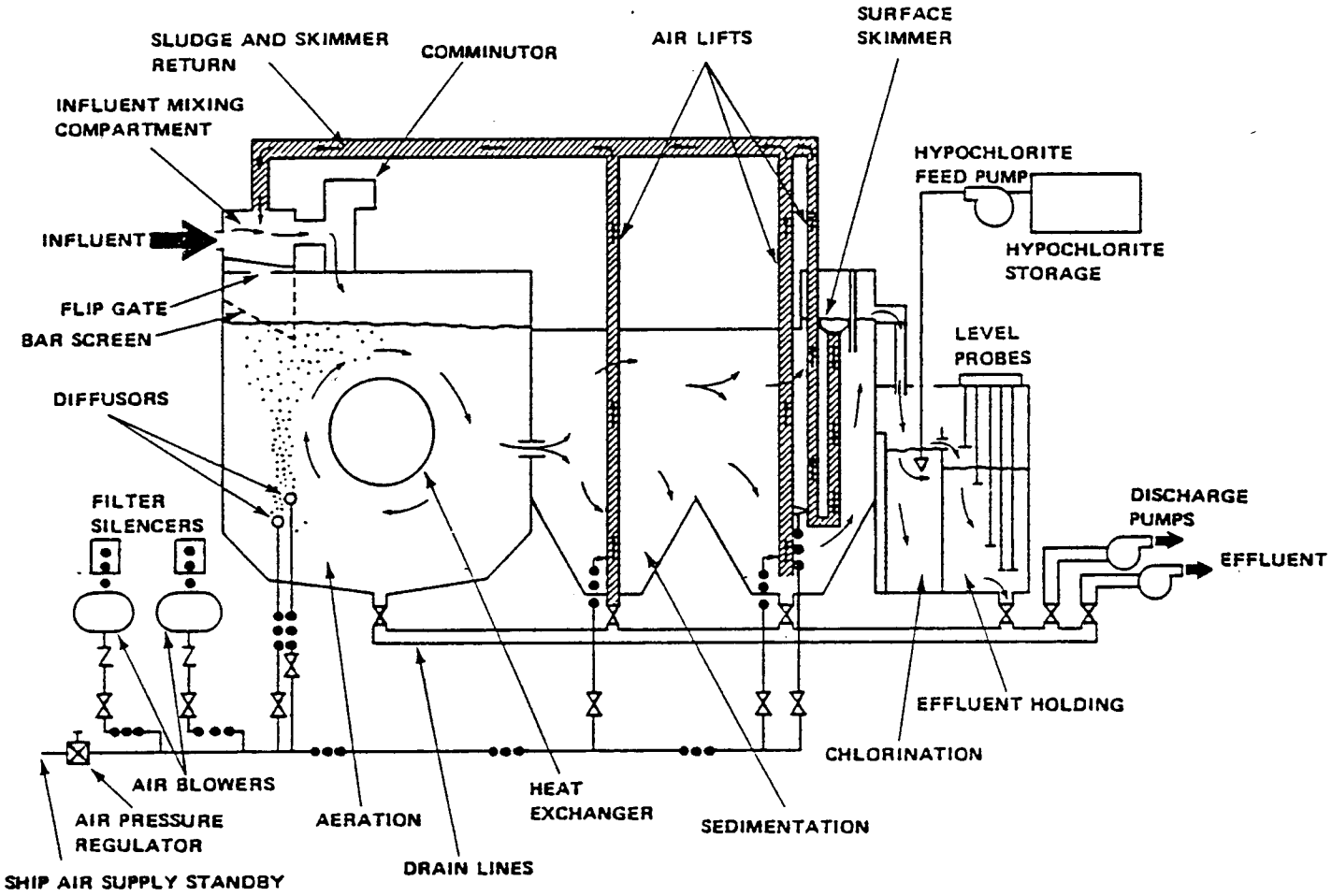


Figure 7-18. Pall Trinity Biological Treatment System

7-19. Ship to Shore Sewage Transfer

1. Sewage receiving facilities have been constructed at most shore activities with fleet support capability. These facilities include sewer risers located along all piers and quay walls for the transfer of sewage from the ship discharge risers to the shore sewer system. Also included are facilities to store, maintain and repair sewage transfer hoses. Specific information and guidelines concerning all aspects of ship to shore sewage transfer facilities and procedures are provided in NAVFAC Publication MO-340, *Ship-to-Shore Hose Handling Operations Manual.*

