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Survivability, Structures, and Materials Directorate

Technical Report

Identification of Weather Deck Runoff Discharge Constituents: Summary Report

by

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Section 325 of the 1996 National Defense Authorization Act, "Discharges from Vessels of the Armed Forces," requires the Navy to comply with Uniform National Discharge Standards (UNDS) to control the overboard discharge of incidental wastewaters from ships of the Armed Forces. The regulatory development process is organized into three phases: During Phase I of the UNDS rulemaking process, all discharges incidental to the normal operation of an Armed Forces vessel were identified. The discharges were characterized as requiring or not requiring control based on the discharges potential to cause an adverse environmental impact. During the current phase, Phase II, the Environmental Protection Agency (EPA) and the Department of Defense (DoD), in consultation with the U. S. Coast Guard (USCG), the Secretary of State, the Secretary of Commerce, other interested federal agencies and interested states, are jointly promulgating Marine Pollution Control Device (MPCD) performance standards for each discharge determined to require control in Phase I. During Phase III, DoD, in consultation with EPA and USCG will promulgate regulations governing the design, construction, installation, and use of MPCDs onboard vessels of the Armed Forces to meet the performance standards promulgated in Phase II. It was determined, during Phase I of the UNDS rulemaking process, that weather deck runoff requires a marine pollution control device to control the discharge.

At the direction of Naval Sea Systems Command (NAVSEA 05L13), representatives from Naval Surface Warfare Center Carderock Division, Puget Sound Naval Shipyard, and AMSEC LLC conducted shipboard assessments aboard 13 U. S. Navy and U. S. Coast Guard ships representing 9 ship classes to identify constituents that have the potential to contribute to weather deck runoff. The data obtained during the assessments will be used to develop the MPCD for weather deck runoff.

This summary report provides the results of shipboard assessments conducted aboard AOE-6, CG-47, CV/CVN, DDG-51, LHD-1, LST-9, MCM-1, WLM and WPB ship classes

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EXECUTIVE SUMMARY

Section 325 of the 1996 National Defense Authorization Act, "Discharges from Vessels of the Armed Forces," requires the Navy to comply with Uniform National Discharge Standards (UNDS) to control the overboard discharge of incidental wastewaters from ships of the Armed Forces. The regulatory development process is organized into three phases: During Phase I of the UNDS rulemaking process, all discharges incidental to the normal operation of an Armed Forces vessel were identified. The discharges were characterized as requiring or not requiring control based on the discharges potential to cause an adverse environmental impact. During the current phase, Phase II, the Environmental Protection Agency (EPA) and the Department of Defense (DoD), in consultation with the U. S. Coast Guard (USCG), the Secretary of State, the Secretary of Commerce, other interested federal agencies and interested states, are jointly promulgating Marine Pollution Control Device (MPCD) performance standards for each discharge determined to require control in Phase I. During Phase III, DoD, in consultation with EPA and USCG will promulgate regulations governing the design, construction, installation, and use of MPCDs onboard vessels of the Armed Forces to meet the performance standards promulgated in Phase II. It was determined, during Phase I of the UNDS rulemaking process, that weather deck runoff requires a marine pollution control device to control the discharge.

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BACKGROUND

Uniform National Discharge Standards. On 10 February 1996, President Clinton signed into law the Fiscal Year 1996 National Defense Authorization Act. Section 325 of the Authorization Act, "Discharges from Vessels of the Armed Forces," requires the Department of Defense and the Environmental Protection Agency (EPA) to jointly develop Uniform National Discharge Standards (UNDS) for wastewater discharges, other than sewage, incidental to the normal operation of a vessel of the Armed Forces. The Act applies to discharges for which it is reasonable and practicable to require the use of a Marine Pollution Control Device (MPCD) to mitigate adverse impacts on the marine environment. The intent of the Act is to establish a consistent set of vessel effluent standards that enhances environmental protection and provides the Armed Forces with mission-related operational flexibility.

The regulatory development process is organized into three phases: During Phase I of the UNDS rulemaking process, all discharges incidental to the normal operation of an Armed Forces vessel were identified. The discharges were characterized as requiring or not requiring control based on the discharges potential to cause an adverse environmental impact. During the current phase, Phase II, EPA and the Department of Defense (DoD), in consultation with the U. S. Coast Guard (USCG), the Secretary of State, the Secretary of Commerce, other interested federal agencies and states, are jointly promulgating marine pollution control device (MPCD) performance standards for each discharge determined to require control in Phase I. During Phase III, DoD, in consultation with EPA and USCG will promulgate regulations governing the design, construction, installation, and use of MPCDs onboard vessels of the Armed Forces to meet the performance standards promulgated in Phase II.

Naval Sea Systems Command (05L13) and EPA conducted equipment expert meetings with cognizant life cycle managers and equipment experts to gain knowledge on equipment operation and to identify additional information required to evaluate each discharge. In addition, NAVSEA and EPA performed nature of discharge analyses and determined that weather deck runoff has the potential for causing an adverse environmental effect. Preliminary practicability analyses showed that at least one reasonable and practicable MPCD exists. As a result, NAVSEA and EPA determined that weather deck runoff will require an MPCD.

Discharge Assessment Teams. At the onset Phase II, Discharge Assessment Teams (DATs) were established for three "planning discharges" (1) weather deck runoff, (2) surface vessel bilgewater, and (3) small boat engine wet exhaust. These discharges are being evaluated using the guidance established by five planning groups: (1) MPCD identification, (2) feasibility analysis, (3) sampling, (4) environmental effects analysis, and (5) cumulative impact analysis. The DATs are comprised of representatives from the U.S. Navy, U.S. Coast Guard, Military Sealift Command, and the Environmental Protection Agency. The DATs are tasked to obtain and evaluate the information and data required to promulgate the MPCD performance standards for each discharge determined to require control in Phase I.

Weather Deck Runoff. Weather deck runoff consists primarily of water from rainfall, deck washdowns, and ship operations in heavy seas that drains directly into surrounding waters.

Sources of contaminants that may be present in deck runoff include materials commonly used on decks and in topside equipment when conducting routine deck operations, maintenance, and general housekeeping aboard all classes of vessels of the Armed Forces. These materials include: paint, corrosion preventive compounds, lubricants, cleaning compounds, and solvents, etc. This discharge was characterized by performing shipboard assessments of topside processes, equipment, and operations, and by interviewing the ships crew while they were engaged in normal operations.

APPROACH

Shipboard Assessment Team. Naval Sea Systems Command (NAVSEA 05L13) established a three-person shipboard assessment team to determine how various topside maintenance processes contribute to weather deck runoff within the contiguous zone, i.e., within 12 nautical miles (nm) of the U.S. and territorial coastlines. Team members include representatives from the following organizations: (1) Naval Surface Warfare Center Carderock Division (NSWCCD); (2) Puget Sound Naval Shipyard (PSNS); and (3) AMSEC LLC.

Ship Class Selection. Prior to performing the shipboard assessments, representatives from NSWCCD and PSNS conducted a comprehensive evaluation of vessels of the Armed Forces. All ships listed in the document *"Ships Applicable to UNDS - Vessel Class Listing with Number of Vessels per Class (Active Vessels Only)"* were analyzed to determine similarities. The analysis included ship mission, topside equipment, weather deck surface area, age and number of ships in class. As a result of the analyses, each class of ship was placed into one of nine platform categories: (1) air capable, carrier; (2) air capable, amphibious assault; (3) surface combatant; (4) auxiliary; (5) service craft; (6) towed support; (7) patrol/small craft; (8) submersible; and (9) research vessel. A inventory of Armed Forces vessels and their respective platform category is provided as Appendix A.

A list was developed to identify class-specific topside processes and equipment that have the potential to contribute to weather deck runoff. All data were reduced to identify specific classes of vessels to survey and to ensure that data was obtained multiple times on each topside process. After completing this process, it was determined that ships representative of the towed support, submersible and research vessel categories would not be surveyed. The rationale for this decision was: (1) they do not have unique topside equipment; (2) they do not perform unique maintenance processes topside; and (3) it would not be cost effective since their study is not expected to provide any new data not available from the study of the other six platform categories. The class-specific process matrix is shown in Table 1.

Prior to conducting the shipboard assessments, the team presented the class-specific process matrix, ship assessment schedule, and survey approach to the UNDS Weather Deck Runoff DAT for concurrence.

Table 1: Class Specific Process Matrix

Class Specific Process	AOE-6	CV/CVN	DDG-51	LHD-1	MCM-1	WLM (USCG)	WPB (USCG)
Air Operations							
Fixed Wing		X		X			
Rotary Wing	X	X	X	X			
Aircraft Elevators		X		X			
Flight Deck Safety Nets	X	X	X	X			
Fire Assist Vehicles		X		X			
Ground Support Equipment	X	X		X			
Aircraft Launch & Recovery Equip.		X					
Recovery, Assist, Securing & Traversing System *							
Aircraft Washdown	X	X	X	X			
Aircraft Fueling	X	X	X	X			
Bow Ramp**							
Buoy Handling Systems						X	
Deck/Superstructure Maintenance & Preservation	X	X	X	X	X	X	X
Deck Washdown	X	X	X	X	X	X	X
Electronic Intelligence Systems	X	X	X	X	X		X
Search/Navigational Systems	X	X	X	X	X	X	X
Firemain Systems	X	X	X	X	X	X	X
Fuel Transfer Systems	X	X	X	X	X	X	X
General Housekeeping	X	X	X	X	X	X	X
Mine Handling Systems					X		
Ships Boats/Ships Boats Launching Systems	X	X	X	X	X	X	X
Stores Handling Systems	X	X	X	X			
Towing & Mooring Systems	X	X	X	X	X	X	X
Weapon Systems	X	X	X	X	X		X

* RAST installed on CG 49-73; FFG-8, 28, 29, 32, 33, 36-43, 45-61; DD 963-973, 975, 977, 978, 980-982, 985, 987-989, 991, 992, 997

** Bow ramp on LST-9 class only.

U. S. Navy Planned Maintenance System. Shipboard operations are very complex and diverse. To streamline the process, the Navy developed a comprehensive system for identifying and tracking equipment maintenance using a tiered system.

> ***Tier One***: Each ship has numerous work centers (shops), e.g., electrical, engineering, auxiliary, etc. Each work center maintains a *List of Effective Pages* (LOEP) that identifies the equipment they are responsible for maintaining. Each piece of equipment is identified by its nomenclature and assigned a *Maintenance Index Page* (MIP) number. i.e., the LOEP is a listing of equipment nomenclature and its associated MIP number.
>
> ***Tier Two***: Each MIP contains a summary of maintenance actions required to be performed on the equipment. The maintenance actions are identified by System Command, Control Number and *Maintenance Requirement Card* (MRC) code number. That is, the MIP is a listing of MRC numbers and a summary of the maintenance detailed on the MRC.
>
> ***Tier Three:*** Each MRC contains a detailed description of: (1) how often to perform the maintenance (weekly, monthly, etc); (2) time required; (3) number of personnel and recommended ratings; (4) materials and tools required; and (4) step-by-step instructions for performing the maintenance.

In summary: each work center has one LOEP that lists, by MIP number, all of the equipment for which they are responsible. Each MIP contains a summary, by MRC number, of the maintenance actions that are required for the piece of equipment. Each MRC provides a detailed description of when and how to perform the maintenance.

U.S. Coast Guard Preventive Maintenance System (PMS). The Coast Guard preventive maintenance system outlines minimum maintenance requirements and procedures for hull, mechanical and electrical; damage control; electronic and ordnance equipment aboard cutters and standard boats. Generation and promulgation of PMS for non-standard boats is the responsibility of the parent unit. The Coast Guard tri-level maintenance system is as follows:

> ***Organizational Level Maintenance.*** Organizational level maintenance is the responsibility of and performed by the units assigned crew, the Maintenance Augmentation Team (MAT), or those directly under their auspices (i.e., cutter-funded commercial contract). Stations are responsible for completing all organizational level preventive and corrective maintenance for all assigned boats including those boats assigned to subordinate stations.
>
> ***Intermediate Level Maintenance.*** Intermediate level maintenance is performed by designated maintenance activities in direct support of the unit and its assigned crew that is not organizational, nor depot level. In practice, only a small percentage of maintenance falls in this category.
>
> ***Depot Level Maintenance.*** Depot level maintenance is performed on equipment or

material requiring a major overhaul or a complete rebuild of parts, assemblies, subassemblies, and end-items, including the manufacture of parts, modifications, testing, and reclamation. Typically, maintenance items in this category can be performed only during a drydock or dockside availability with commercial assistance, or they involve the removal of the affected equipment from the cutter for repair in an industrial facility ashore. For cutters, depot level maintenance represents the vast majority of conventional maintenance, repair, and alterations beyond the organizational level capability

Ship Assessment Schedule. The order in which the assessments were conducted is as follows:

- U. S. Coast Guard WLM Ida Lewis Class Coastal Buoy Tender
- U. S. Navy DDG-51 Arleigh Burke Class Guided Missile Destroyer
- U. S. Coast Guard WPB Island Class Patrol Boat
- U. S. Navy MCM-1 Avenger Class Mine Countermeasure Ship
- U. S. Navy AOE-6 Supply Class Fast Combat Support Ship
- U. S. Navy CV/CVN Class Aircraft Carrier
- U. S. Navy CG-47 Ticonderoga Class Guided Missile Cruiser
- U. S. Navy LST-9 Newport Class Tank Landing Ship
- U. S. Navy LHD-1 Wasp Class Amphibious Assault Ship

One assessment was conducted aboard WLM, DDG-51, AOE-6, CG-47, LST-9 and LHD-1 class ships. Two MCM-1 class ships were surveyed, one in-port, the other at-sea. U. S. Coast Guard representatives arranged for three WPB class vessels at two different ports to be surveyed. Two assessments were conducted on the same CV/CVN class carrier; the initial assessment was conducted to observe and document topside equipment and processes and to identify discharge constituents that have the potential to contribute to weather deck runoff . The second assessment was conducted to observe and document initiatives taken to ensure deck cleanliness prior to the ship entering the contiguous zone at the end of a six-month deployment. The CG-47 and LST-9 class assessments were brief assessments conducted to determine if the CG-47 recovery, assist, securing and traversing system and the LST-9 bow ramp had the potential to contribute to weather deck runoff. No other topside processes were reviewed during the LST-9 and CG-47 assessments

The shipboard assessment schedule that shows the dates and location of the assessments is shown in Table 2.

Table 2: Ship Assessment Schedule

Ship Class	Location		Dates
	In Port	At Sea	
AOE-6		✓	14 – 21 September 1999
CV/CVN		✓	18 – 22 October 1999 15 – 18 March 2000
CG-47 (RAST only)	✓		18 November 1999
DDG-51	✓		29 June – 1 July 1999
LHD-1		✓	9 – 14 December 1999
MCM-1	✓	✓	10 – 11 August 1999
LST-9 (Bow Ramp Only)	✓		18 November 1999
WLM (U.S. Coast Guard)		✓	9 June 1999
WPB (U.S. Coast Guard)	✓		14 – 15 July 1999

Data Collection. The initial approach developed to identify hazardous constituents used on the weather deck of U.S. Navy ships was as follows: (1) develop a ship-specific constituent profile that identifies topside equipment, processes and associated materials; and (2) validate the constituent profile during the shipboard assessments. The constituent profile for the DDG-51 class ship, the first Navy ship assessment, was developed using the NSWCCD Shipboard Hazardous Material Database (SHMD). The SHMD is a relational database containing information related to the Navys planned maintenance system, including: maintenance index pages, maintenance requirement cards, and associated material information (e.g., military specification, national stock number, etc.).

When the discharge assessment team boarded the DDG-51 class ship to validate the constituent profile, it became apparent that the information in the profile was at a maintenance level higher than the crew was accustomed to addressing and that the information could not easily be reduced. For example, Sailors use the periodicity code to refer to a maintenance process instead of the MRC number; not every MRC listed on the MIP is performed aboard ship, etc. As a result, validating the profile as-developed would prove a cumbersome, time consuming process, and place a burden on ships force. Together, the assessment team and shipboard personnel developed a different, streamlined approach to obtain the required information using terminology familiar to the crew. The team successfully employed the revised approach during subsequent assessments. The revised approach is as follows: review each work centers LOEP, identify and record MIP and related MRCs performed topside, and identify associated maintenance materials for all topside equipment and processes. This information is entered into the SHMD and a comprehensive listing off all data

is generated. In summary, the initial approach was reversed, i.e., instead of generating the class-specific constituent profile and then conducting the assessment to validate the information in the profile, the team conducted the assessments to obtain the maintenance information and then generated the class-specific constituent profile.

Two surveys were developed for use during the shipboard assessments: a baseline survey and a class-specific survey. The baseline survey was designed to obtain information common to all ships surveyed (e.g., coaming height, scupper locations, and identification of MPCDs and best management practices already in use). This survey was used during every shipboard assessment and will serve as a baseline for comparison purposes when evaluating potential MPCDs. The class-specific survey was designed to obtain information related to processes that are specific to each class of ship. Copies of these surveys are included in individual ship reports.

Qualitative Vs. Quantitative Data. It is critical to the UNDS process to obtain quantitative as well as qualitative data to aid the identification of marine pollution control devices to control the discharge. However, during the first two shipboard assessment, it was readily apparent that quantitative data was going to be difficult to obtain. During the first two assessments, the team queried each Sailor performing maintenance on topside equipment regarding the amount of material used as well as the amount remaining that is exposed to the environment after the maintenance process is complete. Unfortunately, responses varied significantly. For example, a team member asked a Sailor how much grease he had applied to a 5" gun chase; his response was two ounces (oz.). The team then queried several Sailors who were also working on the gun mount and responses ranged from two oz. to one pound (lb.). Since the grease on the gun chase was exposed, the team visually examined the gun chase and concluded that it contained approximately one lb. of grease. This scenario occurred several times when investigating different maintenance processes. As a result, the shipboard assessment team and the Weather Deck Runoff DAT concluded that quantitative data would be documented for material exposed to the environment only when a team member could verify the amount.

To ensure the team could accurately estimate the amount of material exposed to the environment, the team conducted laboratory tests designed to provide a visual baseline for comparison purposes. The tests were conducted using MIL-L-17331 MS2190 TEP lubricating oil and DOD-G-24508 grease, both commonly used onboard ship. In order to conduct the MIL-L-17331 tests without creating a hazardous material spill, a known volume of the oil was poured onto a polyethylene sheet. Subsequent aliquots were added to the initial volume, until a total of one gallon (gal.) had been dispensed. Although the surface tension of the polyethylene sheet and the temperature of the laboratory are different than that of a weather deck, the tests provided a benchmark for the team to use. When simulating shipboard conditions using DOD-G-24508 grease, the team obtained a grease gun from the supply system identical to the grease guns used onboard ship and, as done onboard ship, hand-packed the gun with grease. The grease was pumped from the gun and spread in various thicknesses on a stainless steel surface. The team visually observed the area covered and thickness of the grease in order to obtain a baseline for comparison purposes. Since the crew often reports the amount of grease in a numerical value of pumps (e.g., three pumps), the grease obtained from pumping the gun once was weighed, the

resulting grease weighed 1.3 grams. The observations made were applied on subsequent shipboard assessments.

