DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
2531 JEFFERSON DAVIS HWY
ARLINGTON VA 22242-5160

IN REPLY REFER TO

NAVSEAINST 9593.1B CH-1
Ser 03V12/055
12 JUL 95

NAVSEA INSTRUCTION 9593.1B CHANGE TRANSMITTAL 1

From: Commander, Naval Sea Systems Command
To: All Offices Reporting Directly to COMNAVSEA
Distribution List

Subj: CERTIFICATION PROGRAM FOR SEWAGE MARINE SANITATION DEVICES (MSDS) IN THE U.S. NAVY SURFACE SHIPS AND CRAFT

Encl: (1) Certification Checklist for DDG 51 Firemain Powered Vacuum Collection, Holding and Transfer (VCHT) and Plumbing Waste Drain Systems, dtd 1 Oct 89
(2) Certification Checklist for DDG 52 and Followships Sewage Powered Vacuum Collection, Holding and Transfer (VCHT) and Plumbing Waste Drain Systems, dtd Jul 93
(3) Certification Checklist for MHC 51 Class Sewage and Wastewater Pollution Control Systems, dtd 5 Dec 90

1. Purpose

a. To add three certification checklists to the instruction for new ship classes.

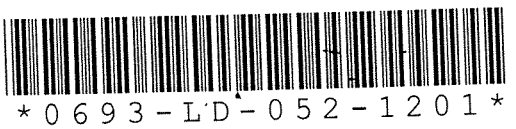
b. To update the instruction to be consistent with NAVSEA organizational code changes.

2. Action Make the following revisions to NAVSEA Instruction 9593.1B as follows:

a. On page 1 of the instruction, add the following three enclosure lines to the list of enclosures:

Encl: (12) Certification Checklist for DDG 51 Firemain Powered Vacuum Collection, Holding and Transfer (VCHT) and Plumbing Waste Drain System, dtd 1 Oct 89

Encl: (13) Certification Checklist for DDG 52 and Followships Sewage Powered Vacuum Collection, Holding and Transfer (VCHT) and Plumbing Waste Drain Systems, dtd Jul 93



Encl: (14) Certification Checklist for MHC 51 Class Sewage and Wastewater Pollution Control Systems, dtd 5 Dec 90

b. Attach enclosures (1), (2), and (3) of the change transmittal to the end of NAVSEAINST 9593.1B as new enclosures (12), (13), and (14). Remove top cover sheet before attaching.

c. On page 1 of NAVSEAINST 9593.1B, change reference (a) to read, "OPNAVINST 5090.1B of 1 Nov 94."

d. In paragraph 4.a, line 23, and paragraph 5.a.4, line 2 change " . . . enclosures (3) through (11) . . ." to read "enclosures (3) through (14)."

e. In paragraph 5.b (header), replace "Amphibious and Combat Support Ship Logistics Division, SEA 911; Aircraft Carrier Ship Logistics Division, SEA 912; Surface Combatant Ship Logistics Division, SEA 913; Gas Turbine Surface Combatant Ship Logistics Division, SEA 914," with "Surface Ship Directorate, SEA 91."

f. In paragraph 5.b.1, delete "The Ship Logistics Manager (SLM) shall . . . " and add "Within SEA 91 the appropriate Ship Program Manager (SPM) shall . . . ."

g. Change "SEA 56Y35" to read "SEA 03V12" in the following locations: paragraph 5, line 12; paragraph 5.a, header; paragraph 5.b.1, line 3; and paragraph 5.b.2, line 2.

h. In enclosure (1) of NAVSEAINST 9593.1B change "SEA 56Y35" to read "SEA 03V12" in the following locations: paragraph 2, line 8; paragraph 4, line 3; paragraph 6.a.3, line 2; paragraph 6.b.4., line 1; and paragraph 6.d., header.

i. In enclosure (1) of NAVSEAINST 9593.1B change "NAVSSES" to "CDNSWC-SSES Phila." and change "NAVSEACENPACDET" to "FTSCPAC" in the following locations: at paragraph 1, line 3; and paragraph 6.a, header.

j. In enclosure (1) of NAVSEAINST 9593.1B change "SLM" to "SPM" in the following locations: paragraph 2, line 8; paragraph 4, line 3; paragraph 6.a.3, line 2; and paragraph 6.b.4, line 1.

k. In enclosure (2) of NAVSEAINST 9593.1B change "SEA 56Y35" to read "SEA 03V12" in the following locations: paragraph 2, line 18; paragraph 4, line 3; paragraph 5.b.5, line 2; paragraph 5.c.4, line 4; and paragraph 5.e, header.

l. In enclosure (2) of NAVSEAINST 9593.1B change "NAVSSES" to "CDNSWC-SSES Phila." and change "NAVSEACENPACDET" to "FTSCPAC" in the following locations: paragraph 1, line 2; paragraph 5.a, header; paragraph 5.b.1, line 2; and paragraph 5.c.4, line 4.

m. In enclosure (2) of NAVSEAINST 9593.1B change "SHAPM" and "SLM" to "SPM" in the following locations: paragraph 2, line 11; paragraph 2, line 13; paragraph 2, line 16; paragraph 2, line 17; paragraph 3, line 2; paragraph 4, line 3; paragraph 5.a.3, line 1; paragraph 5.b.3, line 1; paragraph 5.b.5, line 2; paragraph 5.b.6, line 1; paragraph 5.c, header; paragraph 5.c.4, line 3; and paragraph 5.c.5, line 2. In enclosure (2), paragraph 2, line 18, delete the words "respective SLM". In enclosure (2), paragraph 5.c.4, line 4, delete the words "cognizant NAVSEA SLM".

E. S. MCGINLEY, II
Vice Commander

Distribution: (2 copies each)

SNDL	24A1	COMNAVAIRLANT
	24A2	COMNAVAIRPAC
	24D1	COMNAVSURFLANT
	24D2	COMNAVSURFPAC
	24G1	COMSUBLANT
	24G2	COMSUBPAC
	26B	(Naval Surface Reserve Force and Detachment)
	26U	(Surface Force Readiness Support Group)
	C84B	PERA
	C84C	FTSCPAC
	C84C	FTSCLANT
	FKP8	SUPSHIP
	FKP16	CDNSWC/P

DCAS

Copy to: (2 copies each unless indicated)

SNDL	A3	CNO (N09, N45, N86, N87, and N88)
	B5	COMDT COGARD
	21A1	CINCLANTFLT
	21A2	CINCPACFLT
	FB30	NAVSHIPREPFAC
	FF5	NAVSAFECEN
	FF8	PREINSURV
	FH15	(Environmental and Preventive Medicine Units)

(Continued next page)

Copy to: (2 copies each unless indicated)

SNDL	A3	CNO (N09, N45, N86, N87, and N88)
	B5	COMDT COGARD
	21A1	CINCLANTFLT
	21A2	CINCPACFLT
	FB30	NAVSHIPREPFAC
	FF5	NAVSAFECEN
	FF8	PREINSURV
	FH15	(Environmental and Preventive Medicine Units)
	FKA1C	COMNAVFACENGCOM
	FKM22	NAVPUBFORMCEN(100)
	FKM19	NPPSDO, NDW
	FKP7	NAVSHIPYD
	FT24	(Fleet Training Center)
	FT43	(Surface Warefare Officers School Command)
	41A	COMSC
	FKN7	NAVENENVSA
	03V1	NAVSEASYSCOM (5)
	09A11	NAVSEASYSCOM (5)
	09A115	NAVSEASYSCOM (12)

Naval Publications and Printing Service Office, NDW

Stocked: COMNAVSEASYSCOM (SEA 09A115)

Certification Checklist for DDG 51
Firemain Powered Vacuum Collection, Holding and Transfer (VCHT)
and
Plumbing Waste Drain Systems

1 October 1989

Note: Remove this cover sheet before attaching enclosure to NAVSEAINST 9593.1B.