2. Navy MSDs are designed to discharge sewage to a shore receiving facility when in port. This may be accomplished directly by connecting the ship's sewage discharge risers to the pier sewer risers, or indirectly by connecting to a SWOB or another ship's system which in turn discharges the sewage into pier risers.

3. Ship-to-ship sewage connections (Figure 7-19) occur when several ships are nested at one pier, berth, or when a vessel is

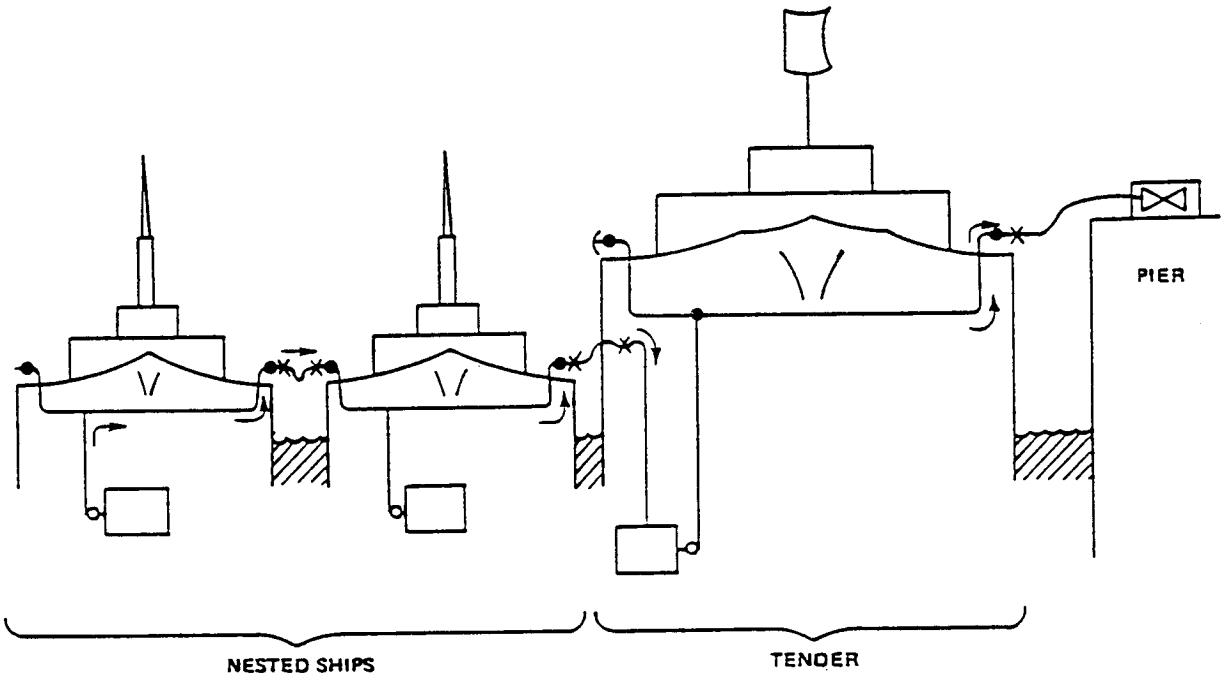


Figure 7-19. Nested Ship Sewage Transfer

nested to a tender. Ships with CHT systems have athwartship piping which allows them to receive sewage from an adjacent ship and transfer it to another ship with the same capability. Thus, several ships' CHT systems can be connected in series such that the sewage generated on these ships, is conveyed through the inboard ships' systems to the pier risers. Vessels with other than CHT systems do not have the pump-through capability and must be connected directly to a pier, SWOB, or a ship such as a tender which has pump-through capability.