OPERATIONAL ZONES

UNDS applies to incidental discharges that occur in U. S. and territorial inland waters and waters from the shoreline out to 12 nautical miles. In an effort to determine the amount of time each ship spends within 12 nautical miles, the assessment team obtained information on the ships area of operation. The percentage of time spent in each zone and the amount of at-sea time spent in each zone for the preceding two years is shown in Tables 3 and 4, respectively:

Table 3: Operational Zone

Ship Class	Previous 12 Months		Previous 12-24	
	In-Port	At-Sea	In-Port	At-Sea
AOE-6	24%	76%	50%	50%
CV/CVN	25%	75%	50%	50%
DDG-51	25%	75%	60%	40%
LHD-1	30%	70%	90%	10%
MCM-1	60%	40%	40%	60%
WLM	25%	75%	25%	75%
WPB	60%	40%	60%	40%

Table 4: Operating Zones for At-Sea Time (shown above)

Ship Class	Previous 12 Months			Previous 12-24 Months		
	0-3 nm	3-12 nm	>12 nm	0-3 nm	3-12 nm	> 12 nm
AOE-6	5%	15%	80%	5%	15%	80%
CV/CVN	Transit	15%	80%	Transit	15%	80%
DDG-51	Transit	15%	80%	Transit	15%	80%
LHD-1	10%	40%	50%	10%	40%	50%
MCM-1	Transit	10%	90%	Transit	10%	90%
WLM	100%	0%	0%	100%	0%	0%
WPB	20%	75%	5%	20%	75%	5%

RESULTS

Ship Characteristics. The general characteristics of each ship class are as follows:

AOE-6 Class.[1] AOE-6 class ships are 754 feet (ft.) long and are manned by a crew of approximately 550 personnel. Fast combat support ships provide underway replenishment (UNREP), i.e., the transfer of fuel and solid stores (food, ammunition and spares) to aircraft carriers and their screening surface combat vessels. There are two UNREP methods: connected and vertical; they may be employed separately or simultaneously. In connected replenishment (CONREP) two or more ships steam side by side, their hoses and lines connecting them. CONREP involves two processes: refueling and resupply. Vertical replenishment (VERTREP) is performed by helicopters, with the ships close by or miles apart depending on the tactical situation and the amount of cargo to be transferred. During the assessment the assessment team observed both CONREP and VERTREP operations.

CV/CVN Class.[2] CV/CVN class aircraft carriers are approximately 1,000 ft. in length. A crew of over 5,000 personnel comprised of approximately 3,000 ships company mans the ships and 2,400 embarked air wing personnel. The ships missions are to provide an independent forward presence and conventional deterrence in peacetime, to operate as the cornerstone of joint/allied maritime expeditionary forces in times of crisis, to operate and support aircraft attacks on enemies, and to protect friendly forces and engage in sustained independent operations during war.

The flight decks of aircraft carriers are large (> 4.5 acres), flat surfaces with a small (70 ft. x 25 ft.) island structure that houses the flight deck control tower, primary flight control, various bridges, and auxiliary jet fuel stations. Unlike other ships, the carrier flight deck has limited fixed topside equipment. Fixed equipment consists of arresting wires and barricade stanchions, jet blast deflectors, and catapult trough components. Most topside processes are performed using mobile equipment that is intermittently topside, e.g., aircraft, flight deck scrubber and ground support equipment.

DDG-51 Class.[3] DDG-51 class ships are 505 ft. in length and are manned by a crew of 340 personnel. The ships mission is to provide anti-air and anti-submarine defense to other surface forces. The ship normally operates outside 12 nautical miles (nm); however, operations are conducted within 3 – 12 nm during gun fire training exercises of the 5"/54 caliber gun mount. Operations within 0 – 3 nm are limited to transit in/out of port as well as upkeep, maintenance and training evolutions.

LHD-1 Class.[4] LHD-1 class ships are 844 ft. long and are manned by a crew of approximately 1,100 ships force and 1,700 embarked troops (Marines). The ships mission is to perform as a primary landing ship for assault operations conducted by Marine Expeditionary Units. LHD-1 class ships use landing craft air cushion vehicles, conventional landing craft and helicopters to transport Marine assault forces ashore. In a secondary role, these ships perform sea control and limited power projection missions.

MCM-1 Class.[5] MCM-1 class ships are 224 ft. in length and manned by a crew of 83 personnel. The ship locates, identifies and destroys mines that cannot be countered by conventional minesweeping techniques. MCM-1 class ships conduct sweeping operations to detect deeply moored mines as well as magnetic and acoustic mines. These vessels perform mine hunting and destruction operations in all areas of the ocean, including within 0 – 12 nautical miles (nm) of the coastline.

WLM Class.[6] WLM class ships are 175 ft. coastal buoy tenders manned by a crew of eighteen. The ships primary mission is to maintain aids to navigation, i.e., buoys and associated equipment. Secondary missions are: marine environmental protection; search and rescue; and domestic ice breaking. Due to its operational zone, the ship assessed always operates within 0 – 3 nautical miles (nm); however, most buoy tenders assigned to ocean homeports normally operate within
0 – 12 nm except when transiting between the mainland and islands.

WPB Class.[7] WPBs are 110 ft. patrol boats manned by a crew of 17 personnel. The ships missions include search and rescue, counter-narcotics enforcement, living marine resources law enforcement, alien migration interdiction operations and national security/defense operations. These vessels perform law enforcement operations that are conducted in areas that are within 0 – 12 nautical miles (nm) of the coastline as well as beyond the 12 nm limit. Due to the unique mission of these ships they are required to house and transport illegal migrant personnel on the weather deck.

Class-Specific Processes. During the shipboard assessments, the team observed and documented topside equipment and processes, general housekeeping practices and their associated materials. The following section is a summary of the class-specific processes and their potential contributing constituents.

Air Operations: Fixed Wing.

The following is a synopsis of the fixed wing air operations observed onboard the CV/CVN and LHD-1 class ships.

CV/CVN Class. The flight decks of aircraft carriers are large (>4.5 acres), flat surfaces with a small (70 ft. x 25 ft.) island structure that houses the flight deck control tower, primary flight control, various bridges, and 2 auxiliary jet fuel stations. Unlike other ships, the carrier flight deck has limited fixed topside equipment. Fixed equipment consists of arresting wires and barricade stanchions, jet blast deflectors, and catapult trough components. Most topside processes are performed using mobile equipment that is intermittently topside, e.g., aircraft, flight deck scrubber, and ground support equipment. During the assessments, the CV/CVN had 62 fixed wing aircraft onboard:

10 F-14 Tomcats	36 F/A-18 Hornets	8 S-3 Vikings
4 EA-6B Prowlers	4 E-2 Hawkeyes	

Two C-2 aircraft that are not included in the ships air wing were also onboard the ship daily. The C-2 Greyhounds are used for Carrier Onboard Delivery (COD), i.e., transporting Navy and civilian personnel to an underway aircraft carrier. In order to safely perform aircraft operations and maintenance, only 48 – 52 aircraft are on the fight deck at one time, the remaining aircraft are housed in the hangar deck. Aircraft are normally flown-off the ship at the end of a deployment when the ship is 150 – 300 nm from land to provide ships force time to conduct the flight deck washdown and subsequent staging of equipment for offload. Process information related to fixed wing aircraft is as follows:

Maintenance. The aircraft are inspected and periodic maintenance/corrosion control is conducted on a 14/28 day cycle. Major maintenance actions are performed based on engine hours of operations. Although the aircrew is diligent in their efforts to maintain the aircraft in excellent condition, leaks in the hydraulic lines are common; however, they are corrected as soon as they are detected. All aircraft use MIL-H-83282 aircraft hydraulic fluid and MIL-G-81322 aircraft grease. Major maintenance actions performed on aircraft engines and airframes are conducted in the hangar bay located on the main deck.

Engine Cleaning. All aircraft engines are cleaned by washing the engines with MIL-C-85704 gaspath cleaner. The amount of cleaner and frequency the of engine washes differ depending on the type of aircraft as shown in Table 5.

Table 5: CV/CVN Class Aircraft Engine Cleaning Data

Aircraft Type	Frequency (hrs. of operation)	Gallons of Cleaner (per aircraft)
F-14	125	10
F/A-18	150	5
S-3	170	1
EA-6B	150	2
E-2	100	2 ½
C-2	100	2 ½

After completing the engine wash, the engines are rinsed using fresh water. The fresh water is supplied from the ships fresh water system using a ¾ inch (in.) garden hose with spray nozzle attached. The gaspath cleaner and rinse water that run onto the flight deck is recovered using wet vacuums to prevent the water and cleaning solution from spreading to other areas of the flight deck resulting in unsafe conditions. This water/detergent mixture is subsequently poured overboard.

Maintenance materials that have become trapped in the rough deck surface have the potential to subsequently become entrained in rainfall and go overboard within the contiguous zone, including MIL-H-83282 aircraft hydraulic fluid; MIL-G-81322 aircraft grease; and MIL-C-85704 gaspath cleaner.

LHD-1 Class. The ship carries five AV-8 Short Take-Off/Vertical Landing (STOVL) harrier aircraft operated and maintained by embarked Marine aviation combat element personnel.

Maintenance. The aircraft are inspected and periodic maintenance/corrosion control is performed on a 7/14/28 day cycle. Major maintenance actions are performed based on engine hours of operation, typically in 25 – 50 hour cycles. Engine and airframe maintenance actions are performed in the hangar bay located on the main level, one level below the flight deck. Although the aircrew is diligent in their efforts to maintain the aircraft in excellent condition and correct leaks immediately, leaks in the hydraulic lines that contain MIL-H-83282 hydraulic fluid are common.

Engine Cleaning. Aircraft engines are washed every 25 hours of flight operations using approximately 1 to 1½ gal. of MIL-C-85704 gaspath cleaner per aircraft. The mixture is poured over and into the engine and then flushed with fresh water until all visible signs of soap are removed from the engine compartment. A pneumatic wet vacuum cleaner is used to contain and recover the cleaning compound/water mixture; the recovered mixture is subsequently poured overboard.

Materials used during aircraft maintenance and engine cleaning have the potential to become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone. These materials include MIL-H-83282 aircraft hydraulic fluid and MIL-C-85704 gaspath cleaner.

Air Operations: Rotary Wing.

AOE-6 Class. The ship carries two CH-46 helicopters operated and maintained by squadron personnel assigned to the ship during underway periods. The helicopters primary mission is to transport cargo and personnel; its secondary mission is to perform search and rescue operations. Aircraft maintenance information is as follows:

Maintenance. The struts of the aircraft are greased every 7 days or 24 hours of flight operations using MIL-G-81322. All access doors are greased every 56 days using MIL-G-81322; however; if the aircraft are frequently deployed, the access doors are greased every 14 days. Rotor heads are greased every 7 days or 24 hours of flight operations using MIL-G-23827. The engine oil, MIL-PRF-23699, is changed every 100 hours of flight operations. The hydraulic system for the aircrafts flight controls is inspected for contamination every 400 hours of flight operations. The flight control system uses aircraft hydraulic fluid MIL-H-83282. The search and rescue winch, which uses MIL-H-83282 hydraulic fluid, is inspected daily prior to each flight.

Engine cleaning. A fresh water rinse is performed on the engines and rotors upon return from each flight to remove salt build-up. The helicopter engines are washed every 25 hours of flight operation; every 14 hours when operating at-sea. The engines are washed using ½ gal. of MIL-C-85704 aircraft cleaning compound mixed with one gallon fresh water. The mixture is poured over and into the engine and then flushed with fresh water until all visible signs of soap are removed from the engine compartment. The runoff travels down the side of the aircraft, onto the helicopter deck and directly overboard.

All aircraft debark prior to entering the contiguous zone. As a result, the discharges generated during aircraft cleaning and maintenance are not subject to Uniform National Discharge Standards. However, negligible amounts of maintenance and cleaning materials could potentially become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone.

CV/CVN Class. The seven SH-60 Seahawk helicopters carried onboard the ship are operated and maintained by squadron personnel. As shown below, process information related to rotary wing aircraft is the same as fixed wing aircraft:

Maintenance. The helicopters are inspected and periodic maintenance/corrosion control is conducted on a 14/28 day cycle. Major maintenance actions are performed based on engine hours of operations. All scheduled maintenance actions are performed in the hangar bay. The SH-60 helicopter uses MIL-H-83282 aircraft hydraulic fluid.

Engine Cleaning. Aircraft engines are washed using MIL-C-85704 gaspath cleaner every 60 hours of flight operations using approximately 1½ gal. of cleaner. The engines are rinsed using fresh water. The fresh water is supplied from the ships fresh water system using a ¾ in. garden hose with spray nozzle attached. Although the gaspath cleaner and rinse water run onto the flight deck, squadron personnel use wet vacuums to prevent the water and cleaning

solution from spreading to other areas of the flight deck resulting in unsafe conditions. This water/detergent mixture is subsequently poured overboard.

As with fixed wing aircraft, maintenance materials that have become trapped in the rough deck surface have the potential to subsequently become entrained in rainfall and go overboard within the contiguous zone, including MIL-H-83282 aircraft hydraulic fluid and MIL-C-85704 gaspath cleaner.

DDG-51 Class. Rotary wing aircraft embark and debark DDG-51 class ships when the ship is well beyond the contiguous zone. Since the assessment was conducted pierside, air wing personnel were not aboard the ship and the assessment team was unable to gather information.

LHD-1 Class: During the assessment, the LHD had 24 rotary wing aircraft onboard: four CH-53 Sea Stallions; four AH-1 Sea Cobras; two UH-1 Hueys; and fourteen CH-46 Sea Knights

All of the aircraft, except two CH-46 helicopters, are operated and maintained by embarked Marine aviation combat element personnel. As shown below, process information related to rotary wing aircraft is the same as fixed wing aircraft

Maintenance. The helicopters are inspected and periodic maintenance/corrosion control is based on engine hours of operation in addition to a 7/14/28 day cycle. Major maintenance actions are performed in the hangar bay. As with fixed wing aircraft, leaks in the hydraulic lines of rotary wing aircraft are common and are corrected as soon as they are detected.

Engine Cleaning. Rotary wing aircraft engines are also cleaned using MIL-C-85704 gaspath cleaner. Engine cleaning information is shown in Table 6.

Table 6: LHD-1 Class Rotary Wing Aircraft Engine Cleaning Data

Aircraft Type	Frequency (hrs. of operation)	Gallons of Cleaner (per aircraft)
CH-53	25	2.25
CH-46	25	1
UH-1	25	1
AH-1	50	1

The mixture is poured over and into the engine and then flushed with fresh water until all visible signs of soap are removed from the engine compartment. A pneumatic wet vacuum cleaner is used to contain and recover the cleaning compound/water mixture that is subsequently poured overboard.

Materials used during aircraft maintenance and engine cleaning that become trapped in the rough deck surface have the potential to subsequently become entrained in rainfall and go overboard within the contiguous zone. These materials include MIL-H-83282 aircraft hydraulic fluid and MIL-C-85704 gaspath cleaner.

Air Operations: Aircraft Elevators. Aircraft elevators are located on all large platform air capable ships, including: CV, CVN, LHD, LHA and LPH class ships. The team observed and documented the maintenance and operation of aircraft elevators during the CV/CVN and LHD-1 shipboard assessments.

CV/CVN Class. Aircraft are transported between the hangar and flight deck levels using the four aircraft elevators. Each aircraft elevator is 4,000 square feet ($ft^{2)}$ and is capable of transporting up to 3 aircraft at one time depending on aircraft type/size. All safety stanchions, locks, and cables are cleaned and lubricated by hand using MIL-G-23549, MIL-G-24139, and MIL-G-18458 greases. The amount used is dependent upon the maintenance action performed and the person performing the maintenance, but information gathered from the crew revealed an average of 2 – 5 gal. of grease per elevator. The largest contributor to deck runoff resulting from the operation and maintenance of aircraft elevators is MIL-G-23549 grease that is used to lubricate elevators operating cables. Although four gallons of grease are used to lubricate each elevator, only a small amount has the potential to wash-off and go overboard.

LHD Class. Aircraft are transported between the hangar and flight deck levels using the two aircraft elevators. Elevator cables, safety stanchions and rails are lubricated using MIL-G-23549, DOD-G-24508, and MIL-G-18458 greases. As with the CV/CVN class ship, the amount of material used is dependent upon the maintenance action being performed and the person performing the maintenance; however, information gathered from the crew revealed an average of 2 – 5 gal. of grease are applied quarterly to each elevator. Although 2 – 5 gal. of grease are applied, only a small amount has the potential to wash-off within the contiguous zone during heavy seas or a rainfall event.

Air Operations: Flight Deck Safety Nets. Flight deck safety nets are located on all air capable ships to provide a measure of protection against personnel falling overboard. The team observed and documented the maintenance of flight deck safety nets during the AOE-6, CV/CVN, DDG-51, and LHD-1 class assessments.

AOE-6 Class. Nylon safety nets are located on the area surrounding the helicopter deck. Safety net maintenance consists of load testing and inspecting the condition of the nylon strapping. The safety nets and frames are cleaned using a hand-held scrub brush wetted with a solution of 8 oz. MIL-D-16791 general purpose detergent mixed with one gal. of freshwater and rinsed-off with fresh water; this cleaning solution discharges directly overboard. Very small amounts of MIL-G-23549 is applied by hand to the hinge pins of the net frames after washing. The deck edge safety nets are washed beyond 25 nm from shore; therefore the effluent generated is not subject to UNDS.

CV/CVN Class. Stainless steel safety nets surround the flight deck. Net maintenance consist of load testing and inspection. The nets are cleaned using a hand held scrub brush moistened with a mixture of 8 oz. of MIL-D-16791 general purpose detergent in 1 gal. of fresh water. The cleaning solution is rinsed-off with fresh water that discharges directly overboard. A very small amount of MIL-G-23549 is hand-applied to the hinge pins. Since the deck edge safety nets are washed only while underway outside the contiguous zone and since they are not located directly over a deck, their maintenance does not contribute to weather deck runoff.