Enclosure (1)

Certification Checklist

for

DDG 51

Firemain Powered Vacuum Collection, Holding and Transfer (VCHT)

and

Plumbing Waste Drain Systems

1 October 1989

Enclosure (12) of
NAVSEAINST 9593.1B

I. Vacuum Flush Water Closet

A. Installation

1. Water closet securing bolts, washers and nuts are properly in place and tightened.

* 2. Vacuum breakers installed on water closet flushing lines supplied by potable water or as part of the water closet assembly.

3. Water closet supply and discharge piping installed to be sound and vibration isolated.

4. Water closet deck mounting provides sound and vibration isolation.

B. Operation

1. Flush water supply pressure is between 30 and 70 psig.

* 2. Flush cycle can be manually initiated and fully automatic.

3. Operate vacuum water closet (vacuum approximately 18 inches Hg) and note:

* a. Flush valve actuates.

* b. Discharge valve opens to discharge contents into vacuum collection piping.

* c. A flow of residual flush water is directed into the bowl to complete the flush cycle.

* 4. Inspect for leaks at the flushing line inlet connections, vacuum hoses and discharge elbows.

5. Determine if a maximum of 3 pints of flush water is dispensed per flush at 30 to 70 psig supply pressure.

* 6. Water closet automatically flushes when vacuum is restored after a flush cycle was initiated while the system is inoperative.

II. Vacuum Collection Urinals

A. Installation

* 1. Vacuum breakers installed in the freshwater supply piping or as a part of the flushometer.

2. Urinals installed with shock mounts.

3. Urinal flushometers are low volume and in accordance with MIL-V-15020, type II.

* 4. Urinal drain lines fitted with vacuum interface valves to isolate gravity drain from the vacuum collection piping.

5. Vacuum interface valves installed close to the urinals.

B. Operation

* 1. Vacuum interface valve operates automatically.

* 2. Urinal flush valve dispenses approximately one pint of water.

3. No pressure or vacuum leaks are present at the flush valve and vacuum interface valve connections.

III. Collection Tanks

A. Vacuum CHT Tank

1. Tank is cylindrical with dished ends and with a design pressure of 50 psig.

2. Tank fitted with a safety relief valve set at 50 psig, discharging to the plumbing waste tank vent.

3. Tank provided with a vacuum regulator valve.

4. Compound pressure/vacuum gage and pressure switch mounted on pressure switch manifold on or near the tank top.

5. Vacuum cross connect installed between forward and aft VCHT tanks with full port isolation valves at each tank.

B. Plumbing Waste Drain Tank

1. Tank bottoms sloped approximately 1.5 inches per foot toward the tank sump basin.

2. After plumbing waste tank incorporates a box strainer at the pump suction intakes.

* 3. Vent and overflow installed.

4. If installed, valves in the vent line have lock-open devices.

C. Both VCHT and Plumbing Waste Drain Tanks

1. Tanks constructed of ordinary strength steel.

* 2. Tanks' access covers provided.

* 3. A 1/2 inch bronze, monel or CRES gas sampling connection with a full port cut out valve, cap and chain installed within 6 inches of the tank top.

* 4. Gas free warning placards installed on or near the tank access plates.

* 5. Tanks internally coated IAW MIL-P-24441.

6. Tanks' internal surfaces smooth and free of structural members.

7. Tanks provided with cathodic protection (sacrificial zinc anodes).

IV. VCHT and Plumbing Waste Drain Tank Discharge Pumps

A. Installation

* 1. Each tank provided with two 20 gpm discharge pumps.

2. Pumps installed to pump in parallel.

3. Each pump provided with suction and discharge line isolation valves IAW MIL-V-24509.

a. Plumbing waste drain pump isolation valves manually operated.

* b. VCHT discharge pump discharge isolation valves are motor operated plug/ball valves and are provided with a manual override.

4. VCHT and plumbing waste drain tank discharge pumps discharge to common overboards and shore connections.

5. Non-clog swing check valve installed in the discharge line of each plumbing drain tank pump between the discharge isolation valve and the beginning of the common discharge line.

6. All pump suction lines independent and take suction from the tank sumps at the low point of the tank.

* 7. The pump impeller eyes located at an elevation at or below the pump shutoff tank level.

8. Pump suction tailpipes take suction in a vertical upward direction and located at a height equal to one pipe diameter above the tank bottom.

9. Flanged spool pieces 12 to 18 inches long installed in each pump suction line between the pump volute and suction line isolation valve.

* 10. One inch vent lines with automatically operated solenoid valves provided for each VCHT discharge pump between the pump discharge and tank top.

11. Compound (vacuum/pressure) gages IAW MIL-I-18997 fitted with diaphragm seals installed in the discharge of each VCHT pump.

B. Operation

* 1. Each pump operates without excessive noise and without leaks.

2. Each VCHT discharge pump operates without cavitation and effectively evacuates tank contents under maximum tank vacuum conditions.

3. Each pump vent line solenoid valve closes when the pump starts running and remains closed until after the motor operated discharge valve closes.

4. Pumps rotate in the proper direction.

5. Pump mechanical seal cavities are full of clean lube oil.

* 6. VCHT discharge pump motor operated discharge valve's manual override feature functions properly.

V. Transfer Piping

A. Sewage Transfer Piping

* 1. A three-way, two-port or three-way, three-port diverter valve IAW MIL-V-24509 installed in the sewage transfer line to permit discharge of sewage either overboard or to the deck risers. Diverter valves shall be properly positioned in the line.

2. Sewage transfer lines have no pockets where sewage can collect.

3. Sewage transfer piping pitched toward the sewage pumps.

4. Sewage transfer piping to the deck risers discharges via a tee connection to connect port and starboard deck discharge assemblies.

5. Overboard discharge line fitted with a gag-scupper valve.

6. Overboard discharge is between 1 and 5 feet of limiting draft waterline.

B. Plumbing Waste Drain Transfer Piping

* 1. Three-way, two-port or three-way, three-port diverter valve IAW MIL-V-24509 installed in the transfer line to permit discharge of waste either overboard or to the deck discharge connections. Diverter valves properly positioned in the line.

2. Overboard piping terminates at the sewage overboard line via a swing check valve just upstream of the overboard gag-scupper valve.

3. Waste water transfer piping discharges to the sewage deck discharge line via a swing check valve prior to the tee fitting.

VI. Deck Discharge Assemblies

* A. Deck discharge assemblies installed in accordance with NAVSHIPs dwg No. 804-4444650.

B. A quick disconnect air connection with a cut out valve and stopcheck hose valve installed on the deck connection to provide for the attachment of a compressed air hose.

C. Air connection installed downstream of the deck connection isolation valve.

D. Padeyes installed near each deck connection.

E. Removable brackets and supports installed using Ni-Cu Fasteners.

* F. Deck discharge connections fitted with 4 inch Cam-Lock adapters and caps.

G. Identification label plates installed at each deck connection.

* H. Hose hook-up procedures and sanitary and health warning placards installed at each deck connection station.

VII. Pump Controls

A. Pump motor controllers, duplex type, installed to provide for automatic or manual operation of both pumps in each pump set, singly or together.

* B. Automatic pump operation activated by level sensors located inside the tanks.

C. Automatic operation:

* 1. Pump cut out. Motor controller deactivates pump motor(s) when the level in the tank drops to the pump cut out sensor. (Note: for the VCHT tank pumps, the pump(s) motorized discharge isolation valve closes.)

* 2. Duty pump cut in. Motor controller activates one pump (duty pump) when tank level reaches the pump cut in sensor. (Note: for the VCHT tank pumps, the pump motorized discharge isolation valve also opens.)

* 3. Standby pump cut in. Motor controller activates the second pump (standby pump) when the duty pump fails to activate or the inflow to the tank exceeds duty pump discharge capacity and the tank level reaches the standby cut in sensor. (Note: for the VCHT tank pumps, the standby pump motorized discharge isolation valve also opens.)

* 4. High level alarm. Motor controller provided with a high level alarm which is activated when tank level reaches the high level alarm sensor. (Note: for the VCHT system, the solenoid-operated valve in the eductor suction line automatically closes.)

D. Manual Operation

1. Motor controller allows for manual selection of duty pump.

* 2. Motor controller allows manual operation of each pump independent of the level sensors.

