Catapult Wet Accumulator Discharge
Discharge Summary

Description of Discharge

How is this discharge generated? This discharge is the water discharged from a catapult wet accumulator, which stores a steam/water mixture for launching aircraft from an aircraft carrier.

The steam used as the motive force for operating the catapults for launching aircraft is provided to the catapult from a steam reservoir, referred to as the catapult wet accumulator. The catapult wet accumulator is a pressure vessel containing a steam/water mixture at a high temperature and pressure. The accumulator is fed an initial charge of boiler feedwater and provided steam from boilers. As steam is released from the accumulator for the catapult launch, the pressure reduction in the accumulator allows some of the water to flash to steam, providing additional steam to operate the catapult. During operation of the system, steam condenses in the accumulator and causes the water level in the accumulator to gradually rise. Periodic blowdowns of the accumulator are required to maintain the water level within operating limits. This steam/water mixture released during the blowdown is discharged below the vessel waterline. In addition to blowdowns required during catapult operation and testing, wet accumulators are emptied prior to major maintenance of the accumulator or when a carrier will be in port for more than 72 hours. When emptying the accumulator, multiple blowdowns are performed over an extended period (up to 12 hours) to reduce pressure prior to draining the tank.

Which vessels generate this discharge? The Navy is the only branch of the Armed Forces with vessels generating this discharge. Eleven of the aircraft carriers are homeported in the United States.

How often and where is this discharge generated? Wet accumulator blowdowns are performed during flight operations, which occur beyond 12 n.m., and during catapult testing, which occurs within 12 n.m. from shore. Wet accumulators are emptied outside 12 n.m. when returning to port for accumulator maintenance or when the carrier will be in port for more than 72 hours. If catapult testing is conducted in port, and the carrier will remain in port for more than 72 hours following the testing, the accumulator will be emptied in port.

Analysis

Nature of Discharge: Catapult wet accumulator blowdowns have little potential for causing adverse environmental impacts because of the low pollutant loadings and thermal effects of this discharge. Because boiler feedwater is used for the initial charge of water to an empty accumulator, the constituents of the discharge include water treatment chemicals present in boiler feedwater. These chemicals include EDTA, disodium phosphate, and hydrazine. During normal operation, the boiler feedwater chemicals are diluted by the supplied steam. Additional constituents present in the blowdowns originate from the steam provided to the accumulator. Based on sampling data for steam condensate and the volume of wet accumulator blowdowns performed within 12 n.m., the combined mass loading for all metals is estimated at less than 0.01 pounds per year. Constituents found in steam condensate include benzidine, bis(2-ethylhexyl)phthalate, copper, nickel, nitrogen (in the form of ammonia, nitrates and nitrites, and total Kjeldahl nitrogen), and phosphorus. The concentrations of benzidine, copper, and nickel in steam condensate were found to exceed acute Federal criteria and State acute water quality criteria. The concentration of bis(2-ethylhexyl)phthalate was found to exceed State acute water quality criteria. The concentrations of nitrogen and phosphorus were found to exceed the most stringent State water quality criteria.

Catapult Wet Accumulator Discharge
Discharge Summary (continued)

Analysis (continued)

The table below lists these constituent concentrations and the resulting fleetwide annual mass loadings.

Constituent	Log Mean Normal Concentration (µg/L)	Annual Mass Loading (lbs)
Copper		
Dissolved	13.4	3.7×10^{-3}
Total	20.1	5.5×10^{-3}
Nickel		
Dissolved	10.3	2.8×10^{-3}
Total	11.6	3.2×10^{-3}
Ammonia as Nitrogen	180	4.9×10^{-2}
Nitrate/Nitrite	440	1.2×10^{-1}
Total Nitrogen[A]	1240	3.4×10^{-1}
Total Phosphorus	90	2.5×10^{-2}
Benzidine	32.8	9.0×10^{-3}
Bis(2-ethylhexyl) phthalate	19.4	5.3×10^{-3}

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

It should be noted that using steam condensate data may overestimate wet accumulator pollutant concentrations because of the shorter contact time between catapult steam and its associated piping system (resulting in less opportunity to entrain corrosion products from the piping). Based on thermal modeling of the discharge plume, catapult wet accumulator blowdowns are not expected to exceed State standards for thermal effects.

Discussion and Discharge Determination

Discussion: Catapult wet accumulator blowdowns have little potential for causing adverse environmental impacts because of the very low pollutant mass loadings in this discharge and because of the low thermal effects from this discharge. Therefore, EPA and DOD determined that it is not reasonable and practicable to require the use of a MPCD to mitigate adverse impacts on the marine environment for this discharge.

Determination: A marine pollution control device is not required.