DDG-51 Class. Safety nets, located around the periphery of the helicopter deck, are made of nylon and attached to steel frames by nylon rope. Annual load testing and inspection are the only maintenance requirements. The nets are cleaned using a solution of approximately ½ gal. of general purpose detergent mixed with 2½ gal. of fresh water supplied by the ships 50 – 70 psi fresh water system and scrubbed with a hand held brush. The safety nets are washed concurrent with the deck washdown evolution prior to entering port. Since the washdown occurs prior to entering the 12 nm zone, this process does not have the potential to contribution to weather deck runoff.

LHD-1 Class. Stainless steel safety nets surround the flight deck. The nets and frames are cleaned using a hand-held scrub brush moistened with a mixture of MIL-D-16791 general purpose detergent in one gal. of fresh water. The cleaning solution is rinsed with fresh water that discharges directly overboard. A very small amount of MIL-G-23549 is hand-applied to the hinge pins. Since the deck edge safety nets are washed only while underway outside the contiguous zone and since the nets are not located directly over a deck, their maintenance does not contribute to weather deck runoff.

Air Operations: Fire Assist Vehicles. Information was gathered on the processes related to the use of fire assist vehicles on the CV/CVN and LHD-1 class ships.

CV/CVN Class. There are three flight deck fire trucks onboard the ship, two are located on the flight deck, the other in the hangar deck. Each vehicle carries 28 gal. of fuel, 70 gal. of water, and 60 gal. of aqueous film forming foam (AFFF). The fire assist vehicles are capable of applying the extinguishing agent in a fog, spray or stream to combat fires. Other vehicles used for aircraft fire fighting, crash, rescue, and salvage are the A/S 32A-35 crash and salvage crane, a 20,000 lb. forklift and a 6,000 lb. forklift. The operation and maintenance of this equipment does not have the potential to contribute to weather deck runoff.

LHD-1 Class. There are two A/S32P-25 fire trucks located on the flight deck. These vehicles have the capability to apply an extinguishing agent in a fog, spray or stream to combat fires. The operation and maintenance of this equipment does not have the potential to contribute to weather deck runoff.

Air Operations: Ground Support Equipment. The team obtained maintenance and operational information on ground support equipment (GSE) during the assessments aboard AOE-6, CV/CVN and LHD-1 class ships.

AOE-6 Class. Minimal ground support equipment is required to support aircraft operations onboard this class of vessel. The GSE includes: one hydraulic service unit; 4 aircraft hydraulic jacks; one portable hydraulic test stand; and one nitrogen oxide cart. The GSE is inspected daily for proper operation and is washed with a mild solution of fresh water and MIL-C-85704 aircraft cleaning compound on the helicopter deck on an as-needed basis. The runoff generated from washing the equipment discharges directly overboard. As with other maintenance related to aircraft, the GSE is not washed within 25 nm of land

CV/CVN Class. Ground support equipment carried onboard the CV/CVN class ship is shown in Table 7.

Table 7: CV/CVN Class Ground Support Equipment

Equipment	Quantity
Mobile electric power plant	1
Gas turbine engine enclosure	1
Flight deck scrubber	1
Hydraulic servicing cart	1
Hydraulic power supplies	3
Maintenance stands	2
Aircraft jacks	3
Weapons loading hoist	1
Aircraft towing tractors	10
Crash and salvage crane*	1
Forklifts*	2
Flight deck fire trucks	1
Coolant oil servicing cart	1

*Also listed in Fire Assist Vehicle report section

All of the equipment listed was not on the flight deck at one time. The amount of equipment topside was dependent on equipment availability and operational requirements. The GSE is washed on the flight deck on an as-required basis using aircraft cleaning compound and fresh water. The cleaner/water mixture is recovered using the flight deck scrubber and poured overboard. All GSE is washed for the last time after the air wing debarks, typically greater than 200 nm from land. Although lubricants may leak from the equipment, they are cleaned-up as soon as they are detected. However, some maintenance materials may become entrained in the deck surface and enter surrounding waters within the contiguous zone during a rainfall event, including MIL-L-46152 oil; Dexron II automatic transmission fluid (no military specification designation); MIL-H-83282 hydraulic fluid; MIL-L-17331 hydraulic fluid; and A-A-52624 antifreeze.

LHD-1 Class. The LHD-1 class ship had the following equipment: four tow tractors; one tow tractor unit; four 6,000 lb. forklifts; one 20,000 lb. crash crane; two pressure washers; one nitrogen oxide cart; one hydraulic service unit; one mobile electric power plant, one corrosion control cart, and one flight deck scrubber. As with the CV/CVN, all of the equipment was not on the flight deck at one time and the amount of equipment topside was dependent on equipment availability and operational requirements. The GSE is washed on the flight deck on an as-required basis using aircraft cleaning compound or Simple Green™ (depending on availability) and fresh water. The wastewater drains directly overboard. All GSE is washed for the last time after the air wing debarks, typically greater than 50 nm from land.

Although lubricants may leak from the equipment, they are cleaned-up as soon as they are detected. However, some maintenance materials may become entrained in the deck surface and enter surrounding waters within the contiguous zone during a rainfall event, including MIL-L-2104 lubricating oil, MIL-L-2105 lubricating oil, MIL-H-83282 hydraulic fluid, A-A-52624 antifreeze; MIL-F-17111 power transmission fluid; and Dexron III automatic transmission fluid (no military specification designation).

Air Operations: Aircraft Launch and Recovery Equipment. Aircraft carriers are the only ships that have Aircraft Launch and Recovery Equipment (ALRE). It consists of catapults for launching aircraft and arresting gear for recovering aircraft. Process information is as follows:

Catapults. All currently active carriers are equipped with four steam-powered catapults. Each catapult consists of a launching engine, control system, retraction engine, and associated deck equipment including the jet blast deflectors.

Launching Engine. The launching engine is enclosed in the catapult trough located immediately below the flight deck. The trough drains are equipped with a strainer basket that is cleaned prior to entering port, during quarterly maintenance, or as required due to a accumulation of constituents resulting from heavy rain or flight deck washdowns. In an effort to mitigate build-up in the strainer basket, a rubber, track slot-seal is installed to close the catapult track slot when in port, during non flight operations, between flight events, and during flight deck washdown. The materials used to maintain and preserve the launching engine equipment have the potential to enter surrounding waters through the catapult drain system, including: Aeroshell Grade 120 lubricating oil (no military specification available); DOD-G-85733 high temperature grease; and P-D-680 Type III degreasing solvent.

Control System. The control system for the catapult includes the deck edge launching control station, jet blast deflector control panel, center deck control station, and the Integrated Catapult Control Station (ICCS). The ICCS is completely enclosed and is raised and lowered during operations. All other control stations are electrical control panels except the steam pressure gages in the center deck control station. The control system does not have the potential to contribute to weather deck runoff.

Retraction Engine. The retraction engine for the catapult is located on the 03 level in the catapult machinery spaces. The retraction engines four cables are connected to the grab assembly located in the catapult trough. The retraction engine provides a means of returning the catapult shuttle and launching engine piston assembly to the battery position in preparation for the next launch. The cables and grab assemblies are cleaned using P-D-680 Type III degreasing solvent, and greased using DOD-G-85733 high temperature grease. Both of these products have the potential to enter surrounding waters through the catapult trough drain.

Associated Deck Equipment. Other equipment related to catapult operations include the catapult launching accessories. Oil and greases used to maintain and preserve this equipment are normally applied to the equipment below decks. Although this equipment is used on the flight deck during operations, the materials used during maintenance do not have the potential to enter surrounding waters.

Jet Blast Deflectors. Each of the four catapults has a jet blast deflector to deflect the high velocity and high temperature exhaust away from personnel and equipment on the flight deck. The areas of the jet blast deflector that require lubrication are contained within the jet blast deflector enclosure. The enclosure drains are equipped with a strainer basket that is

cleaned prior to entering port, during quarterly maintenance, and as required. Examples of conditions that would require the strainer basket to be cleaned include an accumulation of constituents resulting from heavy rain, flight deck washdown, or fuel spill near the jet blast deflector. The aircraft exhaust soot on the jet blast deflector has the potential to enter surrounding water during a rainfall event in port.

Arresting Gear. Arresting gear equipment includes: sheave dampers, fairlead sheaves, barricade stanchions, and various deck equipment.

Sheave Dampers. The sheave dampers are located on the 03 level immediately below the retractable sheave. The primary function of the sheave damper is to absorb the initial peak shock of the aircraft engaging the arresting gear wire. The damper also guides the arresting gear engine purchase cable to the flight deck. The sheave damper components do not contribute to weather deck runoff.

Fairlead Sheaves. The fairlead sheaves are also located on the 03 level and guide the arresting gear engine purchase cable from the engine to the sheave damper assembly prior to transiting to the flight deck. The fairlead sheaves do not have the potential to contribute to weather deck runoff.

Barricade Stanchions. The barricade stanchions are housed flush in the flight deck and used to rig and raise the aircraft emergency barricade recovery nylon webbing assembly. When raised to the full vertical position, the barricade stanchions are 22 ft. high. Each stanchion houses two cable winch assemblies used to tension the barricade webbing. The cables are stainless steel and require no lubrication. The winch assembly gears and stanchion pivoting pins are greased using small amounts Mobilgrease 28 arresting gear grease (no Military Specification). The stanchions are raised hydraulically using the hydraulic cylinder located in the barricade stanchion well. The grease on the tensioning winches and pivoting pins may wash-off during heavy rainfall or during deck washdown evolutions; however, the amount is negligible.

Deck equipment. Deck equipment includes retractable deck sheaves, wire supports, barricade stanchion components, crossdeck pendant (arresting gear wire), and purchase cable. The gravity drains for the barricade stanchions and the retractable deck sheaves discharge directly overboard. The retractable deck sheaves guide the arresting gear wire as it retracts following an aircraft recovery. The maintenance materials that have a potential to enter surrounding waters, include: Mobilgrease 28 arresting gear grease (no military specification), Gricote 31EP lubricating oil (no Military Specification), and MIL-T-22361 anti-seize compound.

As discussed above, materials used to maintain the catapults and jet blast deflector enclosures have the potential to enter surrounding waters. The catapult trough enclosure drains present the largest potential for contribution to deck runoff. The design and open track slot of the catapult trough serves as a collection point for all constituents used topside, including aircraft fuel, hydraulic fluid, soot, rain, sea water, and drainage from flight deck washdown evolutions. In

addition, the accumulated materials in the barricade stanchion wells and retractable sheave enclosure areas in the arresting gear also have a potential to enter surrounding waters. These areas serve as collection and discharge points for deck runoff; however, most of these discharges occur outside 12 nm during flight operations. It is impossible to estimate the amount of the material that could enter surrounding waters, variables include: number of aircraft launched/recovered, operating temperatures, frequency and amount of rainfall, frequency and amount of "green water" (sea water that washes onto the deck in rough seas), and amount of material used when performing maintenance (each person applies a different amount; no quantity is identified on the maintenance requirement card). Ships force is aware that these materials have a potential to go overboard and have implemented various management practices to prevent / reduce deck runoff from ALRE components when in port. These practices include ensuring the drain strainer baskets for the trough and jet blast deflector enclosure are cleaned, ensuring the catapult track slot-seal used to close the catapult track slot is installed, cleaning the barricade stanchion and retractable sheave drains, and removing and stowing (below decks) flight deck equipment used to launch aircraft.

Air Operations: Recovery, Assist, Securing and Traversing System. The Recovery, Assist, Securing and Traversing (RAST) system is designed for installation onboard ships equipped with SH-60B helicopters. It is used to assist the helicopter to land safely on the flight deck, secure the helicopter immediately upon landing, enable the helicopter to be safely transported between the flight and hangar decks, and enable the helicopter to be safely launched during adverse weather conditions. Although the RAST system is not installed aboard DDG-51 class ships, it is installed on other ships in the surface combatant category, i.e., DD-963 (single and dual track), FFG-7, and CG-47 class ships, therefore it is included in this report. Subsequent to the DDG-51 class assessment, two members of the assessment team went aboard a CG-47 class to examine the RAST system and to determine if it has the potential to contribute to weather deck runoff.

The majority of the RAST system equipment is located below decks. Components located topside include the rapid securing device, electric cable reels, tail guide winch assembly, tracks, slot seals, and control console. The rapid securing device (RSD) is housed inside the hangar bay while in port and is moved to the flight deck only when necessary. If the RSD is moved to the flight deck when the ship is in port, the RSD is covered with a form-fitting cover to prevent exposure to the environment. Track slot seals are installed in the traverse track slot to control the migration of water into the track during non-flight hours, between flight events when underway, when in port, and within 12 nm of shore. The RAST system is not operated within the contiguous zone. As a result, only MIL-G-81322 grease applied to the traverse cables, located inside the tracks which are covered with slot seals, has the potential to contribute (minimally) to weather deck runoff.

Air Operations: Aircraft Washdown. Aircraft washdown evolutions were observed and documented during the AOE-6, CV/CVN and LHD-1 shipboard assessments.

AOE-6 Class. Aircraft washdowns are dependent upon flight operations and location. Fresh water washes are performed after all flights over salt water to remove salt deposits. This washdown focuses on the windshield and rotor assembly, and normally takes only two minutes using a ¾ in. garden hose at 20 psi with a nozzle attached. Although the hose is equipped with an on/off nozzle, it is left in the "on" position so the crewmember can spray the helicopter as he walks from the front to the back of the aircraft. A complete fresh water washdown is performed every 7 days; however, if operations are conducted in the Persian Gulf region the helicopters are washed every 3 days due to sand build-up on the aircraft. When a complete washdown is performed, the aircraft is washed using approximately 8 oz. of MIL-C-87936 aircraft cleaning compound added to a one gal. of fresh water. If the aircraft is extremely dirty two gal. of the solution may be required. During complete washes, the fresh water is applied using a 155 psi pressure washer and a ¾ in. garden hose. The wash water/aircraft cleaning compound mixture drains directly overboard. While the crew is washing the top portion of the aircraft with the pressure washer, the crew below the aircraft captures the effluent in buckets and uses it to wash the lower portion of the craft in an effort to reduce freshwater consumption and overboard discharges. Since the aircraft are not onboard when the ship is operating in the contiguous zone, the discharges generated as a result of aircraft washdown are not subject to UNDS. However, residual MIL-C-87936 that has become trapped in the rough deck surface has the potential to subsequently become entrained in rainfall and go overboard within the contiguous zone

CV/CVN Class. Aircraft washdowns are dependent on operational tempo and ship location. While the aircraft are attached to the ship and in an underway operating status, a complete fresh water washdown is performed every 14 days with the exception of the SH-60 helicopter that is washed every 7 days. Spot washing is conducted daily as required using aerosol aircraft cleaning compound. When a complete washdown is performed the aircraft is washed using aircraft cleaning compound MIL-C-85570 Type II; fresh water is supplied using a ¾ in. garden hose with spray nozzle attached. Approximately 100 – 150 gal. of water are used per aircraft. MIL-G-81322 grease is applied via the grease fittings prior to the washdown evolution to expel old grease and again after the washdown to expel grease contaminated with the washwater. Previous laboratory testing conducted by the assessment team using a grease gun from the supply system identical to grease guns used onboard ship revealed that 1.3 grams of grease are expelled each time the grease gun is pumped. Each aircraft grease fitting is lubricated by pumping the gun 3 – 4 times, therefore 3.9 – 5.2 grams of grease are used per fitting prior to and after each washdown for a total of 7.8 – 10.4 grams per fitting per washdown. The expelled grease falls to the flight deck and is recovered with the washwater and discharged overboard. The amount of detergent and grease used is dependent on the type of aircraft as shown in Table 8.

Table 8: CV/CVN Class Aircraft Washdown Data

Aircraft	Amount of Detergent	Number of Grease Fittings
F-14	2 ½ gallons	85
F/A-18	1 ½ gallons	60
S-3	2 ½ - 3 gallons	100
EA-6B	3 gallons	100
E-2	2 gallons	90
C-2	2 gallons	90
SH-60	32 oz.	10

Even though all aircraft debark when the ship is well beyond the contiguous zone, MIL-G-81322 aircraft grease and MIL-C-85570 aircraft cleaning compound may have become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone.

LHD-1 Class. Aircraft washdowns are dependent upon the ships location and operating tempo. Fresh water washes are performed daily when underway to remove salt deposits; the washdown lasts two minutes and is performed using a ¾ in. garden hose at 20 psi with a spray nozzle attached. A fresh water rinse is also performed on aircraft that have flown over water at altitudes less than 500 ft. for extended periods of time. MIL-G-81322 grease is applied via the grease fittings prior to the washdown to expel old grease and again after the washdown to expel grease contaminated with the washwater. Using the data generated during laboratory testing, 7.8 – 10.4 grams of grease are used per fitting per washdown; each helicopter has 10 grease fittings. The expelled grease falls to the flight deck and is recovered with the washwater and discharged overboard.

Each aircraft receives a complete fresh water washdown every 7 days. During the complete washdown of an AH-1 aircraft the team observed, the crew mixed approximately 8 oz. of MIL-C-85570 aircraft cleaning compound with three gal. of fresh water and applied the mixture to the aircraft using long telescoping poles with a flat scrubbing head. A ¾ in. garden hose with a spray nozzle attached was used to wet and rinse the aircraft. The entire process took 40 minutes, with the water running for 14 minutes. The waste water drained directly overboard.

Even though all aircraft debark when the ship is well beyond the contiguous zone, MIL-C-85570 aircraft cleaning compound and MIL-G-81322 grease may have become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone.

Air Operations: Aircraft Fueling. The fueling of aircraft was observed and documented during the AOE-6, CV/CVN and LHD-1 assessments.

AOE-6 Class. All aircraft fueling operations are performed by embarked squadron personnel; ships company is responsible for performing all maintenance on the fueling station. After refueling the aircraft, the fueling hose is drained into a bucket and the fuel is poured into the contaminated fuel tank. The assessment team observed the aircraft refueling process several times and did not observe any spillage. Very small amounts of cleaning and lubricating materials are used on the aircraft fueling station, including: MIL-D-16791 general purpose detergent; DOD-G-25408 grease; and anti-seize compound MIL-A-907. The team concluded that this process does not have the potential to contribute to weather deck runoff.

CV/CVN Class. Maintenance performed on equipment located topside includes inspecting and lubricating hose reel assemblies, inspecting hose and nozzle assemblies, and lubricating the defuel pump. The majority of fueling/defueling station maintenance is performed on equipment that is located below decks. Aircraft fueling stations are cleaned on a weekly basis using Spray & Wipe™ and rags. Preservation is accomplished during periods of repair availability only. Drains located in the fueling station discharge directly overboard.