E. Motor controller provided with an indicator light which is illuminated whenever power is provided to the controller.

F. Level sensors installed at the following tank levels:

* 1. Pump cutout sensors located at approximately 15 percent of tank capacity.

* 2. Duty pump cut in sensors located at approximately 30 percent of tank capacity.

* 3. Standby pump cut in sensors located at approximately 60 percent of tank capacity.

* 4. Tank high level alarm sensor located at approximately 85 percent of tank capacity.

G. The level sensors are float type with two sets of electrically isolated switches.

* H. Level sensors installed so they are not affected by tank inlets or pump suction lines.

* I. Level sensors installed so they are not affected by internal tank piping, structure or tank bottom.

J. Level sensor cable lengths inside the tank are 5 to 6 inches.

VIII. System Alarms

A. Each pump room shall be supplied with the following alarms:

* 1. VCHT and plumbing waste tank high level alarms.

2. VCHT pump and waste tank pump motor overload alarms.

3. VCHT pump and waste tank pump motor overrun alarms.

4. "No power available" alarms for both the VCHT pump and waste drain tank pump motor controllers.

5. Low vacuum alarms set at 12 inches Hg installed for the VCHT tanks.

B. All alarms provided with audible and visual indicators.

C. An audible and visual summary fault alarm installed on the DCC for any alarm condition.

D. Alarms must have provisions for silencing audible alarms while the visual alarms remain activated.

E. Silencing alarms at one station does not silence an audible alarm at another station.

F. Visual alarms shall remain activated until the alarm condition is corrected.

G. Alarm circuits do not require reset after power loss.

IX. VCHT Vacuum Generation Sub-System

A. Each VCHT system provided with a firemain powered eductor IAW MIL-E-24127 for generation of system vacuum.

B. Pressure supply to the eductor is from the firemain at firemain pressure via an isolation valve.

C. Eductor discharges overboard below the waterline via an isolation valve and a full port non-clog swing check valve located at the hull penetration.

D. Eductors are sound and vibration isolated.

E. Vacuum collection header connects to the suction eductor header via a solenoid operated valve and a full port non-clog swing check valve.

* F. Vacuum regulator valve installed at or near the tank top shall maintain vacuum at approximately 18 inches Hg.

* G. Solenoid operated eductor suction valve closes when the VCHT tank high level alarm sounds or when the eductor suction line is pressurized.

H. Emergency VCHT tank evacuation provided by installation of a line between the eductor suction line and the lowest point of the VCHT tank. The line connects to the eductor suction between the solenoid operated valve and the check valve and is provided with a full port isolation valve.

X. System Piping

A. Vacuum Collection Piping

1. Vacuum collection piping shall be 90-10 copper-nickel.

2. Vacuum collection piping shall be 2 inch for mains and 1 1/2 inch for urinals and water closets.

3. Cleanouts installed every 20 to 40 feet, at the inlet to each reformer pocket and at the end of each vacuum collection main. Clean out accesses oriented in the vertically upward direction except in overheads, where they are oriented no lower than the horizontal plane.

4. All turns of 90 degrees in mains, branches or laterals are via long radius 90 degree elbows or two 45 degree elbows.

5. Water closet and urinal branch lines connect to VCHT mains from above via Y branch fittings oriented in the direction of flow.

6. All horizontal vacuum collection lines installed with no pitch or a pitch of 1/4 inch per foot in the direction of flow.

7. Removable drip pans installed beneath each takedown joint and valve located in dry provision storerooms, food preparation and serving areas, berthing compartments, dish washing/storage areas, medical spaces and storerooms and in spaces directly above bilges contacting potable water tank boundaries.

8. Refrigerated compartments free of VCHT piping.

B. Plumbing waste drains shall be installed in accordance with DS 505 and 528.

C. All system piping labeled and marked including direction of flow arrows in accordance with DS 505 and 507.

D. All plumbing waste sources originating below the limiting draft water line drain to the plumbing waste drain tanks.

E. All plumbing waste drains originating above the limiting draft water line drain directly overboard except for the garbage grinder drains which are provided with diverter valves to collect effluent while in-port.

F. All vacuum collection mains enter the vacuum manifold via isolation valves.

G. All vacuum collection and waste water drain lines free of leaks.

XI. System Valves

A. All system isolation valves for vacuum collection and plumbing waste drains must be IAW MIL-V-24509.

B. All system valves labeled for service, DC location number and DC classification (DS 505 and 507).

C. If the valve is operable from the remote operator only, then the location number should be that of the remote operator.

D. All system valve handles or hand wheels properly color coded.

* E. All system diverter valves fitted with label plates to indicate flow direction (i.e., to deck connection, to OVBD, etc.).

* F. All valves in accessible spaces operable locally.

G. All damage control bulkhead stop valves operable from the DC deck.

* H. All valves located in voids, compartments with bolted accesses, storerooms or compartments where storage will preclude access to the valves or located in normally locked spaces fitted with mechanical remote operating gear (ROG).

I. All valves fitted with ROG operable from their remote stations.

* J. All valves without local operation capability operable from their remote stations.

XII. VCHT Tank and Plumbing Waste Drain Tank Space Requirements

* A. Health and safety label plates and operational and maintenance instruction label plates installed in each pump room in the vicinity of the pump controllers.

B. Four to six inch high coamings installed around the sewage and plumbing waste drain equipment in the sewage equipment spaces.

1. A dedicated sump installed in each pump room within the coaming with the deck sloped to drain toward the sump.

2. Voids or pockets where leakage could collect (other than the sump) avoided.

* 3. A sump flooding alarm designed to activate as soon as the sump begins to flood installed in each space sump.

4. Coaming sump evacuation via a hard pipe connection to the vacuum collection main just upstream of the vacuum tank. A full port isolation valve installed near the tank and the line connects to the collection main via a Y branch.

C. Sewage equipment spaces provided with forced air ventilation supply and exhaust configured to prevent the accumulation of heavier-than-air gases is specified in DS Section 512.

D. Cleaning gear lockers installed in each sewage equipment space.

E. Wash up facilities provided in each sewage equipment space and located outside the containment coamings. Wash up sinks connected to the VCHT tank via a Y branch and isolation valve.

F. Firemain seawater service:

1. Seawater provided for operation of vacuum eductor.

2. Fixed hardpipe flushing line connected to the sewage pump transfer lines just down stream of the pump

discharge isolation valves via throttle type valve, check valve and relief valve set at 50 psig.

3. 3/4 inch hose connection provides for space wash down.

4. Supply pressure gage installed in the firemain line to the sewage equipment space.

G. A 3/4 inch hose at least 15 feet in length and a hose rack for storage provided in each pump space.

* H. A 15 pound CO_2 fire extinguisher installed in each sewage equipment space.

I. Communications circuits provided between each sewage equipment space, DC central and CCS where system alarms are installed as well as to each deck riser station. -The communications circuit allows continual 3-way communication between the pump spaces, riser station and CCS.

J. An electrical control schematic must be installed in each motor control panel.

K. All VCHT and plumbing waste drain equipment accessible for proper operation and maintenance.

XIII. System Operational Checks and QA Checks

* A. Soil drain piping vacuum tested to 22 inches Hg.

* B. Demonstrate the capability of the vacuum eductor to maintain system vacuum between 16-20 inches Hg during normal operations.

* C. Demonstrate proper operation of all system alarms.

XIV. Software. The following software provided onboard:

A. VCHT Equipment Technical Manuals

B. VCHT System Drawings

C. NSTM Chapter 593, "Pollution Control"

D. NAVMED P5010, Chapter 7

E. PMS Coverage

F. COSAL Coverage

G. SIB

H. DC Diagram

I. BUMED Notice 6240 of 6 Feb 78

Certification Checklist for DDG 52 and Followships
Sewage Powered Vacuum Collection, Holding and Transfer (VCHT)
and
Plumbing Waste Drain Systems

July 1993

Note: Remove this cover sheet before attaching enclosure to NAVSEAINST 9593.1B.

