Firemain Systems
Discharge Summary

Description of Discharge

How is this discharge generated? This discharge is the seawater pumped through the firemain system for firemain testing, maintenance, and training, and to supply water for the operation of certain vessel systems. Firemain systems distribute seawater for firefighting and other services aboard ship. Firemain water is provided for firefighting through fire hose stations, sprinkler systems, and foam proportioners, which inject aqueous film-forming foam (AFFF) into firemain water for distribution over flammable liquid spills or fire. Firemain water is also directed to other services including ballast systems, machinery cooling, lubrication, and anchor chain washdown. Discharges of firemain water incidental to normal vessel operations include anchor chain washdown, firemain testing, various maintenance and training activities, bypass flow from the firemain pumps to prevent overheating, and cooling of auxiliary machinery equipment (e.g., refrigeration plants).

UNDS does not apply to discharges of firemain water that occur during firefighting or other shipboard emergency situations, because they are not incidental to the normal operation of a vessel.

Firemain systems aboard Armed Forces vessels are classified as either wet or dry. Wet firemain systems are continuously charged with water and pressurized so that the system is available to provide water upon demand. Dry firemains are not continuously charged with water, and consequently do not supply water upon demand. Dry firemain systems are periodically tested and are pressurized during maintenance or training exercises, or during emergencies.

Which vessels generate this discharge? With the exception of small boats and craft, all Armed Forces vessels use firemain systems. All Navy surface ships and some MSC vessels use wet firemain systems. Submarines and all Army and Coast Guard vessels use dry firemains.

How often and where is this discharge generated? Firemain system discharges occur both within and beyond 12 n.m. from shore. Flow rates depend upon the type, number, and operating time of the equipment and systems using water from the firemain system.

Analysis

Nature of Discharge: Samples were collected from three vessels with wet firemain systems and analyzed to determine the constituents present. Because of longer contact times between seawater and the piping in wet firemains, and the use of zinc anodes in some seachests and heat exchangers to control corrosion, pollutant concentrations in wet firemains are expected to be higher than those in dry firemain systems. Pollutants detected in the firemain discharge include nitrogen (measured as total Kjeldahl nitrogen), copper, nickel, iron, and bis(2-ethylhexyl)phthalate. The concentrations of iron exceeded the most stringent State chronic water quality criteria. The concentrations of nitrogen exceeded the most stringent State water quality criteria. Copper, nickel, and bis(2-ethylhexyl)phthalate concentrations exceeded the relevant chronic Federal criteria and State chronic water quality criteria. These concentrations contribute to a significant total mass loading in the discharge due to the large volume of water discharged from wet firemain systems. Circulation through heat exchangers to cool auxiliary machinery increases the temperature of the firemain water, but the resulting thermal effects do not exceed State mixing zone criteria.

Firemain Systems
Discharge Summary (continued)

Analysis (continued)

The following table lists the concentration of the constituents that exceeded chronic federal criteria or State chronic water quality criteria and the resulting annual fleetwide mass loadings.

Constituent	Concentration (µg/L)	Annual Mass Loading (lbs)
Bis(2-ethylhexyl) Phthalate	BDL - 428	3414
Copper		
Dissolved	BDL - 150	2549
Total	34.2 - 143	7061
Iron		
Total	95.4 - 911	3296
Nickel		
Dissolved	BDL - 38.9	2142
Total	BDL - 52.1	2360
Total Phosphorus	130 - 200	*
Ammonia as Nitrogen	BDL - 110	*
Nitrate/Nitrite	BDL - 400	*
Total Nitrogen[A]	500	26330

[A] Total nitrogen is the sum of nitrate/nitrite and total Kjeldahl nitrogen.

BDL = below detection limit

** Mass loading not determined for parameters for which the influent concentration exceeded the effluent.*

Firemain systems have a low potential for transporting nonindigenous aquatic species, primarily because the systems do not transport large volumes of water over great distances. In addition, stagnant portions of the firemain tend to develop anaerobic conditions that are inhospitable to most marine organisms.

Discussion and Discharge Determination

Discussion: EPA and DOD believe that dry firemain systems may offer one means for reducing the total mass of pollutants discharged from firemain systems. The use of dry firemains for Coast Guard vessels demonstrates that, for at least some types of vessels, this option may be an available control mechanism. Another possible MPCD option for achieving pollutant reductions is the use of alternative piping systems (i.e., different metallurgy) that provide lower rates of pipe wall corrosion and erosion. The use of dry firemains and the potential offered by alternative piping systems demonstrates the availability of controls to mitigate potential adverse impacts on the environment.

Determination: A marine pollution control device is required.