4. Most sewage connections, including ship-to-shore and ship-to-ship, are made by means of 50-foot length, 4-inch flexible rubber or plastic sewage transfer hoses which are provided by the sewage receiving facility. The only exceptions are submarines which use a 50-foot length, 2-1/2 inch rubber hose. When a ship arrives for berthing, a shore based handling crew delivers the proper amount of clean sewage transfer hoses to the pier, and connects the hoses to the pier risers. The ship's crew is responsible for connecting transfer hoses to the ship's risers on ship-to-shore and ship-to-ship connections.

5. Sewage transfer hoses must be kept clean and in good repair to avoid unsanitary conditions. Prior to returning the hoses to storage after use, they must be cleaned of residual wastewater. This is usually accomplished by flushing the hoses for at least 10 minutes prior to disconnection with high pressure salt water which is admitted into the MSD discharge piping from the ship's fire fighting system. When a vessel does not have this capability, the shore crew must flush the hoses by connecting them to the nearest saltwater pier riser. In addition, hose couplings and exterior surfaces must be cleaned and the ends of the hoses capped prior to storage. Sewage transfer hoses must never be used for potable water connections.

6. In the event wastewater is spilled onto the -deck of the ship or onto the pier, the affected area must be thoroughly flushed into the harbor with high pressure salt or fresh water. An approved disinfectant such as NSN 6840-00-753-4797, disinfectant Germicidal Fungicidal concentrate (phenolic type) may be used to prevent or eliminate strong odors caused by the wastewater spill.

7. Sewage hose handling and storage facilities are designed to accommodate the repair, maintenance, and storage of sewage transfer hoses. Hose handling and storage facilities are required to incorporate the following design features to preclude conditions which could cause accidents or communicable diseases:

a. Racks and tables used for the handling and storage of sewage transfer hoses must be constructed of metal or other impervious material. Wooden racks and tables are prohibited.

b. All windows and doors which open to the outside must be adequately screened to prevent the entry of flying insects.

c. Back siphonage prevention devices must be installed on all potable water lines used for flushing and cleaning sewage transfer hoses.

d. Lavatories and showers with hot and cold running water, soap, and single use towels must be provided.

e. Sufficient ventilation must be provided in all indoor work spaces.

f. Incandescent and fluorescent lights must be protected from breakage, and nonslip surfaces must be installed on the deck in the hose washing areas.

g. Disinfection of sewage transfer hoses is not normally required; however, the hose handling facility should have this capability in the event the need arises.

h. The sewage hose handling and storage facility must be constructed, equipped and operated in conformance with appropriate health and safety requirements promulgated by the Occupational Safety and Health Administration (OSHA).

7-20. Personal Hygiene, Sanitation and Safety

1. Strict adherence to good personal hygiene and sanitary practices is essential to prevent the spread of fecal contamination and resulting potential for the occurrence of communicable diseases.

2. Personnel are required to wear protective clothing including coveralls, rubber boots, rubber gloves, face shields, hair covering and an oxygen breathing apparatus (OBA) as appropriate when contact with sewage is likely during maintenance, or spill clean-up operations.

3. Personnel who come in contact with sewage in the course of their duties, or as the result of a sewage spill or system backflow must adhere to the following requirements to minimize the spread of contamination to other areas of the ship.

a. Movement about the ship wearing contaminated clothing must be kept to an absolute minimum.

b. Contaminated clothing must be placed in a plastic bag at the conclusion of maintenance or spill clean-up operations for laundering in hot water and detergent. No special laundering procedures are required.

c. Rubber boots, gloves, OBA, and other similar items must be washed with hot soapy water, rinsed with hot clean water and treated with an approved disinfectant solution.

d. Personnel must thoroughly wash with soap and water before engaging in other activities. In the event of a sewage spill, all sanitary and safety requirements specified in Naval Ships Technical Manual (NSTM) 593 must be strictly followed.