Enclosure (2)

Certification Checklist

For

DDG 52 and Followships

Sewage Powered Vacuum Collection, Holding and Transfer (VCHT)

and

Plumbing Waste Drain Systems

July 1993

Enclosure (13) of
NAVSEAINST 9593.1B

I. Vacuum Flush Water Closet

A. Installation

1. Water closets deck mounted type EVAK or equal.

2. A gasket is installed between the water closets and deck for sound and vibration insulation.

3. Water closet supply and discharge piping sound and vibration isolated.

* 4. A backflow preventer installed for each water closet to isolate flushing water supply lines.

5. Water closet control mechanism housed within the toilet and is removable for service without removing the water closet from the deck.

6. Water closet connected to the vacuum line via a discharge valve.

7. Water closet securing bolts, washers and nuts properly in place and tightened.

B. Operation

1. Flush water supply pressure is between 30 and 70 psig.

* 2. Flush cycle can be manually initiated and fully automatic.

3. Operate vacuum water closet (vacuum approximately 18 inches Hg) and note:

* a. Flush valve actuates.

* b. Discharge valve opens to discharge contents into vacuum collection piping.

* c. A flow of residual flush water is directed into the bowl to complete the flush cycle.

* 4. No leaks at the flushing line inlet connections, vacuum hoses and discharge elbows.

5. Approximately 3 pints of flush water is dispensed per flush at 30 to 70 psig supply pressure.

* 6. Water closet automatically flushes when vacuum is restored after a flush cycle was initiated while the system was inoperative.

II. Vacuum Collection Urinals

A. Installation

1. Urinal flushometer is a low-volume type (one pint) meeting MIL-V-15020, type II.

2. Urinal installed with shock mounts.

* 3. Vacuum interface valves installed to interface gravity urinal drain lines with the vacuum collection piping.

4. Vacuum interface valves installed close to urinals.

B. Operation

* 1. Vacuum interface valve operates automatically.

* 2. Urinal flushometer dispenses approximately one pint of fresh water.

* 3. No pressure or vacuum leaks present at the flush valve and vacuum interface valve connections.

III. Both VCHT and Plumbing Waste Drain Tanks

* A. Tanks internally coated with MIL-P-24441.

B. Cathodic protection installed.

* C. A maintenance access provided at or near the tank top.

D. Tank internal surfaces smooth and free of structural members.

* E. A 1/2-inch CRES, bronze or monel gas sampling port installed on the access plate with a full port cut-out valve, cap and chain.

* F. Vent and overflow piping installed. The overflow line can share a common overboard with the pump discharge line but must have a separate gag scupper valve and connect downstream of the pump discharge gag scupper valve.

G. If installed, valves in the vent line have lock open devices.

* H. Gas-free warning placards posted at the tank accesses.

I. Tanks are ordinary strength steel with watertight construction.

J. Tank bottoms sloped toward a sump basin at the discharge pump suction.

* K. Tanks do not leak.

L. Wash down nozzles installed in tanks.

IV. Sewage and Plumbing Drain Discharge Pumps

A. Installation

* 1. Each sewage and plumbing drain discharge system equipped with two 40 gal/min discharge pumps.

2. Each pump takes a separate suction from a sump located in the low point of the VCHT tank.

3. Each pump suction line contains a tee fitting with suction piping to the plumbing waste drain tank.

* 4. Plumbing waste drain tank suction piping has an isolation valve and check valve. Isolation valve shall be installed downstream of check valve.

* 5. Each VCHT tank suction line has an isolation valve between the tank and tee fitting.

6. Each discharge pump suction line incorporates a takedown joint immediately upstream of the pump suction flange.

7. Suction piping within all tanks have tailpieces located approximately one pipe diameter above the low point of the tank bottom. Suction taken vertically upward.

* 8. Pumps are located so that the eye of the impeller remains flooded when the pumps deactivate in the automatic mode.

9. Suction piping arranged to prevent the formation of air pockets.

10. All discharge lines provided with isolation valves located near the pumps.

11. A non-clogging swing check valve with manual lifting capability installed just upstream of each discharge isolation valve.

12. The two pump discharge lines in each system connect in parallel.

13. Diaphragm type pressure gages meeting MIL-I-18997 and calibrated in lbs/sq.in. installed at the discharge of each pump.

* 14. Pump electrical connections insulated and watertight.

15. Pumps resiliently mounted.

B. Operation

* 1. Each pump operates without excessive noise and without leaks.

2. Each pump operates without cavitation and effectively evacuates tank contents.

* 3. Pumps rotate in the proper direction.

* 4. Pump mechanical seal cavities full of clean lube oil.

V. Ejector Pumps

A. Installation

* 1. Each VCHT tank equipped with two ejector pumps sized to ensure a proper vacuum of 14 to 18 inches of mercury.

2. Each pump takes a separate suction from the tank.

* 3. Pumps located so that the eye of the impeller remains flooded when the discharge pumps deactivate in the automatic mode.

* 4. Isolation valves installed in the suction and discharge lines for each pump.

5. Each VCHT pump suction line incorporates a takedown joint immediately upstream of the pump suction flange.

6. Pumps discharge back into the VCHT tank through separate ejectors.

* 7. Pump electrical connections insulated and watertight.

8. Pumps resiliently mounted.

B. Operation

* 1. Each pump operates without excessive noise and without leaks.

2. Each pump operates without cavitation and effectively generates 18 inches of mercury vacuum.

* 3. Pumps rotate in the proper direction.

4. Pump mechanical seal cavities full of clean lube oil.

VI. Sewage and Plumbing Drain Discharge Piping System

A. Pump discharge lines combine into a single sewage transfer line.

* B. A three-way two-port diverter valve meeting MIL-V-24509 installed in each sewage transfer line to divert flow overboard or to the deck discharge assemblies. Diverter valve is properly positioned in line.

C. Sewage pump suction, discharge or transfer lines contain no flow area reductions and no flow discontinuities where sewage solids could collect and clog.

D. Overboard discharge lines are fitted with gag scupper valves.

E. Overboard discharge penetrations above the waterline within one to five feet of the limiting draft waterline.

F. Overboard discharge penetrations not located near the ship's evaporator intakes.

G. Athwartship discharge to the port and starboard deck discharge assemblies is via a tee connection.

H. Transfer piping pitched toward the discharge pumps without pockets.

VII. Deck Discharge Assemblies

* A. A total of four deck discharge assemblies are installed. The two forward port and starboard assemblies service VCHT Pump Room No. 1 and the two after assemblies service Pump Room No. 2.

B. A quick disconnect air connection with a cut out valve installed on the deck connection to provide for the attachment of a compressed air hose.

C. Air connection installed downstream of the deck connection isolation valve.

* D. Assemblies installed in accordance with NAVSHIPS No. 804-4444650.

* E. Four-inch Cam-Lock adapters and caps installed on each deck discharge connection.

F. Identification label plates installed at each deck connection.

G. Padeyes installed at each deck discharge station.

H. All removable steel shore discharge sewage station brackets and supports are coated with powder epoxy. CRES 316 fasteners are used on brackets and supports.

* I. Hose hook-up procedures and sanitary and health warning placards installed at each deck connection station.

VIII. Pump Controls

A. Discharge Pumps

* 1. Pump motor controller is duplex type meeting MIL-C-2212 and provides for manual and automatic operation of both pumps, both singly and together.

2. A two way selector switch installed on each controller for selecting tank discharge priority; sewage collection tank or plumbing waste tank.

3. The controller includes three way selector switch for each pump with AUTO-OFF-MANUAL positions.

4. The controller includes:

a. Elapsed time indicator

b. Lamp test button

c. Pump run indicator light for each pump

d. Power available light

* e. low level indicator lights.

5. Automatic pump operation is activated by level sensors located inside the tanks.

* a. Pump cut-out (low-level). Motor controller deactivates pump motor(s) when the level in the tank drops to the pump cut-out sensor.

* b. Pump cut-in. Motor controller activates pump motor(s) when the level in the tanks reaches the pump cut-in sensor.