The crew stated an average of 20 gal. of MIL-T-5624 jet fuel from aircraft tank vents and tank relief valves/dumps is spilled on the deck during a 24 hour period. A dedicated fuel spill cart is maintained on the flight deck in order to provide rapid spill response, the recovered fuel is transferred to the contaminated fuel tank. All fuel remaining in the fuel hose is evacuated prior to hose release from the aircraft. As a result, the assessment team did not notice any fuel spilled during the numerous (>20) aircraft fueling evolutions they observed. Fuel that has spilled onto the deck from the tank vents and valves may become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone.

LHD-1 Class. Maintenance performed on topside equipment includes: lubricating the defuel pump; inspecting and lubricating the hose reel assemblies; and inspecting and lubricating the hose and nozzle assemblies. Most of the maintenance is performed on equipment that is located below decks and not exposed to the environment. Aircraft fueling stations are cleaned on a weekly basis using Spray & Wipe™. Preservation is accomplished during periods of repair availability.

Sources of MIL-T-5624T jet fuel spills are aircraft tank vents and tank relief valves/dumps. The crew maintains a dedicated fuel spill cart on the flight deck in order to provide rapid spill response; the recovered fuel is transferred to the contaminated fuel tank. Drip pans are not used when fueling/defueling aircraft because they have the potential to become drawn into the aircraft engine intake, resulting in catastrophic engine failure. All fuel remaining in the fuel hose is evacuated prior to hose release from the aircraft. As a result, the assessment team did not note any fuel spillage during the aircraft fueling evolutions observed. The fueling station drains discharge directly overboard. Although the drains are open when underway, they are closed when the ship is in-port.

Residual amounts of MIL-T-5624 jet fuel that has spilled onto the deck from the tank vents and valves may become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone.

Bow Ramp. Tank landing ships (LST) were previously used to transport and land tanks, amphibious vehicles and other rolling stock during an amphibious assault. LST ships offload cargo and vehicles by means of a 112 ft. ramp over their bow. A stern gate allows off-loading of amphibious vehicles directly into the water.

In order to ensure a comprehensive evaluation of all processes performed on amphibious assault ships, two members of the shipboard assesssment team visited a tank landing ship (LST) to determine if the bow ramp has the potential to contribute to weather deck runoff. At the time of the assessment the Navy had two LST class ships. As of this writing, the LST assigned to the Atlantic Fleet has been decommissioned; the last remaining LST is assigned to the Pacific Fleet Naval Reserve Force.

The LST bow ramp contains a exposed wire cable that runs the full length of the ramp and is routed around sheaves located at the top forward part of the boom on both sides. As the boom pays out, the boom and ramp roll forward as they traverse on the boom rails. Although the boom is operational, the crew indicated that routine maintenance and testing has been reduced to a quarterly basis because the bow ramp is not used on a regular basis. The rollers, rails, sheaves, and cable assemblies that are continuously exposed to the outside elements were not lubricated. The assessment team concluded that the bow ramp does not have the potential to contribute to weather deck runoff.

Buoy Handling Systems. U. S. Coast Guard buoy tenders are grouped into four classifications: (1) offshore/seagoing (WLB); (2) coastal (WLM); (3) inland (WLI); and (4) inland construction (WLIC). The team observed and documented buoy handling systems aboard a WLM class buoy tender.

The ship maintains buoys in the following sizes (width x height): 5 ft. x 11ft.; 6 ft. x 20 ft.; 7 ft. x 17 ft. (most common); and 8 ft. x 26 ft. Each buoy is anchored by a "sinker" i.e., a solid block of cement attached to the buoy by an anchor chain. The weight of the sinker is dependent on the size of buoy, depth of water, and average water current. Sinker weights are: 2,500; 4,000; 8,500; 12,700; or 18,000 lb., depending on buoy size. The buoy, anchor chain and sinker are hoisted aboard the ship using a crane and cross deck winches. Once onboard, the buoy is secured to the 36 ft. wide x 50 ft. long buoy deck using tie-down chains. Typical maintenance performed on each buoy/sinker includes: removing marine growth with a scraper and pressure washer; cleaning the solar power panel with Simple Green™ and rag; inspecting battery and light functions; touching-up paint if required; measuring and replacing (if required) the sinker chain; and inspecting the sinker.

Upon completing each buoy maintenance evolution, the marine growth is swept overboard using shovels and a 3,000 lb. per square in. (psi) pressure washer using seawater supplied by the ships 160 psi firemain. Approximately 3 – 5 gal. of marine growth (dependent on buoy size) were removed from each buoy. During the assessment, one of the six buoys retrieved required touch-up painting and two sinkers and two lengths of chain required replacement. If the entire buoy requires painting, it is recovered and taken ashore. Buoy paint conforms to Military Specification MIL-P-24647 and is supplied by several manufacturers. The primary constituent which contributes to weather deck runoff as a result of buoy retrieval and maintenance is Texaco Rando HD 32 hydraulic fluid used in the crossdeck winches.

Deck/Superstructure Maintenance and Preservation. The assessment team obtained information on deck/superstructure maintenance and preservation during every shipboard assessment.

AOE-6 Class. The crew removes deck and superstructure paint using needle guns, disc sanders, grinders, sandpaper and wire brushes. No chemical paint removers are used. Waste paint debris is containerized and turned into the Hazardous Material Minimization Center (HAZMINCEN) for disposal ashore. Surfaces are painted using brushes and rollers; they are rough sanded and wiped-down with a mixture of general purpose detergent and fresh water prior to painting. Tarps are suspended between the ship and the pier to catch paint debris if painting the hull when in port. The primary constituent that has the potential to contribute to weather deck runoff as a result of deck/ superstructure maintenance and preservation is paint chips that may become airborne (when the crew is sweeping-up the paint debris) and carried overboard.

CV/CVN Class. The flight deck is covered with a non-skid surface coating which is removed and applied by a contractor during ships periods of availability. Only spot repairs of small areas are made while underway. If spot repairs are required, the crew removes the non-skid using hand operated deck grinding machines, no chemical removers are used. Waste materials from the non-skid removal are swept, containerized and turned into the HAZMINCEN for disposal ashore. Deck maintenance and preservation do not contribute to weather deck runoff.

DDG-51 Class. Deck and superstructure paint is applied using brushes and rollers. De-painting methods include needle guns, disc grinders, sandpaper and wire brushes. Neither the needle guns nor the disc grinders are vacuum-assisted. During the assessment, the team observed a Sailor de-painting a metal door using a grinder. The Sailor had taken the precaution of placing the metal door on a tarp to contain the debris; upon completion of his task, the debris that had projected beyond the tarp was swept, containerized and turned in to the ships HAZMINCEN. All weather deck surfaces are coated with non-skid material which is applied/removed by contractor personnel during the ships repair availability period. Although no chemical paint remover is used on the deck and superstructure, the product *Peel-Away 7*, is used on the close-in weapons system. Even though the crew exercises caution and takes preventive measures to ensure paint debris does not enter the surrounding water, paint, paint chips and metal chips do have the potential to contribute to weather deck runoff during deck and superstructure maintenance and preservation.

LHD-1 Class. A fresh non-skid surface coating was applied to the flight deck ten months prior to the assessment. All of the ships surveyed have indicated that only spot repairs are made when underway; new non-skid is removed and applied by a contractor during ships periods of availability. No spot repairs had been made since the ship began its deployment three months ago. The crew stated that if spot repairs are required prior to returning to port, they will remove the non-skid using hand operated deck grinding machines, no chemical removers will be used. Waste materials will be swept, containerized and turned into the HAZMINCEN for disposal ashore. As a result, flight deck maintenance and preservation do not contribute to weather deck runoff.

MCM-1 Class. MCM-1 class ships are constructed of glass reinforced plastic sheathed wood, i.e., laminated oak framing, douglas fir planking, and deck sheathing with reinforced fiberglass covering. Great care is taken to maintain and preserve the vessels hull, decks, and superstructure. Surfaces are cleaned with fresh water and Simple Green™ detergent prior to painting, and, a majority of the time (80%), only sandpaper is used to prepare the surface for painting. Deck/superstructure paint is applied using brushes and rollers and removed using sandpaper, grinders, or vacuum-assist disc sanders; no chemical paint removers are used in the ships preservation process. Spray painting is not performed onboard ship and no solvents or thinners are used when painting. Waste materials are swept and containerized for shoreside disposal. Approximately 90 – 95% of the painting is performed while pierside, the remaining 5 – 10% is limited to touch-up work which is performed when underway. Brushes and rollers are solvent-cleaned in the paint locker which is not accessible from the weather deck.

WLM Class. No painting is performed when underway other than touch-up painting of buoys. The ships hull and superstructure are painted in port only and is normally limited to touch up painting; complete hull painting is performed during periods of repair availability. Surface preparation is performed using a wire brush. All residual paint chips are swept-up and containerized for disposal ashore. In the previous 14 months, the hull has been painted once. Paint used is manufactured by Interlux; specific color information is Interlac 800, white; Interlux premium yacht enamel #344, international orange; and Interlux brightside polyurethane #4253, ocean blue. These paints are the primary constituents that contribute to weather deck runoff as a result of deck/superstructure maintenance and preservation.

WPB Class. The crew removes deck and superstructure paint using needle guns, disc sanders with recovery vacuum, palm sanders with dust collection bags, sandpaper and wire brushes; no chemical paint removers are used. Paint debris is swept and containerized for disposal ashore. The hull above the water line is painted every six months and is rough-sanded and wiped-down with denatured alcohol and rags prior to painting the surfaces with brushes and rollers; the ship is waterborne during the 7 – 10 day preparation and painting process. The crew uses paint manufactured by Interlux; specific color information is Interlac 800, white; Interlux Premium Yacht Enamel #344, international orange; and Interlux Brightside Polyurethane #4253, ocean blue.

Deck Washdown. The assessment team gathered deck washdown information during all ship assessments.

AOE-6 Class. The crew washes the deck once a week with fresh water when underway at distances greater than 25 nm from shore. When in-port, the deck is swept and swabbed only, therefore no effluent is generated. When washing the 02 level, a ¾ in. garden hose operating at 20 psi with a nozzle attached is used. A 1½ in. fire hose with a pressure of 125 psi at 95 gal. per minute is used on the 01, 03, and 04 levels. The crew uses corn brooms and scrub brushes to clean the deck with a mild solution of MIL-D-16791 general purpose detergent and fresh water. Approximately 1½ gal. of general purpose detergent are used to clean the entire ship. The washdown evolution for the entire ship (except helicopter deck) takes approximately 6 hours with the water running approximately 50 percent of the time. The helicopter deck is cleaned with the same detergent/water mixture using a ¾ in. garden hose at 20 psi without a nozzle and requires approximately 25 minutes. The amount of time and detergent used when conducting the washdown was provided by crewmembers. The team was unable to observe and document a washdown to record exact times and volumes because a washdown was not performed due to harsh weather conditions during the assessment period. As previously stated the entire ships crew displayed a strong environmental ethic; nonetheless, the assessment team was surprised to observe the crew swabbing the deck immediately after each rainsquall using only the rainwater (no detergent) remaining on the deck surface, thereby cleaning the deck and reducing the ships fresh water usage. Since the washdown occurs outside 25 nm, the only contaminants entering surrounding waters inside the contiguous zone are contaminants that become trapped in the rough deck surface during the washdown and subsequently become entrained in rainfall and go overboard.

CV/CVN Class. The ship had been at-sea conducting flight operations for two months at the time of the first assessment and six months at the time of the second assessment. The objective of the second assessment was to document preparations taken to ensure flight deck cleanliness prior to the ship entering the contiguous zone at the end of a six-month deployment. During both assessments, the team expected to find a build-up of jet fuel, grease and oil on the flight deck; however, visual and contact observations revealed that most of the stains on the deck were tire residue from the thousands of aircraft launch and recovery evolutions. The flight deck was contaminated with only minor amounts of fuel, grease and oil.

Liquid remaining on the flight deck can be drawn into the aircraft intake and can be as damaging to an aircraft as a solid object. The ship maintains constant and tight control over flight deck cleanliness by providing detailed written instructions and recording cleaning evolutions.

The team observed and documented a section of the flight deck being cleaned the teams first night at-sea. Team members recorded all maintenance actions performed on the area for four days then visually examined the area to identify potential contaminants. Stains from materials that had leaked onto the deck and were absorbed in the non-skid deck surface were visible. No accumulation was noted. During the four day period 100 aircraft refuelings, 8 aircraft engine washes, and 60 routine maintenance processes (e.g., change tires, service hydraulic system, etc.) were performed on the section.

Below is a synopsis of observations made during the assessments:

First At-Sea Assessment. It was readily evident that the crew was successful in maintaining flight deck cleanliness. The crew uses two methods to clean the flight deck: a nightly scrubbing exercise referred to as a "SCRUB-X", and continuous cleaning using a mechanical flight deck scrubber.

- SCRUB-X. At the beginning of the deployment, a diagram was developed to divide the flight deck into eight sections. Each embarked air squadron is responsible for one section; the sections are cleaned on a rotational basis. A log book that identifies the responsible squadron and records when each section is cleaned is maintained in Flight Deck Control.

  One section of the flight deck is scrubbed each night after flight operations. During a SCRUB-X, approximately 5 gal. of B&B 88 cleaning compound is spread onto the deck after it has been wetted with seawater supplied from the ships firemain (95 psi) via a 2½ in. fire hose. Approximately 20 – 30 Sailors use push-style brooms with long, stiff bristles to "scrub" the flight deck. The Sailors form a line and scrub the deck with the brooms, making 10 – 15 horizontal and 10 – 15 vertical passes. The deck is sprayed with seawater to remove residual soap. The remaining cleaner/water mixture is suctioned into the flight deck scrubbers recovery tank and poured overboard. The nightly SCRUB-X requires 1 – 1 ½ hours to clean a 120 x 80 ft. section, depending on material accumulation.

  Each morning before flight operations begin, squadron personnel use pneumatic vacuum cleaners to remove liquids and other foreign objects from the aircraft tie-down fixtures located in their assigned section of the flight deck. When this task has been completed, the date, time and responsible individual are recorded in the log book.

- Mechanical Flight Deck Scrubber. A flight deck scrubber equipped with a vacuum system that provides suction (11,800 rpm fan) for residual solution recovery is used to clean the flight deck and remove standing water. The scrubber is equipped with: a portable vacuum wand that is used to clean areas inaccessible to the scrubber, two hydraulically powered scrub brushes, a 140 gal. solution tank, and a 120 gal. recovery tank. The crew adds ½ gal. Simple Green™ to 140 gal. of water. The scrubber applies the cleaning solution in front of dual high-speed opposed rotation brushes. The brushes scrub the soiled area and sweep-up debris. The dirty water and debris is contained by the rear vacuum squeegee and suctioned into the recovery tank. The recovered cleaner/water mixture is poured overboard. The assessment team noted that the flight deck scrubber was used daily during and between scheduled flight operations in order to maintain a high level of cleanliness.

Second At-Sea Assessment. A second assessment was conducted at the end of a six month deployment to observe and document a SCRUB-X of the entire flight and hangar decks. The SCRUB-X was conducted after the air wing debarked and ship was 200 nm from land. Since the ship had launched and recovered more than 10,000 aircraft, there was a significant accumulation of tire residue but not of hazardous constituents.

- Flight Deck SCRUB-X. The entire flight deck was cleaned with B&B'88 flight deck cleaner using seawater supplied from the ships fire main at 95 gpm through a 2½ in. fire hose. The cleaner was applied to the flight deck from a 55 gal. drum using a foaming nozzle. Approximately 40 scrubbers made numerous horizontal and vertical passes over each section of the deck. Following the scrubbing, the deck was sprayed with seawater to remove residual soap. The cleaner/water mixture flowed directly overboard. Ten drums of cleaner were used to wash the entire flight deck. The length of time the hoses were on when applying the cleaner and rinsing the deck was recorded. They were in use for 23 minutes 27 seconds to clean a 31,000 ft^2 (approximate) section of the flight deck, resulting in a usage of approximately 2,228 gal. of water. The section documented represents 15% of the entire flight deck area.

- Hangar Deck SCRUB-X. The hangar deck SCRUB-X also occurred approximately 200 nm from land immediately after the air wing debarked. A 55 gal. drum of B&B 88 cleaning compound was placed on a forklift, punctured, then the fork lift was driven around the hangar bay to disperse the contents. Concurrently, **fresh** water supplied at 95 gpm through a 1½ in. fire hose was sprayed on the deck. Approximately 25 Sailors used push-style brooms with long, stiff bristles as scrubbing devices and made several vertical and horizontal passes over sections of the deck prior to spraying the deck with fresh water to remove residual soap. The soap/water mixture flowed directly overboard. Six 55 gal. drums of cleaning compound were used to clean the hanger deck.

Flight and hangar deck scrubbing exercises occur well beyond (>200 nm) the contiguous zone. Nonetheless, residual cleaner may dry on the deck surface or become trapped in the non-skid material and subsequently become entrained in rainfall and go overboard within the contiguous zone

DDG-51 Class. The deck is washed weekly when the ship is underway; however, in accordance with Naval Station San Diego requirements, the deck is not washed when the ship is in port. When underway, the washdown occurs beyond 12 nautical miles from land and requires approximately two hours to clean all weather deck surfaces. A solution of approximately one pint of MIL-D-16791 general purpose detergent is mixed with fresh water supplied by the ships 50 – 70 psi fresh water system. The washdown process is as follows: a ½ in. garden hose (without an on/off nozzle) is used to wet the deck, the water/detergent solution is lightly dispersed on the deck and the deck is scrubbed with brooms and brushes. Upon completion of the scrubbing evolution, the garden hose is used to rinse the water/detergent mixture from the deck. Since no detergents are used when in port and the deck is swept several times a day, only

minimal amounts of residual soap and debris have the potential to contribute to weather deck runoff as a result of deck washdown within 12 nm.

LHD-1 Class. A flight deck washdown was not conducted while the assessment team was aboard; however, the process was discussed. The crew indicated that flight deck is cleaned via two methods: a scrubbing exercise (SCRUB-X) and a mechanical flight deck scrubber.

SCRUB-X: During a SCRUB-X, a cleaning compound is spread onto the flight deck after it has been wetted with seawater supplied from the ships firemain. Approximately 20 – 30 Sailors use push-style brooms with long, stiff bristles to "scrub" the flight deck. The Sailors form a line and scrub the deck with the brooms, making 10 – 15 horizontal and 10 – 15 vertical passes. The deck is sprayed with seawater to remove residual soap. The remaining cleaner/water mixture is suctioned into the flight deck scrubbers recovery tank and poured overboard. The procedure is the same for a hangar deck SCRUB-X except fresh water is used.