4. Spaces which become contaminated with sewage as a result of leaks, spills, or sewage system backflow must be thoroughly washed down with water and a stock detergent. In addition, food service spaces,• berthing areas, and medical spaces must be treated with an approved disinfectant (EPA registered and labeled) such as NSN 6840-00-753-4797, Disinfectant, Germicidal Fungicidal Concentrate (Phenolic Type) or NSN 6840-00-526-1129, Disinfectant, Germicidal and Fungicidal Concentrate (Iodine Type). To be effective, these agents must be used in accordance with instructions printed on their respective labels.

5. Bilges contaminated with sewage wastes must be pumped out, washed down with a fire hose and pumped out again. If potable water tanks form the floor of the bilge, daily bacteriological monitoring of the water from those tanks must be promptly initiated and continued until it is assured that sewage contamination of the tanks has not occurred. Furthermore, if the potable water system is suspected of being contaminated, the appropriate tanks must be secured until the water is determined to be safe.

6. Signs must be posted in spaces containing MSD equipment warning maintenance personnel against consuming food and beverages or smoking in MSD spaces and directing them to thoroughly wash with soap and water prior to leaving the area.

7. Personnel who handle or connect sewage transfer hoses must not subsequently handle potable water hoses without first washing, and changing into clean clothing.

8. There must be no open flames, flashlights, or other electrical apparatus in or near open holding tanks or other voids until they have been certified safe by a gas-free engineer. When the tank is designated gas-free and safe, personnel may enter using an (OBA) or other approved respiratory protection device specified in NSTM Chapter 593. A safety harness and tending line must be used if only a single person enters the tank. If more than one person enters the tank, they must keep in constant sight of one another. Personnel must always be on hand outside the tank to watch those inside and the ready to lend assistance. See Article 7-22 and 7-23 for additional health and safety provisions.

7-21. Medical Department Responsibilities

1. The presence of marine sanitation devices and the associated equipment and facilities aboard ship increase the risk of exposure to untreated wastewater which in turn increases the potential for the occurrence of infectious diseases associated with human waste. Since preventive medicine is an integral part of the medical department responsibility aboard ship, it is incumbent upon the MDRs to become familiar with the MSD system aboard their ship; knowledgeable in the proper personal hygiene practices and decontamination procedures with regard to the operation and maintenance of MSD systems; and to take an active role to insure the systems are operated and maintained in a safe and sanitary manner.

2. The MDR's duties must include the following:

a. Conduct visual inspections of MSD components as described in Article 7-18 as part of the routine habitability and sanitation inspection program or on a more frequent basis as the situation dictates. Whenever practicable, inspections should be conducted in conjunction with engineering department personnel.

b. Indoctrinate personnel associated with the operation, maintenance, and repair of MSD systems concerning the potential health hazards associated with human wastes, proper personal hygiene necessary to reduce the risks associated with working with MSD systems, and the correct procedures for cleaning and disinfecting contaminated spaces. This training must be conducted on a periodic basis to ensure that the appropriate personnel are able to operate and repair the MSD system without endangering themselves or the ship's crew.

c. Provide on-site advice, when requested, in the correct procedures for personal protection and disinfection of spaces in the event of major sewage leaks or spills. The MDR must be present for clean-ups and disinfection of food services spaces, living areas, and medical spaces.

7-22. Safety and Health Hazards of CHT Systems

1. A serious potential hazard associated with CHT systems is that toxic or explosive gases could be released in confined spaces. Hydrogen sulfide has been identified as the most likely gas hazard associated with the decomposition of sewage in CHT tanks, however, other gases may include methane, ammonia, and carbon dioxide.