* c. High level alarm. Motor controller activates a high level alarm for the VCHT tank and a high level alarm for the plumbing waste drain tank when the level in either tank reaches the high level sensor. The high level alarm sensors in both tanks always remain active regardless of the tank discharge selector position. A VCHT tank high level alarm simultaneously activates a high level indicator on the ejector pump controller panel.

6. Manual pump operation

* a. The motor controller shall allow the pump(s) to empty the tank down to the level of the pump cut-out sensor and then automatically shut off.

* b. Controller includes a switch for manual override of the pump cut-out sensor which allows the pumps to completely empty the tanks.

* 7. The motor controllers are designed to prevent rapid fluctuations in the tank (e.g., wave action) from disrupting proper system operation.

B. Ejector Pumps

* 1. Pump motor controller is duplex type meeting MIL-C-2212 and provides for manual and automatic operation of both pumps, both singly and together.

2. Controller includes a three way selector switch for each pump with AUTO-OFF-MANUAL positions.

3. Controller includes:

a. Elapsed time indicator

b. Lamp test button

c. Pump run indicator for each pump

d. Power available light

* e. High level indicator light.

* 4. Automatic pump operation activated by pressure switches which sense system vacuum.

* a. Duty pump. Pressure switch activates the duty pump when the vacuum falls below the preset level of 14 inches of mercury. Pressure switch deactivates the duty pump when a vacuum level of about 18 inches of mercury is reached.

* b. Standby pump. Pressure switch activates the standby pump when the vacuum level falls to approximately 12 inches of mercury. Pressure switch deactivates the standby pump when a vacuum level of about 18 inches of mercury is reached.

* c. Pump alternation. Motor controller alternates the duty pump and standby pump each cycle.

* d. Motor controller automatically deactivates both ejector pumps when a VCHT tank high level alarm activates in either the automatic mode or manual mode. Ejector pump operation resumes when tank level drops below high level sensor.

* 5. Manual pump operation. Controller includes a switch for manual override of the pressure switch.

* C. Level sensors are installed at the following tank levels:

1. VCHT Tank

* a. Pump cut-out sensor located such that the tank always contains sufficient volume for proper ejector pump operation.

* b. Pump cut-in sensor located at approximately 75 percent of tank capacity.

* c. Tank high level alarm sensor located at approximately 90 percent of tank capacity.

2. Plumbing Waste Drain Tank

* a. Pump cut-out sensor located at approximately 15 percent of tank capacity.

* b. Pump cut-in sensor located at approximately 75 percent of tank capacity.

* c. Tank high level alarm sensor located at approximately 85 percent of tank capacity.

D. Level sensors are float type with two sets of electrically isolated, normally open switches.

* E. Level sensors are not positioned near pump suction, inlet lines to tank or in direct line with ejector discharge.

* F. Level sensors positioned to avoid interference with one another or with any internal piping, tank structural members or the tank bottom.

G. Cable length between tank wall and the beginning of the float is between five and six inches.

* H. The failure of one level sensor does not prevent operation of other sensors.

* I. All electrical connections insulated and watertight.

IX. System Alarms

A. Each pump room shall be supplied with the following alarms:

1. Discharge pump motor controller alarms

* a. VCHT tank high level

* b. Plumbing waste drain tank high level

c. Motor overload

d. Pump over-run

2. Ejector pump motor controller alarms

a. Motor overload

b. Pump over-run

B. All alarms provided with audible and visual indicators.

C. An audible and visual summary fault alarm installed on the DCC for any alarm condition.

D. All local and summary alarms must have provisions for silencing audible alarms while the visual alarms remain activated.

E. Silencing alarm at one station does not silence an audible alarm at another station.

F. Visual alarms shall remain activated until the alarm condition is corrected.

X. Ejector

* A. Two sewage powered ejectors provided for each VCHT system

B. Ejector body is stainless steel or other approved material.

C. Each ejector is connected to distribution manifold via an isolation valve, vacuum piping reducer and a non-return valve at ejector entry.

XI. System Piping

A. Vacuum Collection Piping

1. Piping is installed in accordance with Detailed Specification Sections 505 and 508, and DDS 593-1 dated 1 July 1984 except that cleanouts installed in the overhead are turned 90 degrees in either direction from the downward orientation.

2. Each vacuum collection main enters the suction distribution manifold separately via a full port ball or full port teflon coated plug isolation valve.

3. Suction distribution manifold has a three-inch minimum diameter with a blank flange cleanout access on one end. The other end has a one inch nipple and one-inch ball isolation valve.

4. Pressure switch service manifold has a 1-1/2 inch minimum diameter and connects to top of the distribution manifold.

5. Vacuum gage and pressure switches connected to pressure switch service manifold have diaphragm seals.

* 6. Removable drip pans installed beneath each valve and takedown joint in vacuum collection and sewage discharge piping located in dry provision storerooms, food preparation or serving areas, dish washing or dish storage areas, berthing compartments, medical spaces and medical storerooms, and spaces directly above bilges contacting potable water tank boundaries.

7. Refrigerated compartments free of VCHT piping.

8. Vacuum collection piping is 90-10 copper nickel.

9. Cleanouts in VCHT collection piping installed every 20 to 40 feet, at inlet to each reformer pocket, at the end of each vacuum collection main and branch unless the branch serves a single fixture which discharges into the main from above, and at the inlet to reformer pockets unless the pockets are immediately adjacent to a fixture. Cleanout accesses oriented in the vertically upward direction except in overheads where they are oriented no lower than the horizontal plane.

10. Vacuum collection piping shall be 2 inch for mains and 1-1/2 inch for urinals and water closets.

11. All turns of 90 degrees in mains, branches or laterals are via long radius 90 degree elbows or two 45 degree elbows.

12. Water closet, urinal and branch lines connect to VCHT mains from above via Y branch fittings oriented in the direction of flow.

13. All horizontal vacuum collection lines installed with no pitch or a pitch of 1/4 inch per foot in the direction of flow.

B. Plumbing waste drain piping in accordance with Detailed Specification Sections 505, 508 and 528.

C. All piping stenciled with service and direction of flow.

D. Plumbing waste drain piping subject to sea water exposure is copper-nickel.

E. Plumbing waste drain piping cleanouts should be installed as follows:

1. At each change of direction greater than 45 degrees

2. At the base of waste stacks

3. In vent pipes above fixtures

4. Not more than 50 feet apart in horizontal piping.

F. Cleanouts installed to open opposite the direction of flow or at right angles to the piping.

G. Plumbing waste drain piping is pitched a minimum of 1/2 inch per foot.

H. Pump room piping free of lagging except for any lines with elevated temperatures.

I. Drains from laundry, commissary, and medical waste drains, and deck drains from these spaces shall be provided with check valve protection.

J. Garbage disposers fitted with flushing connections have separate diverter valves and check valves installed prior to their connection to plumbing waste main.

K. Check valves installed horizontally and in the fore-aft direction.

L. Plumbing waste main effluent piping incorporates a three-way, two-port MIL-V-24509 diverter valve and a check valve for diversion capability to VCHT tank. Diverter valve is properly positioned in line.

M. Air gaps installed in drains from the following fixtures:

1. Refrigerator

2. Hot food tables

3. Cold food counters

4. Beverage service machines

5. Other receptacles where food is stored

6. Vegetable peeler

7. Appliances, devices and apparatus used in preparation or processing of food or drink

8. Appliances, devices and apparatus using fresh water as a cooling or heating medium

9. Sterilizers, medical water stills, water treatment devices, fresh water operated devices and medical space water storage tanks.

N. Plumbing vents terminate away from personnel, intakes and accesses.

* O. All VCHT and plumbing waste drain piping free of leaks.

XII. System Valves

A. All system valves for vacuum collection and plumbing waste drains meet MIL-V-24509 standards. The position of the ports in the valves shall be shown by permanent and distinct external markings.

B. All system valves shall be labeled in accordance with ship specifications, section 507.

C. If valve is operable from the remote operator only, then the location number is that of the remote operator.

D. All system valve handles or hand wheels properly color coded.

* E. All system diverter valves fitted with label plates to indicate flow direction (i.e., to deck connection, to OVBD, etc.).