The LHD had been at-sea for three months and had conducted two flight deck scrubbing exercises concurrent with scheduled testing of the firemain system. Each SCRUB-X lasted 6 to 8 hours, with the water in use 50 percent of the time. Visual observations made during the assessment revealed that the flight deck was stained with an accumulation of tire, grease and oil residue.

Flight Deck Scrubber. All LHD-1 class ships are equipped with a mechanical flight deck scrubber. The flight deck scrubber has a vacuum system that provides suction for residual solution recovery, a portable vacuum wand that is used to clean areas inaccessible to the scrubber, two hydraulically powered scrub brushes, a solution tank, and a recovery tank. The scrubber applies the cleaning solution in front of dual high-speed opposed-rotation brushes. The brushes scrub the soiled area and sweep-up debris. The dirty water and debris are contained by a rear vacuum squeegee and suctioned into the recovery tank. The recovered cleaner/water mixture is poured overboard.

The LHD-1 assessment provided team members the opportunity to compare the LHD flight deck conditions and best management practices to those observed and documented aboard the CV/CVN class carrier. The LHD has 5 fixed and 24 rotary wing aircraft with a moderate operating tempo; the CV/CVN had 62 fixed and 7 rotary wing aircraft with a busy operating tempo. Although the CV/CVN had far more aircraft and a heavier operating schedule than the LHD, the level of flight deck cleanliness was significantly different between the two ships. In order to achieve and maintain flight deck cleanliness, the CV/CVN crew manually scrubbed a section of the flight deck daily. In addition, a mechanical flight deck scrubber was continuously in use onboard the CV/CVN both during and after air operations. The assessment team was onboard the LHD for six days and did not observe the flight deck scrubber in use, nor was the flight deck manually scrubbed. As a result, the team concluded that the best management practices observed onboard the CV/CVN should be considered for transition to all large platform air capable ships.

LHD-1 flight deck personnel stated it is routine practice for all air capable ships to conduct a thorough SCRUB-X of the flight and hangar decks using B&B 88 flight deck cleaner at the end of a deployment and prior to entering the contiguous zone. Although flight and hangar deck scrubbing exercises occur outside the contiguous zone only, residual cleaner may dry on the deck surface or become trapped in the non-skid material and subsequently become entrained in rainfall and go overboard within the contiguous zone

MCM-1 Class. The weather decks of both MCMs were remarkably clean. As a result of all the mine sweeping and handling equipment located topside, the surface area that is washed is significantly smaller than other warships in the same platform category. The frequency of deck washdowns is dependent upon the amount of saltwater accumulation. Washdowns are normally conducted once every three weeks. Sixty percent of washdowns are conducted pierside, 20% within the 0 – 3 nm range and 20% within the 3 – 12 nm range. Two types of washdown evolutions were described by the crew, i.e., rinses and full washdowns, both use freshwater. Full washdowns are conducted using approximately two gal. of Simple Green™ detergent. The crew prefers to conduct full washdowns while the vessel is in port and receiving pierside services. The full washdown evolution takes approximately 2½ hours using a ½ in. garden hose with a water pressure of 35 – 60 psi, the nozzle is normally left open so the water runs continuously. If a full washdown is conducted when underway, the water pressure is 55 – 65 psi and an on/off nozzle is used so the water does not run continuously in an effort to conserve the ships fresh water supply. The crew scrubs the deck with corn brooms, scrub brushes and detergent during a full washdown evolution.

WLM Class. The buoy deck is rinsed after each buoy maintenance evolution to remove the residual marine growth. At the completion of each workday and prior to entering port, the buoy deck is thoroughly washed-down using seawater supplied by the ships firemain. In accordance with local policy, no detergents are used. The deck is washed using a 3,000 psi pressure washer and fire hoses; the wash-down evolution takes approximately 45 minutes. Freshwater washdowns are performed infrequently, only in port, and use pier-supplied fresh water (no detergents).

There are no constituents which contribute to weather deck runoff as a result of daily deck washdown because the only material that enters the surrounding water is marine growth, which is indigenous to the waters it is returned to. A potential for contamination exists only if a material is accidentally released onto the deck.

WPB Class. The team conducted assessments at two ports: two ships at Homeport A, one at Homeport B. Due to the unique mission of WPB class ships, they are required to hold and transport illegal migrant personnel on the weather deck of the ship. It is important to note that the illegal migrants remain on the weather deck and do not enter the skin of the ship at any time. In addition, crewmembers must stand guard over the illegal migrants to ensure they do not jump overboard and swim ashore (which can easily be accomplished due to the lack of a topside enclosure to contain the migrants). As a result, a portable, unenclosed toilet is placed on the weather deck and remains topside until the illegal migrants disembark. The portable toilet quickly fills to capacity because it is not piped to the ships plumbing. The crew is then required

to drain the toilet overboard and hose-down the area, resulting in topside conditions that are extremely unsanitary. The crew also brings food and blankets topside to feed and shelter the migrants. It is not uncommon for these vessels, especially the ships at Homeport B, to carry as many as 30 – 50 illegal migrants for a period of several days. The time the illegal migrants are aboard the ship is dependent upon several factors, e.g., distance from a larger receiving vessel, time required for legal issues to be resolved, and, in the case of Homeport B, time required to transit if they are required to return the migrants to their homeland. In either case, the illegal migrants are housed on the aft section of the weather deck and only moved forward during deck washdowns. The crew reported that fibers from blankets and clothes, as well as human hair and food particles litter the deck and are washed overboard; this most frequently (85%) occurs within the contiguous zone. The crew indicated that most weather deck runoff occurs during deck washdowns conducted after alien migration interdiction operations.

The ships at each homeport conducted deck washdown operations differently. The deck washdown processes for each homeport are described below.

Homeport A: When pierside, the crew uses fresh water supplied from pierside services to rinse the ship twice weekly. This rinsing process takes two hours using a ¾ in. garden hose at a pressure of 40 – 50 psi, normally without an on/off nozzle attached. No detergents are used when pierside. When underway, washdowns are conducted prior to entering port, approximately 17 times per month. The crew estimated 75% of underway washdowns are conducted within the contiguous zone. The crew uses fresh water and ½ gal. of Simple Green™ concentrated detergent and a small amount (2 – 3 oz.) of Brite Creme™ on the hull. The washdown process takes eight hours (depending on how dirty the deck is) using fresh water and a garden hose equipped with an on/off nozzle. The crew estimated that the water is on for approximately 3 of the 8 hours.

Homeport B: When pierside, weekly washdowns are conducted using fresh water and ½ gal. of Simple Green™ concentrated detergent. This process takes approximately four hours using a ¾ in. garden hose with a water pressure of 50 – 70 psi and an on/off nozzle attached. When underway the crew uses salt water supplied from the ships 160 psi firemain only; this process takes approximately 2 – 3 hours depending on how dirty the deck is.

Electronic Intelligence Systems and Search/Navigational Systems. Processes information was obtained during the AOE-6, DDG-51, MCM-1, WLM and WPB shipboard assessments.

AOE-6 Class. The crew cleans the surface search and navigation radar rotating assemblies with fresh water and MIL-D-16791 general purpose detergent which is immediately wiped-off. Ships force personnel do not conduct any maintenance or repairs to drive assemblies except to determine oil and grease levels in the AN/SPS-67 and AN/SPS-64 radar. As a result, electronic intelligence and search/navigational systems do not contribute to weather deck runoff.

DDG-51 class. The DDG-51 class surface search and navigation rotating assemblies are cleaned using fresh water supplied from ships 50 – 70 psi fresh water system; no cleaning compounds are used. The whip antennas are also washed using fresh water only and wiped dry with rags. No maintenance or repairs to drive assemblies are conducted by ships force other than checking oil and grease levels in the SPS-64 and SPS-67 radar. Whip antenna maintenance is limited to applying small amounts of silicone to the couplers and applying sealing compound, which hardens within 24 hours, to all connections. Preservation and painting of radar assemblies and whip antennas is limited to touch-up painting performed by the crew. These assemblies are removed form the ship and refurbished by an intermediate maintenance activity during ship availability periods. As a result, the electronic intelligence and search/navigation systems aboard a DDG-51 class destroyer do not contribute to weather deck runoff.

MCM-1 Class. MCM-1 class ships are equipped with the following systems: AN/SSN-2 Precise Integrated Navigation System (PINS); AN/SQQ-32 Sonar; AN/SPS-55 Radar; and AN/WSN-2 Gyrocompass. The surface search and navigation radar rotating assemblies are cleaned using fresh water and Simple Green™ detergent. Since all surface search and navigation systems used onboard ship are self-contained, there are no constituents (other than a very small amount of Simple Green™ detergent) that have the potential to contribute to weather deck runoff.

WLM Class. The WLM has two remote control search and rescue lights and a self-contained Sperry commercial radar system. The ships navigation system uses a Global Positioning System (GPS) and Differential Global Positioning System (DGPS) linked to a computer-controlled thruster propulsion setup to maintain position during buoy maintenance. Several fixed whip antennae support ship communications. The system is occasionally cleaned with fresh water during inspection to remove salt buildup. Because the radar arrays are self-contained, it does not contribute to weather deck runoff.

WPB Class. The crew cleans the WPB class surface search and navigation radar rotating assemblies using only fresh water supplied from the ships fresh water system at approximately 50 – 70 psi. Ships force conducts no maintenance or repairs to drive assemblies except to determine oil and grease levels in the SPS-69 and SPS-73 radars. The WPB has two remote control search and rescue lights. The ships navigation system uses a GPS. These systems do not have the potential to contribute to weather deck runoff.

Firemain Systems. Contaminants that may or may not result from using firemain systems are being addressed as a separate UNDS discharge. The shipboard assessment team was tasked to determine only if the firemain system contributes to weather deck runoff. Since the firemain system uses salt water obtained from surrounding waters, it does not have the potential to contribute constituents to weather deck runoff other than the constituents that become entrained in the salt water as it traverses the weather deck. The following information was obtained during the AOE-6, DDG-51, MCM-1,WLM and WPB assessments and is included in this report for information purposes only.

AOE-6 Class. The firemain system is designed to operate at 150 psi using the standard combination nozzle and hose stations. The system uses salt water from the ships environment and applies it in a fog, spray, or stream to combat fires. An in-deck sprinkler system is installed in the helicopter deck for aircraft firefighting. The ship is equipped with a countermeasure washdown system for combating chemical, biological and radiological attack.

DDG-51 Class. The forecastle and helicopter decks have "in deck" sprinkler systems installed for fire suppression. These sprinkler systems are supplied by the ships firemain and aqueous film-forming foam (AFFF) systems. The firemain system is not operated or tested within the contiguous zone.

MCM-1 Class. The firemain system is designed to operate at 125 psi using the standard combination nozzle and hose stations. The system uses salt water from the ships environment and applies it in a fog spray or solid stream to combat fires. A total of 13 stations are located throughout the ship on the weather decks. The sprinkler system for weather deck countermeasure washdown is tested every 60 months in accordance with the planned maintenance system; however, the system is activated approximately once every six months for crew training.

WLM Class. The firemain system is capable of generating 160 psi using the standard combination nozzle and hose stations. The fire suppression system uses salt water from its environment and applies it in a fog, spray or stream to combat fires. This system is also used to conduct ships washdown, particularly in the buoy deck area.

WPB Class. The firemain system is designed to operate at 160 psi using the standard combination nozzle and hose stations. The system uses saltwater from the ships environment and applies it in a fog, spray or stream to combat fires

Fuel Transfer Systems. The shipboard assessment team observed and documented processes related to fuel transfer systems onboard AOE-6, DDG-51, MCM-1, WLM and WPB class ships.

AOE-6 Class. During refueling-at-sea (FAS) operations, MIL-F-16884 marine diesel fuel or MIL-T-5624 jet fuel (JP-5) is pumped from a delivery ship to a receiving ship. The ship receives fuel through its three starboard side fuel receiving stations when pierside and has a capacity to carry 6.5 million gal. of fuel. The ship has two fuel transfer stations on the starboard side and three fuel transfer stations on the port side for conducting FAS operations. The topside equipment for each FAS station is independently operated and controlled. Each FAS station has 5 winches; three of the winches contain 800 ft. of 7/8 in. wire rope, two contain 800 ft. of ¾ in. wire rope. Each winch is greased with 5 gal. of MIL-G-24139 general purpose grease. In addition, each FAS station has three saddle winches which control the tension of the saddle whips; each saddle winch contains 400 ft. of ½ in. wire rope lubricated with 2 ½ gal. of MIL-G-24139. Prior to refueling operations, plastic bags filled with oil absorbent material are double-bagged and placed in all topside scuppers to prevent an overboard discharge in the event of a spill. Upon completion of each fueling evolution, the fuel hose "nozzle" is placed in a large (38 in. wide x 24 in. deep) drip pan immediately after it is retrieved onboard. The drip pan remains in place until no fuel leakage is detected; the contents of the drip pan are then poured into the contaminated fuel tank. Although some spillage during hose disconnect is normal during refueling operations, the amount spilled is insignificant in relation to the amount of fuel being transferred. The ships crew was diligent in their efforts to ensure no contaminants went overboard during FAS operations. One member of each FAS crew stood-by during operations to clean up excess grease that dropped from the wire rope to the weather deck. Although underway replenishment operations are conducted outside the contiguous zone, the potential does exists for the wire rope grease to be washed-off during rainfall within the contiguous zone; therefore, MIL-G-24139 general purpose grease has the potential to contribute to deck runoff.

DDG-51 Class. The DDG-51 class has four refueling stations which are not enclosed by a containment device. All fuel pumps and control systems are located below deck. Due to recent changes in the planned maintenance system, valves located topside are maintained on an "as required" basis. In addition to locating the spill kit close to the refueling station, the crew takes the following precautions to prevent fuel from entering surrounding waters: (1) plastic bags are filled with water and placed in scupper drains during refueling operations, and (2) buckets are placed under hose connection points during refueling operations. However, contaminants resulting from refueling operations have the potential to contribute to weather deck runoff in the event of a significant spill or if the crew does not take precautionary measures.

MCM-1 Class. The MCM-1 class ship normally receives fuel from a shoreside refueling truck when the ship is pierside. All fuel transfer pumping gear is located below decks and is common to both refueling stations; above-deck valves and piping are enclosed within a containment device. The crew takes the following precautions to prevent fuel from entering surrounding waters: (1) threaded plugs are installed in the containment device to allow the controlled drainage of collected rainfall or fuel in the event of a leak; (2) an oil boom is placed around the ship; (3) all deck drains are plugged during refueling operations; and (4) a spill kit is maintained onboard. Since the ship does not carry or maintain fueling hoses onboard, the shoreside fuel depot

provides equipment (fuel hoses equipped with cam lock quick disconnect fittings) required for refueling operations. As a result, there is minimal potential for the fuel transfer system to contribute to weather deck runoff. A potential for spillage exists only when connecting or disconnecting the transfer hoses or in the event of a fuel hose rupture; however, these would be attributed to catastrophic equipment failure and are not incidental to normal operation of a vessel.

WLM Class. The WLM class ship is typically fueled from its operating pier via hoses. The ship has the capability to transfer fuel from its storage tanks to other ships; however, this method is never employed due to the ships operational zone. All fuel transfer pumping gear is located below decks, with the above deck valves and piping located in a containment. The potential to contribute to weather deck runoff exist only if the diesel fuel is inadvertently spilled when connecting or disconnecting the transfer hoses.

WPB Class. The WPB class is typically fueled through hoses from a refueling truck while the ship is pierside. Refueling stations are located on the forward section of the ships superstructure, both port and starboard. All fuel transfer pumping gear is located below deck and is common to both refueling stations, with the above-deck valves and piping located in a containment enclosure. The refueling stations are covered with canvas zip-down covers secured to the ship with snaps to protect the equipment from the elements. In addition, the crew installed threaded plugs in the containment enclosure. During refueling evolutions, an oil boom is placed around the ship and all deck drains are plugged. The area around the refueling station is lined with sandbags to assist in containment in the event of an accidental spill. The fuels depot personnel maintain spill kits on the pier. There is potential for the fuel transfer system to contribute to weather deck runoff. However, such potential exists only in cases of inadvertent fuel spills while connecting or disconnecting the transfer hoses or in the event of a fuel hose rupture. Both inadvertent spills and hose ruptures are attributable to equipment failure and are not incidental to normal operations of a vessel.

General Housekeeping. The assessment team found general housekeeping to have a positive rather than a negative impact. During every shipboard assessment, the team observed the crews performing general housekeeping throughout the day. On every ship visited, the team noted clean weather decks with no visible dirt or debris and attributed this to good housekeeping practices. The following information was obtained during the AOE-6, DDG-51, MCM-1, WLM and WPB shipboard assessments.

AOE-6 Class. The assessment team observed the crew sweeping the deck throughout the day as part of the ships daily routine. The decks are swabbed using fresh water and small amounts of general purpose cleaner. Additionally, the assessment team observed the crew swab all weather decks immediately after each rainsquall using only the rainwater on the weather deck (no cleaning compounds). This practice is indicative of the proactive approach the command takes to ensure the ship remains clean using all available resources. The assessment team concluded that general housekeeping does not contribute to weather deck runoff.

DDG-51 Class. The assessment was conducted when the ship was pierside, as a result, the decks were swabbed using fresh water only (no detergent) and care was taken to prevent the water from flowing overboard. During the assessment all dirt and debris were swept and containerized. It is important to note that when a ship is in port the weather deck is normally swept several times a day. As a result of the crews attention to cleanliness, there is minimal debris topside which has the potential to enter surrounding waters.

MCM-1 Class. All dirt and debris was swept and containerized for shoreside disposal. The decks were swabbed using a small amount (3 – 4 oz.) of Simple Green™ mixed with fresh water in a 5 gal. bucket. None of the water/Simple Green™ mixture was discarded overboard. As a result general housekeeping does not contribute to weather deck runoff.

WLM Class. The crew reported that small amounts (less than 1 quart per month) of Simple Green™ are used when performing general housekeeping. During the shipboard assessment, the entire crew focused on buoy maintenance and retrieval, hence no housekeeping was observed. Although only small amounts of Simple Green™ are used, it is the primary constituent which has the potential to contribute to weather deck runoff as a result of general housekeeping.

WPB Class. Three pierside assessments were conducted at two homeports. During all the assessments, dirt and debris was swept, containerized and turned in to the homeports Hazardous Materials Minimization Center. Since the overboard discharge of detergents at the first homeport is prohibited, the crew swabs their decks using a mop dampened with fresh water and a very small amount of Simple Green™. The crew ensures excess water containing the detergent does not drain overboard in port. The primary constituent resulting from general housekeeping is a small amount of Simple Green™ detergent.

Mine Handling Systems. The shipboard assessment team conducted one pierside and one day at-sea assessment aboard a MCM-1 class ship to observe and document mine handling system processes.