2. The following precautions will minimize the potential hazards resulting from the release of toxic gases.

a. Insure that the installed CHT tank aeration system is operated properly in tanks larger than 2,000 gallons. The aeration system must be operated while transiting the three-mile zone or while in port as sanitary wastes are being collected. Systems

with tank capacities of less than 2,000 gallons do not have aeration systems; but because of the smaller tank capacity, the CHT discharge pumps will cycle more often while in port.

b. Always assume the CHT tank contains sewage and toxic gases. Any maintenance requiring the removal or disassembly of valves, pumps, flanges, etc. inside the CHT pump room or below the CHT overflow must be conducted in accordance with the Naval Ships' Technical Manual, NAVSEA S9086-T8-STM-010, Chapter 593, Paragraph 4.21.2.1 through 4.21.2.10.

c. Personnel working in the CHT pump room, comminutor space, or any space containing CHT piping, must evacuate the space immediately if hydrogen sulfide is detected by a "rotten egg" smell or by a portable personal hydrogen sulfide alarm. A space in which hydrogen sulfide has been detected may only be reentered by personnel wearing air line respirators with full face masks.

d. Corrective maintenance not requiring immediate attention should be deferred until the ship is port and industrial facilities are available. In a situation where holding wastes presents a health or safety hazard, the system should be secured and an engineering casualty report filed. If retention of waste interferes with operational effectiveness, it may be diverted over the side.

e. Smoking, eating, or drinking is never permitted inside CHT pump rooms, comminutor spaces or when working on any CHT component.

7-23. CHT Pump Room Safely

1. In most cases, CHT pumps are located in very small compartments on lower deck levels. This provides an excellent collection basin for heavier-than-air gases, such as hydrogen sulfide.

2. To eliminate hazardous gas exposures in CHT pump rooms, it is strongly recommended that:

a. Slightly negative pressure ventilation, to include powered air supply and exhaust ventilation be installed in CHT pump rooms in accordance with General Specifications for Ships of the United States Navy (GENSPECS), Section 512. The exhaust ventilation ducting should extend to within 9 inches of the deck.

b. An indicator light be installed outside the compartment to indicate the ventilation system is operating.

c. Two emergency escape breathing devices (EEBD) be placed in each CHT pump room.

d. A portable hydrogen sulfide detector be used during all CHT maintenance.

e. A placard be installed at access to the CHT pump room stating the following:

SEWAGE SPILLS PRODUCE HAZARDOUS GASES

1. *SEWAGE SPILLS CAN PRODUCE HAZARDOUS GASSES*

2. USE EEBD MOUNTED IN PUMP ROOM FOR EMERGENCY ESCAPE IN EVENT OF SEWAGE SPILL

3. FOLLOW SAFETY PROCEDURES IN NAVSHIPS TECHNICAL MANUAL, "POLLUTION CONTROL," NAVSEA S9086-T8-STM-010/CH-593 DURING SYSTEM MAINTENANCE OR SPILL CLEAN UP

4. USE OBA ONLY FOR EMERGENCY RESCUE AND DAMAGE CONTROL (SECURING OF FLOODING)

f. The following label plate be placed in the vicinity of each CHT holding tank access and sewage tank access:

WARNING

TOXIC OR EXPLOSIVE GASES MAY EXIST IN THE TANK. DO NOT OPEN UNLESS AT A SUITABLE INDUSTRIAL ACTIVITY AND TANK HAS BEEN CERTIFIED GAS FREE IN ACCORDANCE WITH THE REQUIREMENTS OF NAVAL SHIPS TECHNICAL MANUAL, ENTITLED "POLLUTION CONTROL," PUBLICATION NAVSEA S98086-T8-STM-010/CH-593.

g. A safety watch with a spare OBA must be posted at the compartment access any time maintenance is conducted which requires the system to be opened in the pump room, or in any space below the CHT tank overflow.