* F. All valves in accessible spaces operate locally.

G. All damage control bulkhead stop valves operate from DC deck.

* H. All valves located in voids, compartments with bolted accesses, storerooms or compartments where storage will preclude access to valves, or located in normally locked spaces are fitted with mechanical remote operating gear per Detailed Specification, Section 505.

I. All valves fitted with remote operators operate from their remote stations.

* J. All valves without local operation capability operate from their remote stations.

K. Remote operators on accessible valves are equipped with quick-disconnect fittings.

L. Any plug valves not teflon coated accessible for lubrication.

M. Overboard gag scupper valves are oriented in the fore-aft position.

* N. Gag scupper valves are installed at all hull penetrations except in tanks or floodable voids, where a cut-out valve and check valve is installed upstream of the tank or void penetration.

* O. All diverter valves are properly positioned in the lines.

XIII. VCHT Pump Room and Plumbing Waste Drain Tank Space Requirements

* A. Free-standing coamings are welded to the deck in each space in accordance with Detailed Specification, Section 621.

1. Coamings are four inches to 6 inches in height and surround components such that any leakage will be contained.

2. Isolated system components not surrounded by main coaming are provided with a separate coaming.

3. A dedicated sump is provided in coaming area. Separate coaming areas have drainage capability to the sump, or have their own dedicated sumps.

4. Coaming area sloped toward sump. Voids or pockets do not exist, or are provided with drainage holes or filled with MIL-D-21631 latex cement.

* 5. A sump flooding alarm is installed. Alarm sensors located to activate as soon as the sump begins to overflow.

6. Sump evacuated through a hard pipe connection to a vacuum collection main just upstream of the suction distribution manifold.

7. Sump suction piping connects to collection main from above by a Y-branch fitting and includes a full port ball or plug valve near sump.

* B. VCHT tanks and potable water tanks do not share a common or integral boundary.

C. Forced air ventilation provided in each equipment space. Exhaust duct terminates approximately nine inches above the deck.

D. A wash-up facility installed in each space containing sewage pumps or sewage tanks. Wash-up facilities are located outside containment coamings.

E. Sink drain piping connects to a vacuum collection main just upstream of the suction distribution manifold. Drain piping connects by a Y-branch fitting from above and includes a full port ball or plug valve near the sink.

F. Cleaning gear lockers provided in each sewage equipment space.

G. Firemain seawater service

1. Firemain seawater service piping with a pressure gage provided in each equipment space.

2. A fixed sewage transfer piping flushing line connected just downstream of the sewage pump discharge valves.

3. Flushing line includes a throttle type valve, a relief valve set at 50 lb/sq.in., and a check valve.

4. Relief valve located upstream of check valve and relieves outboard of discharge pump overboard gag scupper valve through a check valve.

5. A 3/4 inch hose connection with a flow control valve installed in each pump space.

6. A 3/4 inch hose, 15-foot minimum length, and a hose rack provided in each pump space.

* H. Communications provided in each pump space, in Machinery Centralized Control Station (near the alarm panel), and at deck discharge connection stations which permit three-way communications.

* I. Detailed operating instructions, schematics, and health warnings are posted in each pump space and at each deck discharge connections station.

* J. A 15-pound CO_2 fire extinguisher installed in each equipment space.

K. EEBDs installed in pump spaces.

XIV. System Operational Checks and QA Checks

A. Each ejector must maintain normal operating vacuum (14 to 18 inches of mercury) when five fixtures per minute are flushed.

B. All level sensors, pump control features and gages must operate properly.

C. All system alarms and panel indicator lights must operate properly.

D. Communication systems must operate properly.

E. Ventilation systems in all pump rooms and tank spaces must operate properly.

XV. Software. The following software is provided on board:

A. VCHT Equipment Technical Manuals

B. VCHT System Drawings

C. NSTM Chapter 593, "Pollution Control"

D. NAVMED P5010, Chapter 7

E. PMS Coverage

F. COSAL Coverage

G. SIB

H. DC Diagram

I. BUMED Notice 6240 of 6 Feb 78

XVI. PQS is on board.

Certification Checklist for MHC 51
Sewage and Wastewater Pollution Control System

5 December 1990

Note: Remove this cover sheet before attaching enclosure to NAVSEAINST 9593.1B.

Enclosure (3)

Certification Checklist for MHC 51

Sewage and Wastewater Pollution Control System

5 December 1990

Note: Items which require correction prior to system certification are annotated by an asterisks.

5 December 1990

Enclosure (14) of
NAVSEAINST 9593.1B

I. VACUUM FLUSH WATER CLOSET

A. Installation

1. Water closet securing bolts, washers and nuts are properly in place and tightened.
* 2. Vacuum breakers provided with each water closet to provide isolation of flushing water supply lines.
3. Water closet supply and discharge piping provided with sound and vibration isolation.
4. Water closet deck mounting gasket provided for sound and vibration isolation.
5. Water closet connected via discharge valve to a vacuum soil drain line under 12 to 18 inches of mercury.
6. Water closets made of vitreous china with white plastic seats, open front and hinged at rear, except closed front seats for officer water closets and private baths.

B. Operation

1. Flush water supply is between 30 and 70 psig.
* 2. Flush cycle can be manually initiated and is fully automatic.
3. Operate vacuum water closet (vacuum approximately 18" Hg) and note:
* a. Flush valve actuates.
* b. Discharge valve opens to discharge contents into vacuum collection piping. Valve should remain open approximately four seconds.
* c. Residual flush water remains in the bowl after the flush cycle.
* 4. Inspect for leaks at the flushing line inlet connections, vacuum hoses and discharge elbows.
5. Determine if a maximum of 3 pints of flush water is dispensed per flush at 30 to 70 psig supply pressure.
* 6. Initiate flush cycle while vacuum system is inoperative. Restore vacuum and observe automatic flush.

II. VACUUM COLLECTION URINALS

A. Installation

* 1. Vacuum breakers installed in the supply piping or as a part of the flushometer.
2. Urinals installed with shock mounts.
3. Urinal flushometers dispense approximately 1 pint of fresh water.

* 4. Urinal drain lines fitted with vacuum interface valves to isolate gravity drain from the vacuum collection piping IAW DDS-593.
5. Vacuum interface valves installed in close proximity to the urinals.

B. Operation

* 1. Vacuum interface valve operates automatically.
* 2. Urinal flushometer dispenses approximately one pint of water.
* 3. No pressure or vacuum leaks are present at the flushometer and interface valve connections.

III. VACUUM COLLECTION PIPING

A. Installation

1. Vacuum collection piping installed in accordance with Detailed Specification Sections 505 and 508, and DDS 593-1.
2. Vacuum collection piping is 90-10 copper-nickel.
3. Suction distribution manifold (5 inch minimum diameter) and pressure switch service manifold (1-1/2 inch minimum diameter) installed.
* 4. Pressure switch service manifold installed on top of suction distribution manifold.
5. Vacuum collection mains enter suction distribution manifold separately via full port ball isolation valves.
6. Suction distribution manifold contains blank flange, ball isolation valve, and nipple.
7. Vacuum relief valve installed on distribution manifold and set at 20 inches Hg.
8. Check valve and full ported cutout valve installed between the vacuum relief valve and the suction distribution manifold.
9. Vacuum gage and pressure switches with flexible element isolators installed on pressure switch service manifold.
10. Cleanouts in VCHT collection piping installed every 20 to 40 feet, at inlet to each reformer pocket and at the end of each vacuum collection main.
11. Vacuum collection piping shall be 2 inch for mains and 1-1/2 inch for urinals and water closets.
12. All turns of 90 degrees in mains, branches, or laterals are via long radius 90 degree elbows or two 45 degree elbows.
13. Water closet, urinal and branch lines connect to VCHT mains from above via Y branch fittings oriented in the direction of flow.

14. All horizontal vacuum collection lines installed with no pitch or a pitch of 1/4 inch per foot in the direction of flow.
15. VCHT piping stenciled with service and direction of flow.