MCM-1 Class. Topside mine handling equipment includes: four cable reel assemblies; five winch assemblies; three winch control stations; three outrigger booms; two cranes; three mine tensioner payout systems; and a mine neutralization system (MNS) remotely operated vehicle. During the assessment, a 55 gal. drum of MIL-L-2105, *"Lubricating Oil, Gear, Multi-Purpose"* was carried onboard the ship to replenish the acoustic and magnetic cable reels and the stern crane in the event of a leak The bases of each of the three outrigger booms contained approximately one lb. of MIL-G-24139 *"Grease, Water Resistant, General Purpose"*, which has the potential to contribute to weather deck runoff under certain conditions, such as extreme temperature or rainfall. In addition, the drive gear located on the acoustic cable reel was thinly coated with MIL-G-24139 grease. Placards, which specify material and frequency of lubrication, were posted on the cable reels and cranes. The equipment is cleaned using fresh water and small amounts of Simple Green™. Since the equipment is continuously exposed to salt water, it requires periodic paint touch-up. Paint is removed using mechanical paint removal methods only (e.g., needle guns, sanders and hand sanding) and applied with brushes and rollers; paint debris is swept and containerized for disposal ashore. The areas surrounding the base of hydraulically operated cranes and cable reels did not have containment devices to contain fluid; therefore, a potential does exist for constituents to enter surrounding waters in the event of a spill resulting from a ruptured line or hose. During Phase I of the UNDS initiative, it was determined that mine countermeasure equipment lubrication does not require control by a marine pollution control device. As a result, the assessment team did not gather data related to waterborne equipment lubrication.

Ships Boats/Ships Boats Launching Systems. The term boat refers to small craft limited in their use by size and are usually not capable of making independent voyages of any length on the high seas. The navy uses thousands of boats; they are powered by diesel engines, outboard motors and underwater jets. Most boats are built of aluminum, plastic, or rubber. The assessment team obtained information on ships boats and the equipment used to launch the boats onboard AOE-6, DDG-51, MCM-1, WLM and WPB class ships.

AOE-6 Class. The AOE-6 class carries six small boats that are equipped with Cummings engines: two 20 ft. rigid hull inflatable boats (RHIBs), one 40 ft. and one 50 ft. fiberglass utility boats, one 35 ft. aluminum work boat, and one 33 ft. fiberglass captains gig. All small boat engines are started and operated weekly for a period of 15 – 30 minutes. Upon retrieval, the bilges are checked to ensure there is no oil in the bilge before the bilge plug is removed and the boat is hoisted onboard. If oil is present, it is collected and turned in to the HAZMINCEN for disposal ashore. Non-oily bilge water is discharged directly overboard. The small boats are removed from the ship and painted when in port only, except for minor touch-up painting. All small boats are cleaned with a solution of 1 cup MIL-D-16791 general purpose detergent mixed with 5 gal. fresh water followed by a fresh water rinse. The constituents which have the potential to contribute to weather deck runoff are the detergent/water mixture used to clean the boats and small boat engine wet exhaust resulting from the weekly onboard operations. Small boat engine wet exhaust will be addressed separately under UNDS.

The captains gig and utility boats are retrieved and deployed using a double arm, pivoting, gravity davit that contains two drums housing ¾ in. wire rope. A boat lifting boom that contains one drum of wire rope 125 ft. in length is used to raise and lower the RHIBs. The cables are cleaned using MIL-T-5624 (JP-5) and lubricated using MIL-G-18458 wire rope grease. Prior to conducting maintenance, a tarp is spread on the deck to contain the cleaning compound and greases. The contributing constituents to weather deck runoff from the ships boats launching system are MIL-G-18458 and MIL-T-5624.

DDG-51 Class. The DDG-51 class has two 24 ft. Rigid Hull Inflatable Boats (RHIBs) equipped with a diesel inboard/outboard engine which uses MIL-T-5624 (JP-5) fuel. The RHIBs are removed from the ship and taken to the intermediate maintenance activity for painting; however, minor repairs to the fiberglass hull are performed by the crew. When the RHIB is hoisted on board after operations, the bilge pump is disabled and residual bilgewater is wiped-up with a sponge and deposited in a bucket, the contents of the bucket are then emptied into a deep sink that drains to the ships wastewater tank. The hull is cleaned with fresh water and general purpose detergent. There is minimal potential of topside contamination from the RHIBs as evidenced by the cleanliness of the deck area immediately below the boats.

One electro/mechanical slewing arm davit (SLAD) with 110 ft. of ¾ in. wire cable is used to launch and recover the RHIBs. The cable is manually cleaned on an annual basis using 2 – 3 gal. of P-D-680 Type III and lubricated with one lb. of MIL-G-23549 grease. A tarp is spread on the deck prior to conducting the maintenance in an effort to contain the materials and prevent the hazardous constituents from contacting the deck. Because the wire cable is exposed to the

environment it is possible that some of the of MIL-G-23549 grease may drip from the cable to the weather deck under certain conditions, such as extreme temperature or rainfall.

MCM-1 Class. Each MCM maintains two 17 ft. 10 in. RHIB for use by the mine-disposal divers. The MCM assessed pierside carried one RHIB with a 90 hp outboard engine and one with a 60 hp outboard engine. The MCM assessed underway had two RHIBS, each with a 90 hp outboard engines. The RHIBs are refueled using 6 gal. gas cans filled from the 30 gal. motor gasoline tank located on a jettison platform and surrounded by a containment device with plug and lanyard which allows the crew to drain the containment device as required. The outboard engines are operated daily for 2 – 3 minutes or as long as 15 minutes depending on the ships crew. The external surfaces and the bilge of the RHIBs are washed down with fresh water and Simple Green™ following every use and during major ship cleanings. The primary constituents that have the potential to contribute to weather deck runoff are: (1) gasoline spilled when refueling the RHIB onboard ship; and (2) contaminants resulting from the onboard operation of the outboard engines on a daily basis. (Small boat engine wet exhaust will be addressed by a separate UNDS Discharge Assessment Team.)

One anti-magnetic electric hoist winch type BE-09 with 1 in. nylon rope with lifting capacity of 2,000 lb. is used to launch and recover the RHIBs. The nylon rope is static tested at twice the lifting capacity and operational testing is performed during the actual hoisting of the RHIBs. All load testing is performed by an outside activity when in port. The nylon rope is cleaned using fresh water; the hoist assembly is cleaned with fresh water and Simple Green™.

WLM Class. The WLM had one 18 ft. RHIB with a Yanmar four cylinder engine and a Hamilton Jet inboard/outboard. The RHIB refueling station is enclosed by a 12 in. high containment. The RHIB is washed down following every use and during major ship cleanings using Simple Green™. The primary constituent which has the potential to contribute to weather deck runoff is diesel fuel spilled during fueling operations and/or leaking fuel system fittings on the power plant.

One Allied D6000 articulating crane with ½ in. galvanized steel cable is used to launch and recover the RHIB from surrounding waters. The galvanized steel cable does not require lubrication. The hydraulic fluid used in the crane is Texaco Rando HD 32 hydraulic fluid. The primary constituent which contributes to weather deck runoff as a result of ships boats launching systems is Texaco Rando HD 32.

WPB Class. The WPB class carries one 17 ft. RHIB with a 90 horsepower outboard engine with a through-prop exhaust system. The RHIB is refueled using gasoline supplied from 6 gal. cans. Two 6 gal. cans of gasoline and one 2½ gal. can of Shell 30W motor oil are maintained inside the RHIB and eight 6 gal. cans of gasoline are maintained topside. The crew washes down the RHIB following every use and during major ship cleanings using Simple Green™ detergent. The crew places a cover over the RHIB when the ship is in port to protect it from the elements. The engine on each RHIB is operated for 2 – 3 minutes each time the RHIBs are brought onboard (approximately 15 times a month). The primary constituents that have the potential to contribute to weather deck runoff are: (1) gasoline spilled when refueling the RHIB onboard ship; and (2)

contaminants resulting from the onboard operation of the outboard engines on a daily basis. (A separate UNDS Discharge Assessment Team will address small boat engine wet exhaust.)

One Electro/Hydraulic Sealift Appleton Marine Crane with ¾ in. cable is used to launch and recover the RHIB from surrounding waters. This crane uses NAPA Dextron III hydraulic fluid with a normal operating pressure of 1,800 psi, supplied from the cranes 15 gal. reservoir located below deck. The crane has a lifting capacity of 1,750 lb. A cover is placed over the crane while the ship is in port to protect the equipment from the weather and reduce corrosion. The cable is cleaned using P-D 680 Type III and greased using MIL-G-18458. A tarp is spread on the weather deck prior to cleaning and greasing the cable to contain the materials. The contributing constituent to weather deck runoff from the crane is the MIL-G-18458 grease used to lubricate the cable.

Stores Handling Systems. Information on equipment used to handle and transfer stores was obtained during the AOE-6 and DDG-51 assessments only. Since stores are transferred by hand on MCM-1, WLM and WPB class ships, they do not have stores handling systems.

AOE-6 Class. The stores transfer system consists of four Replenishment-At-Sea (RAS) stations. The RAS stations consist of a kingpost assembly and four winches that provide and control the cable required to conduct highline transfer of stores. Each of the winches contain differing lengths and sizes of wire rope: (1) 900 ft. of 1 in. wire rope; (2) 900 ft. of ¾ in. wire rope; (3) 700 ft. of ¾ in. wire rope; and (4) 1200 ft. of ½ in. wire rope. Each winch station is lubricated with approximately 5 gal. of MIL-G-24139 general purpose grease; each RAS station is lubricated with approximately 10 gal. Although underway replenishment operations are conducted outside the contiguous zone, the potential does exists for the grease to be washed-off during rainfall within the contiguous zone. (Note: The crew reported that the MIL-G-24139 grease on the kingpost "sloughed-off" when exposed to the high temperatures in the Persian Gulf.)

DDG-51 Class. Two kingpost sliding padeyes are located amidships: one port, one starboard. The sliding padeye is used to transfer materials between ships during underway replenishment operations, which are never conducted within 12 nm. Each of the sliding padeyes is comprised of a stanchion with a 25 ft. lead screw assembly, an easing-out cleat, and an easing-out stabilizer. The constituent which has the potential to contribute to weather deck runoff from the kingpost sliding padeye is approximately one quart of MIL-G-23549 grease (per padeye) used to lubricate the lead screw which is exposed to the environment. It is important to note that routine shipboard operations within the contiguous zone will not result in grease entering surrounding waters. The conditions under which a portion of the grease could be transferred from the kingpost to the weather deck include extreme temperature and/or rainfall.

Towing and Mooring Systems. Most routine towing jobs in the Navy are handled by harbor and fleet tugs. Combatant vessels can tow other vessels or be towed, but such operations are usually performed only in an emergency. The towing rig varies between ship classes, but includes the following in one form or another: the towing-pad eye, usually located on the centerline of the stern; a towing assembly consisting of a large pelican hook shackled to the towing pad and hawser; and the hawser itself (wire rope).

Mooring a ship to a pier, buoy or another ship requires the use of an anchor windlass, capstan, and mooring lines, winches, and fittings such as cleats, bits, chocks, shackles and towing pads. Mooring lines are typically located at the bow, stern and amidships. The assessment team obtained towing and mooring system information during the AOE-6, DDG-51, MCM-1, WLM and WPB shipboard assessments.

AOE-6 Class. The crew performs all towing and mooring using multi-strand nylon line. No preservation measures are taken other than to inspect the lines after each use and replace when required. Cleaning is limited to fresh or seawater rinses when required. All lines are stowed in the line locker or faked on deck. All grease fittings and mechanical components of the electrically operated capstans are internal. As a result, the towing and mooring system does not contribute to weather deck runoff.

DDG-51 Class. All towing and mooring is performed using multi-strand nylon line. No preservative measures are taken other than to inspect and replace the nylon line when required. Cleaning is limited to fresh water or seawater rinses when required. The towing and mooring system do not contribute to weather deck runoff.

MCM-1 Class. All towing and mooring is performed using multi-strand nylon line. No preservation measures are taken other than to inspect and replace the nylon line when required; cleaning is limited to fresh water rinses when required. The anchor chain capstan is equipped with a gypsy that can be de-clutched to allow independent operation and is used to assist in mooring. The towing and mooring system does not contribute to weather deck runoff.

WLM Class. Multi-strand nylon line is used for all towing and mooring. No preservative measures are taken other than to inspect and replace the nylon line when necessary. The line is rinsed with fresh or salt water as required. The towing and mooring system does not contribute to weather deck runoff.

WPB Class. The crew performs all towing and mooring using multi-strand nylon line. No preservation measures are taken other than to inspect and replace the nylon line when required. Cleaning is limited to fresh or seawater rinses when required. The towing and mooring system does not contribute to weather deck runoff.

Weapon Systems. The largest guns now fitted in active U.S. Navy ships are the 5 in. MK 45 lightweight guns in cruisers and destroyers; these weapons are considered primarily shore bombardment weapons and have limited anti-air capability. The 76 mm guns in Navy frigates and the larger Coast Guard cutters are primarily anti-aircraft weapons and also have limited anti-air capability. Most Navy surface warships are armed with the MK 15 20 mm Close-In Weapon System (CIWS) for close-in defense against anti-ship missiles. In addition, various types of 25 mm, 20 mm and .50 caliber and 7.62 mm machine guns are fitted in naval ships, primarily for defense against small craft in restricted waters[8]. Weapon system information was obtained on the AOE-6, DDG-51, MCM-1 and WPB class ships. The WLM ship does not have weapon capability.

AOE-6 Class. The AOE-6 class has two MK38 25 mm machine guns, four 50 caliber M2HP machine guns, two close-in weapon systems (CWIS), and one dual box missile launcher. All gun mounts are cleaned using fresh water and MIL-D-16791 general purpose detergent. MIL-L-63460 cleaner lubricant and preservative is applied to the 50 caliber gun mounts and the MK38 25 mm gun mount. The gun mounts are covered when not in use; however, the crew indicated the covers do not maintain integrity so rusting of gun mount components is a continual problem. Since the weapon systems are covered and minimal materials are used to maintain the systems, they do not have the potential to contribute to weather deck runoff.

DDG-51 Class. DDG-51 class weapon systems include: one MK 45 5"/54 caliber lightweight gun mount; two MK 41 vertical launch systems (VLS); two phalanx close-in weapon systems (CIWS); two MK 32 MOD 14 triple-barrel torpedo tubes; two 50 caliber machine gun mounts, and two MK 36 MOD 12 super rapid-blooming offboard CHAFF launchers (SRBOC). The majority of materials, e.g., grease and oils that are used on the weapons systems are used on internal components and therefore do not have the potential to contribute to weather deck runoff. However, two materials used on the external surfaces of DDG-51 class weapons system were identified as having the potential to contribute to weather deck runoff : (1) MIL-G-21164 grease; and MIL-L-63460 cleaner, lubricant and preservative. Interviews with the crew revealed that approximately 30 – 35% of the 16 oz. of MIL-G-21164 that is applied to the gun mount chase is washed-off during a normal rainfall. The crew also estimated that approximately 50% of the two oz. of MIL-L-63460 cleaner, lubricant and preservative applied to the 50 caliber gun mount is washed-off during a normal rainfall.

During the assessment the team observed the crew using a chemical paint remover on the CIWS. The material, *Peel Away 7* (manufactured by Dumond Chemicals Inc., New York, NY 10036), was applied with a brush and allowed to stand for 30 minutes then removed with a putty knife. The resulting paint/Peel Away 7 mixture was placed into plastic bags and turned into the HAZMINCEN for disposal.

MCM-1 Class. Systems employed aboard MCM-1 class ships are two .50 caliber machine guns and two M60 machine guns mounted port and starboard. All gun mounts are cleaned using fresh water and Simple Green™. MIL-L-63460 cleaner, lubricant and preservative is applied to the gun mounts. Covers are installed on the gun mounts when the ship is in port to protect the equipment from the weather and to prevent corrosion.

WPB Class. Systems employed aboard the WPB class are one MK38 25 mm machine gun and two 50 caliber M2HP machine guns. All machine guns are cleaned using fresh water and Simple Green™. Approximately 2 oz. of MIL-L-63460 cleaner, lubricant and preservative is applied to the 50 caliber gun mounts and the MK38 25 mm gun mount. Covers are installed on the guns when the ship is in port to protect the equipment from the weather and prevent corrosion. Since machine guns are covered when in port the only constituent that has the potential to contribute to weather deck runoff is MIL-L-63460; however, the potential only exists if the ship is operating in the contiguous zone during rainfall or heavy seas.

Deck Coaming and Drains. The assessment team obtained deck coaming and drain information during each shipboard assessment.

AOE-6 Class. The forecastle area is completely enclosed and designed with two scupper drains for direct overboard discharge. Levels above the main deck drain directly to the deck below.

CV/CVN Class. The flight deck has scupper drains that run the length of the port and starboard sides of the flight deck, with the exception of along the aircraft elevators. The aircraft elevator drains discharge directly overboard. Each aviation fuel station drain discharges directly overboard.

DDG-51 Class. The 01 level has a 2 in. coaming around the entire deck, with a scupper drain approximately every 20 ft. providing direct overboard discharge. Gravity deck drains are installed on all deck levels above the 01 level and are piped to the deck directly below, stair-casing downward until draining overboard through scupper drains on the 01 level.

LHD-1 Class. Levels above the main deck drain directly to the deck below. Trough-type scuppers run the full perimeter of the flight deck with a drain approximately every 20 ft.. Drains from the superstructure staircase downward and drain directly onto the flight deck before flowing overboard, resulting in an additional source of deck runoff. Additionally, the water results in a liquid foreign object which can be as damaging to an aircraft engine as a solid foreign object.

MCM-1 Class. The main deck and 01 level have 2 in. coaming around the entire deck area. All levels above the 01 level have a 1 in. coaming and drain directly to the deck below and then overboard via the main deck scuppers

WLM Class. The 02, 03, and 04 levels all have a 3 in. coaming with deck drains piped to the 01 level. The drain piping ends approximately 3 in. above the deck on the 01 level directly above a gravity-fed deck drain that is piped to the ships two 3,000 gal. graywater holding tanks. The 01 level has no coamings except the port and starboard bulkheads amidships. Gravity deck drains on the 01 level are positioned port, starboard, and amidships. The foredeck has no coaming except a 1 in. beading that is installed on approximately 30% of the deck. The buoy deck has coaming port and starboard that is approximately 15 ft. long and 12 in. high. This coaming is rolled and sloped along the main working area of the buoy deck. The fore and aft sections of the buoy deck have cutouts for overboard drains.