B. Operation

1. Vacuum gage indicates vacuum as preset by pressure switch(es).
2. Vacuum relief valve operates.
3. Pressure switch(es) maintain vacuum within operating range of 12" to 18" of mercury.
4. All vacuum collection piping is free of leaks.

IV. SEWAGE VACUUM COLLECTION, HOLDING AND TRANSFER (VCHT) TANK

A. Tank access cover provided.

B. Tank internal surface smooth and free of structural members.

C. Air escape and overflow:

* 1. Air escape and overflow installed.
2. Air escape terminates in weather above FWL II.
3. Air escape installed with rising pitch and without pockets.
4. Overflow incorporates gag scupper valve at hull penetration.
5. Air escape and overflow separate from all other air escapes/overflows.
6. Overflow insures gravity drainage back to plumbing waste drain tank.

D. Gas free warning placard installed on or near the tank access plate.

E. Tank constructed of CRES 316.

F. A 1/2 inch gas sampling connection with a full ported bronze, monel, or CRES valve fitted with locked closed device, cap and chain installed in access plate.

G. Tank grounded.

V. SEWAGE VCHT TANK, TANK LEVEL SENSORS

A. Level sensors installed at following tank levels:

* 1. Pump cutout sensor located a sufficient distance above ejector pump(s) suction to insure proper ejector pump operation.

2. Pump cutin sensor located approximately one foot above pump cutout sensor.

* 3. High level alarm sensor located at approximately 85 percent of tank capacity.

* B. Level sensors installed so as not to be affected by tank inlets, pump suction lines, internal tank piping, structure or tank bottom.

C. Level sensors are float type with 2 sets of leads.

D. Level sensor cable length between tank boundary and float between 5 and 6 inches.

* E. No leakage evident at tank level sensor cable stuffing tubes.

VI. EJECTORS

A. Installation

* 1. VCHT tank provided with two sewage powered ejectors mounted horizontally near the tank top.

2. Suction inlet of sewage ejector connected to suction distribution manifold via an isolation valve, vacuum piping reducer, and non-return valve (installed in a vertical position) installed at ejector entry.

B. Operation

* 1. Ejectors maintain normal operating vacuum at the design peak flushing rate of 5 flushes per minute.

VII. EJECTOR/DISCHARGE PUMPS

A. Installation

* 1. VCHT tank provided with two ejector/discharge pumps in accordance with MIL-P-24475.

* 2. Isolation valve installed between VCHT tank and each pump suction.

3. Removable spool piece or elbow installed between each pump isolation valve and pump suction.

* 4. Each pump maintains a flooded suction during all automatic operational conditions.

5. Pump suction tailpieces extend approximately 22" from VCHT flange into center of tank. Half of tailpiece is halfpipe, capped at the end. The inlet of the tailpiece shall be located at a height of one pipe diameter (measured from the bottom

perimeter of the full pipe inlet) from the tank bottom.

6. Ejector/discharge pumps installed in parallel with independent pump suctions.
7. Piping tee provided downstream of the discharge of each pump.
* 8. The run of each tee discharges back to the sewage tank via an ejector.
9. A full ported cutout valve installed between each tee and its respective ejector.
* 10. The branch of each tee discharges through a separate swing check valve (with manual lift mechanism) and a separate unidirectional motor operated discharge valve (with manual override), to the combined sewage transfer line.
11. Diaphragm type pressure gauges meeting MIL-I-18997 calibrated in PSI installed in the discharge of each pump.

B. Operation

* 1. Pump mechanical seal cavities full of clean lube oil.
* 2. Ejector pumps rotate in proper direction.
* 3. Ejector pump produces sufficient flow through ejector to maintain normal operating vacuum at the design peak flushing rate of 5 flushes per minute.
4. Ejector pumps operate without cavitation, excessive noise, or leaks.
* 5. Ejector pumps effectively discharge tank contents when in the discharge mode.

VIII. PUMP CONTROLS, EJECTOR/DISCHARGE PUMPS

A. Installation

* 1. Duplex type motor controller (IAW MIL-C-2212) provides automatic and manual operation of pumps, singly or together.
* 2. Automatic pump operation activated by level sensors located within the VCHT tank an intermittent discharge timer, and pressure switches in the pressure switch service manifold.
3. Three-way selector switch (AUTO-OFF-MANUAL) provided for each ejector/discharge pump.
4. Following control panel indicator lights installed:
   a. "Power on" lamp
   b. "Pump on" lamp (one lamp per pump)
   c. "Discharge valve closed" lamp (per motorized valve)
   d. Elapsed time indicators
   e. Lamp test buttons

f. High level alarm
g. Motor overload alarm
h. Pump overrun alarm
i. Summary fault indicator

B. Automatic operation

* 1. Pump cut-in. - Motor controller activates duty pump and opens corresponding motor operated discharge valve(s) when the level in the collection tank reaches the pump cut-in sensor.
* 2. Pump cutout. - Motor controller deactivates pump(s) when the level in the collection tank drops to the pump cutout sensor. Low level indicator lamp on.
* 3. High level alarm. - Motor controller activates high level alarm when VCHT tank level reaches the high level alarm sensor. Alarms are audible and visual and sound in CCS, OOD stations, and locally.
* 4. Silencing audible alarms does not deactivate visual alarm.
* 5. Silencing audible high level alarm in one location does not silence it in another location.
* 6. Duty pump operation. - First pressure switch activates duty pump when vacuum is less than 14 inches of mercury (approximately). The switch deactivates the duty pump when approximately 18 inches of mercury vacuum is achieved.
* 7. Standby pump operation. - Second pressure switch activates standby pump when vacuum drops below 12 inches of mercury.
* 8. Pump alternation - Duty and standby pumps alternate each pump cycle.
9. Time discharge - Intermittent discharge timer automatically initiates duty pump cut-in and cutout as preset by discharge timer.

C. Manual Operation

* 1. Motor controller allows manual operation of each pump independent of the level sensors.
* 2. Motor controller allows manual operation of each pump independent of the pressure switches.
3. Motor controller allows pump(s) to empty tank to the level of the pump cutout tank level sensor. Pump(s) cut off.

IX. SEWAGE TRANSFER PIPING

A. Sewage transfer piping to the deck risers discharges via a tee connection to connect port and starboard discharge assemblies.

* B. Three-way, two port diverter valve IAW MIL-V-24509 installed in transfer line to permit diversion of sewage overboard or to deck discharge assemblies.

* C. Overboard discharge line fitted with a gag scupper valve.

D. Overboard line discharges within approximately three feet above the limiting draft waterline and aft of the ship's distiller intakes.

E. Sewage transfer piping pitched towards discharge pumps without pockets or flow area reductions.

X. DECK DISCHARGE ASSEMBLIES

* A. Port and starboard deck discharge assemblies installed in accordance with NAVSHIPS Dwg. No. 804-4444650, with the following modifications:

1. Air blowdown connection deleted.
2. Support bracket mounted to piping vice bracket.

B. Deck connection stations clearly labeled to indicate sewage discharge connections.

C. Padeyes installed near each deck connection.

* D. Hose hook-up procedures and sanitary and health warning placards installed at each deck connection station.

XI. TRANSFER PIPING FLUSHING SYSTEM

A. Installation

1. Flushing system installed from the firemain. Sea water supplied to the sewage transfer piping just downstream of the sewage ejector/discharge pump motor operated discharge valves.
2. A throttle valve, relief valve, check valve, and isolation valve (in that order) are installed upstream from where the flushing connection meets the sewage transfer piping.
3. Relief valve discharges overboard downstream of VCHT tank overflow gag scupper valve

B. Operation

1. Transfer piping flushing system functions properly.
2. Relief valve set to relieve at 50 psi.

XII. PLUMBING WASTE DRAIN PIPING

A. Plumbing waste drain piping in accordance with Detailed Specification Sections 505, 508, and 528.

B. All piping stenciled with service and direction of flow.

C. Plumbing waste drain piping subject to sea water exposure is copper-nickel.

D. Plumbing drain cleanouts installed as follows:

1. In horizontal drain piping at each change of direction greater than 45 degrees.
2. In horizontal drain piping not more than 50 linear feet apart.
3. In each vent pipe serving a drain from a plumbing fixture or fixtures, located above the fixture positioned to facilitate mechanical cleaning of the drain line.

E. Cleanouts open in direction opposite the flow of drainage.

F. Diverter valve installed in combined waste mains to permit diversion of drainage originating above the waterline overboard or to plumbing waste drain tank.

G. Plumbing waste drain piping is pitched a minimum of 1/2 inch per foot.

H. Swing check valve provided at each waste drain connection to combined plumbing waste main.

I. Food waste pulper drains led separately from other drains via a diverter valve to permit discharge overboard or to plumbing waste drain tank.

J. Air gaps installed in drains from:

1. Refrigerators
2. Hot food tables
3. Receptacles where food is stored
4. Appliances
5. Devices and apparatus used in preparation or processing of food or drink
6. Appliances or apparatus using fresh water as a cooling or heating medium

* K. All plumbing waste drain piping free of leaks.

XIII. PLUMBING WASTE DRAIN TANK

A. Tank constructed of glass reinforced plastic.

* B. Tank access cover provided

* C. Air escape and overflow:

* 1. Air escape and overflow installed.
2. Air escape terminates in weather above FWL II.
3. Air escape installed with rising pitch and without pockets.
4. Overflow incorporates gag scupper valve at hull penetration.
5. Air escape and overflow separate from all other air escapes/overflows.
6. Overflow insures gravity drainage back to plumbing waste drain tank.

* D. Gas free warning placard installed on or near the tank access plate.

E. Tank internal surface smooth and free of structural members.

F. Tank bottom sloped towards the tank sump basin.

* G. Tank exhibits no evidence of leakage.

XIV. PLUMBING WASTE DRAIN TANK LEVEL SENSOR LOCATIONS

A. Pump cutout sensor location insures plumbing waste drain tank discharge pump volutes remain flooded during automatic operation.

B. Pump cut-in sensor located at approximately 75 percent of tank capacity.

C. High level alarm sensor located at 85 percent of tank capacity.

D. Location of sensors relative to pump suction and tank inlet does not adversely affect system operation.

XV. PLUMBING WASTE DRAIN TANK DISCHARGE PUMPS

A. Installation

* 1. Plumbing waste drain tank provided with two macerator type pumps installed in parallel with independent pump suctions.

2. Isolation valve installed between plumbing waste drain tank and each pump suction.
3. Removable spool piece or elbow installed between each pump isolation valve and pump suction.
* 4. Each pump located to maintain a flooded suction during all automatic operational conditions.
5. Pump suction inlets flush with the plumbing waste drain tank at a height of one pipe diameter (measured from the bottom perimeter of the inlet) from the plumbing waste drain tank bottom.
* 6. Swing check valve and isolation valve installed, in that order, on the discharge of each pump.
7. Plumbing waste drain pump discharge piping permits discharge of tank contents overboard or to the installed deck discharge connection.

B. Operation

1. Each pump operates without cavitation or excessive noise, and without leaks.
* 2. Pumps rotate in proper direction.
* 3. Pump mechanical seal cavities full of clean lube oil.

XVI. PUMP CONTROLS, PLUMBING WASTE DRAIN TANK DISCHARGE PUMPS

A. Installation

* 1. Duplex type motor controller IAW MIL-C-2212 provides automatic and manual operation of pumps, singly or together.
* 2. Automatic pump operation activated by level sensors located within the plumbing waste drain tank.
3. Three-way selector switch (AUTO-OFF-MANUAL) for each pump.
4. Following control panel indicator lights installed:
a. "Power on" lamp
b. "Pump on" lamp (one lamp per pump)
c. Lamp test buttons
* d. High level alarm
e. Motor overload alarm
f. Pump over-run alarm
g. Summary fault lamp

B. Automatic Operation

* 1. Pump cut-in - Motor controller activates pump(s) when the level in the plumbing waste drain tank reaches the pump cut-in sensor.

* 2. Pump cutout - Motor controller deactivates pump(s) when the level in the tank drops to the pump cutout sensor.
* 3. High level alarm - Motor controller activates a high level alarm when tank level reaches the high level alarm sensor. Alarms are audible and visual and sound in CCS, OOD stations, and locally.
4. Silencing audible alarms does not deactivate visual alarm.
5. Silencing audible high level alarm in one location does not silence it in another location.

C. Manual Operation

1. Motor controller allows pump(s) to empty tank to the level of the pump cutout tank level sensor and automatically cut off.
2. Motor controller allows manual operation of each pump independent of the level sensors.

XVII. MISCELLANEOUS

A. Drip pans installed under takedown joints in dry provisions storerooms, food preparation, storage, or serving areas, berthing areas where takedown joints are above or directly adjacent to bunks, and above potable or fresh water tank boundaries.

B. Hydrogen sulfide gas detector installed in the sewage treatment room. Alarm indication at the sewage treatment room access, in the sewage treatment room, and in CCS and OOD stations.

C. Leakage Containment

1. Coamings 4 to 6 inches in height installed around sewage treatment equipment. A dedicated sump installed within coaming.
2. Sump hard piped to vacuum collection main upstream of the suction distribution manifold via vacuum interface valve.
3. Connection of sump evaluation line to vacuum collection main via a Y-branch fitting from above.

D. Wash-up Facilities

1. Wash-up facilities provided with hot and cold potable water soap dispenser, and hand drying facilities in the sewage treatment room.

2. Sink drain piped to vacuum collection main upstream of suction distribution manifold via a vacuum interface valve.
3. Full ported ball valve provided near sink.

E. Cleaning Gear Locker

1. Cleaning gear locker provided in the sewage treatment room.

F. Washdown Hose Connections

1. Threaded 3/4 inch hose connection from the potable water system provided in sewage treatment room, at the deck discharge assemblies, and waste drain tank discharge pumps.
2. Hose connection contains stop-check valve, a vacuum breaker back flow preventer, and a hose adapter (with cap and chain) in that order from upstream to downstream.
3. A 3/4 inch hose, minimum length of 25 feet with corrosion resistant nozzles, and stowage rack provided at each location.

G. Label Plates

* 1. Detailed operating instructions including schematics are posted in the sewage treatment room and plumbing waste drain tank space. Schematics include valve designation.
* 2. Each deck discharge connection has hose connection and disconnection procedures posted.
3. Required caution placard attached to VCHT Room cleaning gear locker.
4. Required warning placard installed at access to VCHT Room.
* 5. Diverter valves located in VCHT Discharge Piping, Plumbing Waste Drain Piping and Plumbing Waste Drain Tank Discharge Piping incorporate labeling indicating the direction of flow at the diverter valve outlets.

H. System Valves

1. All system isolation valves (except motor operated discharge valves and gage isolation valves) shall meet MIL-V-24509 standards.
2. All system valves and remote operator stations, if installed, are labeled for service, DC location number and DC classification.

3. If valve is operable from the remote operator only, the location number is that of the remote operator.
4. VCHT system valve handles or handwheel color coded gold.
* 5. All valves in accessible spaces operate locally.
6. All damage control bulkhead stop valves operate from DC deck.
* 7. Remote operators installed on valves located in the following locations:
   a. Voids or compartments with bolted access.
   b. Storerooms or compartments where space loading will preclude access to the valve.
   c. Located in locked spaces.
   d. Other as specified in Detailed Specifications Sect. 505b9.
8. All valves fitted with remote operators operate from their remote stations.
* 9. All valves without local operation capability operate from their remote stations.
* 10. Gag scupper valves are installed at all hull penetrations except in tanks or floodable voids, where a cutout valve and check valve is installed upstream of the tank or void penetration.
* 11. All diverter valves are properly positioned in the lines.

I. Communications provided in VCHT Room, VCHT Deck Discharge Assemblies, and areas where remote alarms are located.

* J. VCHT Room provided with mechanical supply and mechanical exhaust ventilation.

* K. Fire extinguisher installed inside or in the vicinity of the VCHT Room.