WPB Class. The main deck has no coamings with the exception of the forecastle, which has a 2½ in. coaming installed. Levels above the main deck drain directly to the deck below.

Topside Equipment. The following equipment was located on the weather deck.

AOE-6 Class.

Main Deck - Forecastle:

- 2 anchor wildcats & capstans each operated by an electric motor.

02 Level:

- Fueling-at-sea (FAS) stations # 3 & 7 starboard, # 6, 8 & 10 port.
- Replenishment-a-sea (RAS) stations # 1 & 5 starboard, # 2 & 4 port.
- Fuel receiving stations # 3, 5 & 7A starboard.
- 1 spanwire locker.
- 2 mooring capstans (amidships).
- 1 floating padeye.

04 Level:

- Boat handling station # 9 starboard, # 12 port. Each station consist of topping winch, gypsy winch, boat hoist winch (single drum), and boat handling boom.
- 1 aft vane winch.
- 1 topping winch.
- 1 captains gig, 33 ft. fiberglass with Cummings diesel engine.
- 1 work boat 35 ft. aluminum with 2 Cummings diesel engines.
- 1 utility boat 40 ft. fiberglass with Cummings diesel engine.
- 1 utility boat 50 ft. fiberglass with Cummings diesel engine.
- 2 20 ft. rigged hull inflatable boats with 5.9L Cummings diesel engine.

Helicopter Deck:

- 2 CH-46 helicopters.
- 1 aircraft fueling station, port side.

CV/CVN Class.

04 Level (Flight Deck):

- Aircraft: F-14, F/A-18, S-3, EA-6B, E-2, C-2, and SH-60. Note: the actual number of aircraft on the flight deck is dependent upon status of aircraft and operational requirements. Typically 48 – 52 aircraft are on the fight deck.
- 4 aircraft elevators.
- 4 steam operated catapult troughs and water brake enclosures.
- 4 jet blast deflector enclosures.
- 2 integrated catapult control stations.
- 4 arresting gear retractable sheave sets with cross deck pendent.
- 1 arresting gear barricade retractable sheave set without cross deck pendent.
- 1 set arresting gear barricade stanchions.
- fresnel lens optical landing system, including a Landing Signal Officers platform.
- 2 NC-2A mobile electrical power plant carts.

- 6 to 10 aircraft towing tractors.
- 1 flight deck scrubber.
- 3 hydraulic power supplies.
- 2 aircraft maintenance stands.
- 3 aircraft jacks.
- 1 weapons loading hoist.
- 1 crash and salvage crane.
- 6,000 LB forklift.
- 20,000 LB forklift.
- flight deck fire trucks.
- 1 coolant oil servicing cart.
- 1 aviation fuels de-fuel cart.
- 14 aircraft fueling stations.
- 1 aviation fuels spill cart.
- weapons elevators.

DDG-51 Class.

01 Level - Forecastle:

- Anchor windlass comprised of 2 chain pipes, 1 capstan, and 1 wildcat.
- Anchor chain lock control station with 6 air hoses and 1 pressure gage.
- MK 45 MOD 2 5"/54 caliber lightweight gun mount.
- MK 41 vertical launch system (VLS) with slew drive crane (enclosed).
- 2 50-caliber gun mounts (guns mounted only when ship is underway).
- Astern refueling station, diesel fuel marine (DFM) only (used for refueling with NATO vessels). This refueling station is not used.
- 1 seawater fire-fighting station.
- 2 AFFF fire-fighting stations.
- In-deck seawater and AFFF sprinkler system around the 5"/54 gun mount.

01 Level - Mid-Ship:

- 2 kingpost sliding padeyes, with 25 ft. swivel screw. 50,000 lb. capacity Manufactured by Ingalls Shipbuilding.
- 2 24-ft. Rigid-Hull Inflatable Boats (RHIB) with 5.0 liter 6 cylinder Cummings diesel inboard / outboard motors. Each RHIB has 2 bilge plugs, which are pulled prior to bring RHIB onboard the ship. Each RHIB also has 2 duckbill drains.
- 1 slewing arm davit, electric-mechanically operated, with 5,700 lb. lift capacity using ¾ in. wire rope. Manufactured by Lake Shore Inc.
- 2 seawater fire-fighting stations.
- 1 oily waste spill kit, located on the starboard side.

01 Level - Aft:

- MK 41 vertical launch system (VLS) with slew drive crane (enclosed).
- 2 MK 32 MOD 14 triple-barrel torpedo tubes.
- 2 refueling stations (DFM/JP5). Starboard station is used for refueling RHIBs

- 2 harpoon missiles mounts.
- 2 AFFF fire-fighting stations.
- 2 50 caliber gun mounts (guns mounted only when ship is underway).

Flight (Helicopter) Deck

- 1 aircraft refueling station (JP5).
- Nylon safety nets surround the helicopter deck.
- 1 capstan for mooring and towing.
- 1 whip antenna; manually raised and lowered.
- 1 seawater fire-fighting station.
- In-deck seawater and AFFF sprinkler system.

02 Level:

- 2 refueling stations (DFM).
- 2 MK36 MOD12 super rapid-blooming offboard CHAFF launchers (SRBOC).
- 2 phalanx close-in weapon system (CIWS) mounts.
- 1 motor driven whip antenna.
- 2 seawater fire-fighting stations.

03/04/05 Levels:

- 1 AN/SPG-62 illuminator per level.

06 Level:

- 1 AN/SPS-64 navigation radar.

07 Level:

- 1 AN/SPS-67 surface search radar.

LHD-1 Class.

04 Level (Flight Deck):

- Replenishment at sea station This station consist of: 7 in. fueling hose; saddle winch; 25HP motor; ¾ in. span wire with single drum and ramless tensioner.
- 4 tow tractors.
- 2 P-25 fire assist vehicles.
- 1 tow tractor unit.
- 4 6,000 lb. forklifts.
- 1 20,000 lb. crash crane.
- 1 nitrogen oxide cart.
- 1 mobile electric power plant.
- 1 hydraulic service unit.
- 1 corrosion control cart.
- 1 flight deck scrubber.
- 2 pressure washers.
- 2 RAM launchers.

- 2 20mm Phalanx close-in weapon system mounts.
- 2 NATO sea sparrow launchers.
- 3 25mm Mk 38 machine gun mounts.
- 4 .50 caliber machine gun mounts.

MCM-1 Class.

Main Deck/Forecastle:

- Non-magnetic anchor windlass and capstan assembly Model X-1852; dynamic load test 11,993 lb. static load test 11,694 lb., working load 4,648 lb.
- 2 8 in. fixed fairlead rollers.
- 1 SQQ32 sonar winch assembly.
- 1 SQQ30 sonar winch control panel.
- 2 portable water hose stowage chests.
- 1 P250 pump (enclosed).
- 2 hawse reels port and starboard.
- 2 seawater fire stations.

Main Deck/Fantail:

- 1 magnetic cable reel model 2D5-03347. Manufactured by Lake Shore, Inc.
- 1 mine sweeping winch model 2D5-00348.
- 1 acoustic cable reel model 2D5-00346.
- 1 acoustic cable reel model 2D5-00347.
- 2 stern cranes port and starboard; dynamic load test 91,000 lb. static load test 12,000 lb. working load 6,000 lb.
- 3 mine tensioner/payout systems.

01 Level:

- 1 BSP winch model CTD-110-365. Manufactured by Sound Ocean Systems
- 1 30 gal. motor gasoline stowage tank with containment.
- 2 Avon Rigid Hulled Inflatable Boats, 17 ft. 10 in. 8 person capacity (the RHIBs on the ship assess pierside had one 90 and one 60 hp Johnson outboard motors; both RHIBs on the ship assessed underway had two 90 hp Evinrude outboard motors).
- 1 antimagnetic electric hoist winch type BE-09 with 1in. nylon rope; dynamic load test 3,000 lb., static load test 4,000 lb., working load 2,000 lb.
- 1 hazardous material spill kit.
- 1 oil spill kit.
- 1 electrically operated winch control station.
- 1 magnetic and acoustic cable reel control panel.
- 1 aft outrigger boom 4,100 lb. with 1 in. nylon rope.
- 1 forward outrigger boom with 1½ in., 1 in. nylon rope and 5/8 in. steel cable.
- 1 padeye for booms.
- 1 P250 pump (enclosed).
- 1 mine neutralization system (MNS) remote operated vehicle (ROV).

02 Level:

- 2 12 in. search and rescue lights port and starboard.
- 1 microwave antenna.
- MNS center boom, dynamic load test 4,500 lb., static load test 6,000 lb., working load 3,000 lb.
- MNS center winch-electrically operated.

03 Level:

- 2 50-caliber machine gun mounts.
- 6 ammunition lockers.
- 3 pyrotechnics lockers.
- 2 MK3 MOD4 binoculars port and starboard.
- 2 search and rescue lights port and starboard.
- 1 AS-3018A/WSC-IV antenna manufactured by Datron Systems.
- 2 M60 machine gun mounts.
- Various stowage lockers.

WLM Class.

Foredeck:

- Dual anchor windlass operated by a 2,500 psi hydraulic system using Texaco Rando HD 32 hydraulic fluid
- 2 scuttles providing access to rope lockers.

Buoy Deck:

- 4 New England Model X2318 cross deck winches with 125 ft. of 5/8 in. cable. The winches use Texaco Rando HD 32 hydraulic fluid; the cable is lubricated with MIL-G-18458 grease using a Kirkpatrick Model J cable cleaner/lubricator.
- 1 Dodge FAF-XT528 drum winch with pivoting arm containing 1-1/8 in. chain The drum winch uses Texaco Rando HD 32 hydraulic fluid.
- 1 Appleton 10 ton hydraulic pedestal crane with a 42 ft. boom. The main hoist has 220 ft. of ¾ in. cable, the auxiliary hoist has 140 ft. of 5/8 in. cable. The crane uses Texaco Rando HD 32 hydraulic fluid and the cables are lubricated with MIL-G-18458 grease using a Kirkpatrick Model J cable cleaner/lubricator.

01 Level/Fantail:

- 1 Allied D6000 articulating crane with ½ in. galvanized steel cable. The cable does not require lubrication. The crane uses Texaco Rando HD 32 hydraulic fluid.
- 18' Rigid-Hulled Inflatable Boat (RHIB) with a Yanmar four cylinder engine and a Hamilton Jet inboard/outboard motor.
- 3 six gal. cans of gasoline for use in the P-250 emergency dewatering/firefighting pumps
- 1 refueling station for the RHIB (fueling station has 12 in. containment).
- 1 hydraulically operated mooring capstan.

02 Level:

- 1 pyrotechnics locker.

03 Level:

- No equipment.

04 Level:

- 2 Remote control search and rescue lights.
- Self-contained Sperry radar system.

WPB Class.

Main Deck/Forecastle:

- Anchor windlass operated by an electric motor.
- 1 MK38 25MM machine gun.
- 2 hazardous materials lockers.
- 2 seawater fire stations.
- 2 fueling stations.

Main Deck/Fantail:

- 1 Sealift Appleton Marine crane with ¾ in. steel cable. The crane uses NAPA Dextron III hydraulic fluid.
- 17 ft. Rigid-Hulled Inflatable Boat (RHIB) with a 90 horsepower outboard engine.
- 8 6-gal. cans of gasoline.
- 1 P-250 pump with two 6 gal. cans of gasoline.
- 3 lifeboats.
- 1 pyrotechnics locker.
- 1 P-1 pump (used for small craft de-watering).
- 1 bilge pumping station.

01 Level:

- 4 hoses used for the P-1 pump.
- 1 50 caliber gun locker.

02 Level:

- 2 remote control search and rescue lights.
- Self-contained Sperry radar system.

MARINE POLLUTION CONTROL DEVICES IN USE

During each shipboard assessment, the team identified marine pollution devices currently in use. Although the MPCDs identified may have performed well, it is not practicable to mandate the implementation of every MPCD identified. For example, during the AOE-6 assessment, the team observed the crew swabbing the deck after each rain squall, using only the water remaining on the deck. While this worked well for the crew of the AOE-8, it would prove impracticable and labor intensive to implement Fleet-wide. A listing of all MPCDs observed in use during the shipboard assessments is provided in Table 9.

Table 9: Marine Pollution Control Devices Observed in Use During Assessments

Ship Class	Marine Pollution Control Device in Use
AOE-6	• Using rain water to swab the decks • Cleaning grease as it drops to the deck during underway replenishment operations • Placing fuel "nozzles" in large (35 gal.) drip pans to contain dripping jet fuel or diesel fuel marine after FAS operations • Placing double-bagged oil absorbent material (to add weight) in all scupper drains prior to FAS operations; this blocks the drain and prevents the spilled material from entering surrounding waters. • Concurrently washing the lower and upper portions of aircraft (lower portion cleaned using wash water that falls from the upper portion • Using equipment installed by NSWCCDs Pollution Prevention Afloat Team, including: cable lubricators, automatic paint dispensers, and vacuum assist needle guns and grinders.
CV/CVN	• Continually cleaning the flight deck when underway and thoroughly cleaning the flight deck prior to entering the contiguous zone. As a result, contaminants do not accumulate. • Maintaining the instruction *"Foreign Object Damage Prevention/Hangar and Flight Deck Cleanliness"* that outlines mandated procedures and responsibilities within the ship for maintaining deck cleanliness. • Maintaining a fuel clean-up cart on the flight deck to quickly contain and clean-up fuel spills. • Training a spill response team comprised of squadron personnel and ships company to provide immediate spill response.
CG-47 RAST	• Covering the rapid securing device with a form-fitting cover

Ship Class	Marine Pollution Control Device in Use
DDG-51	• Placing plastic bags filled with water (to add weight) in all scupper drains during refueling or oily waste transfer evolutions; this blocks the drain and prevents the spilled material from entering surrounding waters. • Sweeping weather decks several times daily when in port. • Washing the weather deck only outside 12 nautical miles. • Not using detergents to clean weather decks when in port. • Spreading tarps on deck prior to cleaning kingpost sliding padeye lead screw assembly. • Spreading tarps on deck to contain debris when using grinders to remove paint.
LHD-1	• Closing fueling station deck drains when the ship is in port. • Placing plastic bags filled with oil absorbent material (to add weight) in all scupper drains during refueling operations; this blocks the drain and prevents the spilled material from entering surrounding waters. • Maintaining a fuel clean-up cart on the flight deck to quickly contain and clean-up fuel spills. • Training a spill response team to provide immediate spill response
MCM-1	• Using nylon rope on the RHIB hoist and winches. Although intended to reduce the magnetic signature of these vessels, the use of nylon rope instead of steel or other metallic materials serves as an excellent MPCD for light duty cranes. • Installing nylon rope on the forward and aft outrigger booms used to raise and lower the mine neutralization system remotely operated vehicle. • Installing covers on the gun mounts when the ship is in port to protect the equipment from the weather and to prevent corrosion. • Installing a containment device with pipe nipple and cap around the fueling station. This device allows the crew to attach a hose to the nipple and drain the containment as required. • Installing a containment device with plug and lanyard around the 30 gal. drum of motor gasoline located on a jettison platform.
WLM	• Using a cable cleaner/lubricator to clean and relubricate the cables on the four cross-deck winches and the pedestal crane.
WPB	• Placing sand bags around refueling stations when receiving fuel; this prevents spilled material from entering surrounding waters. • Installing zip-down canvas covers (attached to the ship by snaps) over the fuel transfer station to prevent water from entering the station. • Placing buckets under fitting connections during refueling operations. • Covering cranes and P-250 fire pumps with canvas covers when in port. • Installing nylon covers on exposed equipment such as the RHIB, machine guns and RHIB crane.

POTENTIAL MARINE POLLUTION CONTROL DEVICES

The assessment team identified several **potential** MPCDs during each shipboard assessment. However, before any new system is used aboard a warship, the Navy must first address its impact on the operation of that ship in terms of its weight, power and space requirements; affect on other ship systems, life cycle cost, and safety; and the mission of the ship. A list of the potential MPCDs identified is shown in Table 10.

Table 10: Potential Marine Pollution Control Devices

Ship Class	Potential Marine Pollution Control Devices
AOE-6	• Install containment (low height coaming) around FAS stations and related components • Install containment enclosures around RAS stations and related components • Install containment around fuel receiving stations • Install containment enclosures around winches • Install quick disconnects on winch oil drains • Install sampling Ts with drains on hydraulic system • Install extensions on the kingpost gearbox drains • Install a system to drain fuel hoses directly into a contaminated fuel tank after FAS operations • Use environmentally preferable grease with high dropping point on the kingpost • Use environmentally preferable wire rope lubricant • Design a durable weapons systems cover • Use vacuum assist needle-guns, sanders and grinders • Use bioenzymatic cleaners to clean weather decks
CV/CVN	• Use an explosion proof vacuum cleaner to clean-up fuel spills. • Use a more powerful flight deck scrubber. One solution offered by a crewmember is a steam cleaner. • Use a cable lubricator to clean and lubricate the aircraft elevator cables. The lubricator should be similar to those installed onboard ships by NSWCCDs Pollution Prevention Afloat Team. • Use a bioenzymatic cleaner to clean the flight deck
DDG-51	• Install containment enclosures with drain plugs around fuel stations. • Use vacuum assisted sanders, grinders and needle guns when depainting the deck and superstructure. • Use a cable cleaner/lubricator to remove and apply grease to the slewing arm davit wire rope. • Use a less soluble, environmentally preferable grease on the chase of the 5"/54 gun mount.

Ship Class	Potential Marine Pollution Control Devices
DDG-51 (continued)	• Use a dedicated hose and quick-disconnect assembly when refueling the RHIBs • Cover the 50 caliber machine gun mounts with a form-fitting cover when in port
LHD-1	• Initiate a flight deck cleaning schedule similar to the schedule documented during the CV/CVN assessment. • Use an explosion proof vacuum cleaner to clean-up fuel spills. • Use a cable lubricator to clean and lubricate the aircraft elevator cables. The lubricator should be similar to those installed onboard ships by NSWCCDs Pollution Prevention Afloat Team. • Use a bioenzymatic cleaner to clean the flight deck. • Install quick disconnects on the winch oil drains. • Design drip pans to fit underneath aircraft that can easily be emptied. • Install a system to allow fuel hoses to drain directly to the contaminated fuel tank after underway replenishment operations. • Install quick disconnect couplings around winch bases to prevent spill during oil changes
MCM-1	• Install containment devices around cranes and cable reels which have hydraulic systems. • Install chaffing jackets on hydraulic hoses to prevent wear, possible leakage, and hose rupture.
WLM	• Maintain spill kits onboard ship. • Install containment around areas of machinery that have hydraulic piping and hoses. • Install coaming on the foredeck and the 01/fantail area. • Install containment around the 6 gal. gasoline cans located on the fantail that will not interfere with their quick discharge. • Install expandable plugs with lanyards in existing containments for ease of u and reinstallation. Install fittings to prevent hydraulic leaks or install support braces for existing fittings.
WPB	• Maintain spill kits onboard ship. • Install coamings on the deck around the fantail area. • Install containment enclosures around the 6 gal. gasoline cans stored on the fantail that will not interfere with their quick discharge. • Install permanent toilet facilities topside for use by migrant personnel.

DISCUSSION

Assessment Team Comments. It is important to recognize the following:

- Information was obtained on each identified process until the survey team reached a consensus that enough data had been gathered to be representative of the Fleet. Once a consensus was reached, the shipboard assessment team ceased gathering data related to that specific process on subsequent shipboard assessments. For example, data on small boats was not gathered during the final assessments (LHD and CV/CVN).

- As previously discussed, the shipboard assessment team and the Weather Deck Runoff DAT decided that although quantitative data was desirable, it could not be consistently obtained. The data presented in this report are estimates based on assessment team observations only.

- This data can be considered accurate for the specific ship surveyed. However, due to individual ship operational scenarios, maintenance requirements and practices, it is necessary to assume that the data are representative of all vessels in the same ship class.

- It is the opinion of the shipboard assessment team that the data contained in this report do not lend itself to mass loadings analysis.

Material Safety Data Sheets. The United States Code of Federal Regulations, Section 29 CFR 1910.1200, Hazard Communication, requires that the hazards of all chemicals produced or imported be evaluated, and that information concerning their hazards be transmitted to employers and employees. This information is transmitted via a Material Safety Data Sheet (MSDS). A summary of the Department of Defense (DoD) process is as follows:

- Vendors selling material to DoD activities are required to submit a MSDS, prepared in accordance with 29 CFR 1910.1200, to the procuring activity. The procuring activity forwards the MSDS to the Navy Environmental Health Center (NEHC), the Navy focal point for MSDS submission. NEHC reviews the MSDS for completeness and prepares, or oversees the preparation of, an MSDS information package which is sent to the Defense Logistics Agency (DLA) for input into the DoD Hazardous Material Information System (HMIS).

- DoD established HMIS to store and disseminate manufacturers data and supplemental related information on hazardous materials. DLA manages HMIS and maintains a computerized central repository of information on hazardous materials purchased for use within DoD.

- DLA consolidates MSDS information submitted by service and HMIS focal points, maintains the HMIS database, and provides the data to the Naval Computer and Telecommunication Area Master Station Atlantic who produces the HMIS on compact disks and distributes them to recipients designated by the Naval Supply Systems Command. The recipients include ships and shore facilities.

It is the Navys objective to obtain the same MSDS that vendors supply to private industry; however, vendors often submit a MSDS that contains proprietary information. If the MSDS contains proprietary information, the Navy is required to protect the manufacturers data; approximately 5% of the MSDSs in HMIS are proprietary. Consequently, several of the Material Safety Data Sheets for products used topside can not be provided. In addition, since manufacturers are only required to identify carcinogens or suspected carcinogens in amounts greater than 0.1%, and hazardous ingredients in amounts greater than 1%, very few of the MSDS in HMIS identify 100% of the products ingredients.

Although the author thoroughly searched HMIS to locate the most complete MSDS for every product used topside, the MSDSs that were provided in the individual ship reports do not contain 100% of the products ingredients. In addition, the product used onboard ship may not be the exact same product as that identified in the report.

Materials are ordered using a National Stock Number (NSN). A NSN is provided for different units-of-issue (e.g., pint, gal.); many manufacturers supply products under the same NSN. Since manufacturers supply their product to DoD using the same NSN, the products used onboard ship may have different formulations even though they all conform to the same Military Specification. For example: There are 19 products supplied under Military Specification MIL-L-17331 MS2190TEP lubricating oil. These 19 products are supplied by 6 different manufacturers. As a result, a Sailor does not know which manufacturer he is ordering or which manufacturer he will receive. Although all of the products conform to the same Military Specification, the product formulation may be different. Additionally, a product from a different manufacturer may be received each time a order is placed.

Environmental Effects Analysis. The UNDS legislation requires the performance of an environmental effects analysis to assess the extent of the impacts of the discharge both with and without potential control. The analysis includes evaluating discharge parameters to water quality criteria or other regulatory limits, annual mass loadings, toxicity; potential to release bioaccumulators, human pathogens, and nonindigenous species. At the direction of NAVSEA 05L13, the shipboard assessment team developed a weather deck runoff constituent mass loading report, Appendix B, to support the environmental effects analysis.

Initiatives to Reduce or Eliminate Hazardous Material Usage Onboard Ship. Naval Surface Warfare Center Carderock Division (NSWCCD) currently has one ongoing and one recently-completed initiative designed to reduce shipboard hazardous material usage, i.e., the Pollution Prevention Afloat Program and the Shipboard Hazardous Material Minimization Program.

Pollution Prevention Afloat Program. The Pollution Prevention (P2) Afloat Program was established in 1995 to develop hazardous material (HM) related pollution prevention strategies for the U.S. Navy Fleet. To meet the mandates of Executive Order (EO) 12856 and now 13148, the P2 Afloat Program assists ships to reduce their offloads of HM to support Naval facility HM reduction requirements. While Navy ships are not regarded as hazardous waste "generators", up to 70% of hazardous waste reported by homeport facilities is HM offloaded from ships. The P2

Afloat Program also aims at reduction and elimination of HM usage by providing proven substitutes and implementing better HM management practices, focusing on pollution prevention.

NSWCCD Code 632 was tasked to investigate and find solutions for excess/used HM issues aboard specific Navy platforms. For each ship, the P2 Afloat Team examined offloaded excess/used HM records and determined P2 practices to reduce, recycle, or reuse HM. These practices are called "opportunities" and include equipment, material, and/or process changes that minimize shipboard use, procurement, storage, handling, and offload of HM. The Program supported selected ships for at least 18 months of opportunity test and evaluation each, including a six month deployment. Opportunities that passed shipboard testing and evaluation are being transitioned across the Fleet.

The P2 Afloat Teams focus is on the direct use or minimal reengineering of commercial-off-the-shelf products for timely reduction of shipboard hazardous material use and its associated shore-side disposal impacts. This also allows for cost savings derived from conducting test and evaluation vice full research and development, and improves turnaround time for installation. The equipment has to be durable, user-friendly, have proper ship interfaces, and conform to the space available on any ship.

Following the test and evaluation phases, final reports providing the results and cost analyses of P2 initiatives tested and evaluated onboard were developed for each participating ship. The reports recommended transitioning opportunities that were technically and economically feasible, and compatible with ship operations. (Economic feasibility was determined by a target return on investment (ROI) of three years or less.) The P2 Team recognizes some opportunities as vital to the reduction of HM onboard, the improved safety of the Sailor, or reduced time applied to a maintenance process, which may not be reflected in a formal ROI. Engineering judgment and qualitative input from ships force were called upon to augment the decision to transition any P2 equipment or process. Table 11 lists the P2 Opportunities being transitioned.

Table 11: Pollution Prevention Opportunities

Aqueous Parts Washers	Cable Cleaner/Lubricator	Maintenance-Free Battery
Mercury Ion Exchange Cartridge System	Pneumatic Vacuums	Aerosol Can Puncturing Device (beginning in FY02)
Paint Brush Holder & Rack	Reciprocating Saw	Hand Pump/Spray Bottles
Hand Wipes Kit	Drum Level Indicator	Vacuum Sanding System
Explosion-Proof Vacuum	Reciprocating Saw	
Paint Dispenser	Pressure Washer	

Fleetwide implementation is being accomplished in two parts. Fiscal Year 1999 was a jump-start phase. Transition, in accordance with the Fleet Modernization Program, began in FY00 and will continue through FY05. By the end of FY05, specialized suites of 20 pieces of P2 equipment will have been distributed to 161 in-service Navy ships.

Shipboard Hazardous Material Minimization Program. NSWCCD recently concluded a comprehensive program to reduce the types and quantities of hazardous material used aboard Navy ships. The Shipboard Hazardous Material Minimization (HAZMIN) program applied source reduction methodologies to reduce hazardous material (HM) usage and generation.
The Shipboard HAZMIN Program was driven by environmental, pollution prevention, and safety and health regulations including OPNAVINST 5090.1B, Environmental and Natural Resources Program Manual; OPNAVINST 5100.19C, Navy Occupational Safety and Health Program Manual for Forces Afloat; Presidential Executive Order (E.O.) 12856, Federal Compliance With Right-to-Know Laws and Pollution Prevention Requirements; and E.O. 13148, Greening the Government Through Leadership in Environmental Management.

The Shipboard HAZMIN Program was designed to eliminate or minimize the use of hazardous materials in Navy maintenance processes and housekeeping activities. The Programs intent was to identify, quantify, and where possible, eliminate targeted hazardous material (HM) from shipboard use and identify suitable alternative materials or processes.

NSWCCD identified, developed and validated a strategy to accomplish shipboard HM minimization. This strategy involved research encompassing:

- Identifying shipboard maintenance and housekeeping hazardous materials listed in the most recent Ship Hazardous Material List, their use, and related processes;
- Establishing Environmental Safety and Health (ESH) criteria for screening shipboard hazardous materials;
- Evaluating shipboard products;
- Identifying alternative materials and processes for targeted materials; and,
- Developing HAZMIN recommendations.

Material classification was performed to facilitate the evaluation of shipboard maintenance and housekeeping materials. NSWCCD identified seven general classes of materials based on functional use, that comprise the universe of shipboard maintenance and housekeeping materials. The seven general material classes established are:

- **Class I** Cleaning Compounds and Solvents (CC/S)
- **Class II** Adhesives and Sealants (A/S)
- **Class III** Lubricants and Functional Fluids (L/FF)
- **Class IV** Acids and Alkalis (A/A)
- **Class V** Oxidizers and Reactive Compounds (O/RC)
- **Class VI** Corrosion Preventive Compounds (CPC)
- **Class VII** Miscellaneous Maintenance Materials (MMM).

During the HAZMIN Programs initial stages a screening process was developed to evaluate shipboard maintenance and housekeeping products. The following established lists and considerations form the basis for the Shipboard HAZMIN Program Evaluation Criteria.

- The Navy Environmental Health Center (NEHC) Priority One and Priority Two Lists of Hazardous Materials
- The Environmental Protection Agencys (EPA) 33/50 Program List
- Carcinogens as defined by the Occupational Safety and Health Administration (OSHA 29CFR1917.28 Appendix A); the International Agency for Research on Cancer (IARC), monographs 1-66; and the National Toxicology Program (NTP), including materials listed in Group 1 (carcinogenic to humans), 2A (limited human data), and 2B (sufficient animal data), in concentrations equal to or that exceed 0.1% (by weight)
- The Occupational Chemical Reproductive Hazards List (in concentrations equal to or greater than 0.1% (by weight)) as defined by OPNAVINST5100.23E, Chapter 29 *Occupational Reproductive Hazards* and the Navy Reproductive Hazards Review Board Meeting (31 March 1998)
- Polychlorinated biphenyls (PCBs) in concentrations equal to or exceeding 50 parts per million (40CFR761)
- Ozone depleting substances (Class 1 and 2) as defined by the Clean Air Act Amendments of 1990 (40CFR82) in concentrations equal to or that exceed 1.0% (by weight)
- Crystalline Silica content in a concentration $\geq$ 0.1% (by weight)
- Additional material chemical, physical, and hazardous waste characteristics including: VOC content specific to the class of materials being addressed, product flashpoints $\leq$ 140°F, corrosivity (pH $\leq$ 2.0 or pH $\geq$ 12.5), and oxidizing or highly reactive products

The research and development phase of the HAZMIN project was recently completed. The project has been transitioned to the Navys in-service engineering agents for shipboard implementation.

CONCLUSIONS

The shipboard assessment team found the weather decks of all the ships extremely clean, including those that perform industrial processes. It was readily evident that the Navy has made vast strides in promoting a cultural change that has greatly improved environmental awareness and individual responsibility. All levels of the chain-of-command are concerned and diligent in their efforts to achieve and maintain shipboard cleanliness.

Hazardous materials must be used onboard ship to maintain equipment; it is realistic to assume that some of the materials have the potential to enter surrounding waters. It is important to note that although the majority of processes performed topside use hazardous constituents, the constituents are not always exposed to the environment and therefore, do not have the potential to enter surrounding waters. Furthermore, since the equipment is typically not located near the decks edge, the constituent would have to traverse across a deck coated with a rough, somewhat absorbent non-skid coating that may absorb or entrap materials before the constituent would enter the water. Although ships force typically conduct a thorough deck washdown outside 12 nm, it is possible constituents could potentially exude or become dislodged and carried overboard during a rainfall event within the contiguous zone. In summary, materials that are exposed to the environment have some *potential* to enter surrounding waters, but the potential has many variables. For example: type of material, amount of material exposed, location of equipment, temperature of the operational area, amount and intensity of rainfall, and sea state.

A listing of the constituents and the associated processes that have the potential to enter surrounding waters is provided in Table 12.

Table 12: Constituents that have the Potential to Enter Surrounding Waters

Ship Class	Process	Contributing Constituents In Order of Predominance
AOE-6	Stores Handling Systems	MIL-G-24139 grease used to lubricate the 64 topside winches and kingposts
	Ships Boats Launching Systems	MIL-G-18458 grease used to lubricate the boat davit
	Fuel Transfer Systems	Residual MIL-T-5624 and MIL-F-16884 resulting from fueling at-sea operations
CV/CVN	Aircraft Launch and Recovery Equipment	Materials used to maintain the catapult: Aeroshell Grade 120 Lubricating oil* DOD-G-85733 high temperature grease** P-D-680 Type III degreasing solvent
		Materials used to maintain the arresting gear: Mobilgrease 28* Gricote 31EP lubricating oil* MIL-T-22361 anti-seize
	Deck Washdown	B&B 88 flight deck cleaning compound
	Ground Support Equipment	Materials used to maintain the equipment: MIL-L-46152 lubricating oil Dexron II automatic transmission fluid* MIL-H-83282 hydraulic fluid MIL-L-17331 hydraulic fluid A-A-52624 antifreeze
	Air Operations	Materials used during aircraft maintenance: MIL-H-83282 hydraulic fluid MIL-G-81322 grease MIL-C-85704 gaspath cleaner
	Aircraft Washdown	MIL-C-85570 aircraft cleaning compound
	Aircraft Elevators	MIL-G-23549 grease used to lubricate the aircraft elevator operating cables
	Other	Soot accumulated on the jet blast deflectors Simple Green™ Tire residue
	Aircraft Fueling	MIL-T-5624 jet fuel (residual amounts)
DDG-51	Weapon Systems	MIL-G-21164 grease used on the 5"/54 gun mount chase
	Stores Handling Systems	MIL-G-23549 grease used to lubricate the kingpost sliding padeye lead screw assembly
	Ships Boats Launching Systems	MIL-G-23549 used to lubricate the slewing arm davit
	Weapon Systems	MIL-L-63460 lubricant used on the 50 caliber gun mounts

Ship Class	Process	Contributing Constituents In Order of Predominance
LHD-1	Ground Support Equipment	Materials used to maintain the equipment: MIL-L-2104 engine lubricating oil MIL-L-2105 gear lubricating oil MIL-H-83282 hydraulic fluid A-A-52624 antifreeze MIL-F-17111 power transmission fluid Dexron III automatic transmission fluid*
	Air Operations	Materials used during aircraft maintenance: MIL-H-83282 aircraft hydraulic fluid MIL-C-85704 gaspath cleaning compound
	Aircraft Washdown	MIL-C-85570 aircraft cleaning compound MIL-G-81322 grease.
	Deck Washdown	B&B 88 flight deck cleaning compound.
	Aircraft Elevators	Materials used to lubricate the aircraft elevator. MIL-G-23549 grease DOD-G-24508 grease MIL-G-18458 grease
	Air Operations	Tire residue
	Aircraft Fueling	MIL-T-5624 jet fuel (residual amounts)
MCM-1	Mine Handling Systems	MIL-G-24139grease used to lubricate the swivel fittings on the base of the booms that raise and lower the mine neutralization system remotely operated vehicle and to lubricate the drive gear located on the acoustic cable reels
	Ships Boats	Motor gasoline used to refuel the boat
WLM	Buoy Handling Systems	Materials used when operating the system: MIL-H-17672 hydraulic fluid MIL-G-18458 grease
		Minor amounts of buoy paint removed when cleaning buoys
	General Housekeeping	Simple Green™ detergent
WPB	General Housekeeping	Simple Green™ detergent
	Deck/Superstructure Maintenance & Preservation	Brite Creme™ used to clean the hull
	Ships Boats Launching Systems	MIL-G-18458 grease used to lubricate the wire rope on the small boat crane
	Ships Boats	Gasoline from the gasoline containers located on the fantail
	Other	Human waste from the portable toilet and other debris (hair, food, personal products) introduced as a result of alien migration interdiction operations also has the potential to contribute to weather deck runoff

* No Military Specification

** Contains proprietary ingredients

The contributing constituents can be grouped into four categories: (1) petroleum, oil and lubricant products; (2) cleaning compounds; (3) paint debris; and (4) processes that do not contribute. The processes and their associated groupings are shown in Table 13.

Table 13: Topside Processes and Contributing Constituents

Petroleum, Oil and Lubricants	Cleaning Compounds	Paint Debris	Processes that do not Contribute
Aircraft elevators	Aircraft washdown	Buoy handling systems	Electronic intelligence/navigation systems
Aircraft fueling	Deck washdown	Deck/superstructure maintenance	Fire assist vehicles
Aircraft launch and recovery equipment (ALRE)	General housekeeping	Ships boats	Flight deck safety nets
Aircraft operations, fixed wing	Ships boats		Firemain systems
Aircraft operations, rotary wing	Weapons systems		LST bow ramp
Buoy handling systems			Towing and mooring
Fuel transfer systems			
Ground support equipment			
Mine handling systems			
Recovery, assist, securing and traversing (RAST) system			
Ships boats			
Ships boats launching systems			
Stores handling			
Weapons systems			

ABBREVIATIONS

%	percent
AFFF	aqueous film-forming foam
AOE	fast combat support ship
CG	guided missile cruiser
CNO	Chief of Naval Operations
CV/CVN	aircraft carrier/nuclear-propelled aircraft carrier
DAT	Discharge Assessment Team
DDG	guided missile destroyer
DLA	Defense Logistics Agency
DoD	Department of Defense
EPA	Environmental Protection Agency
ft.	feet
ft^2	square feet
gal.	gallon
ppm	parts per million
GSE	ground support equipment
HAZMIN	hazardous materials minimization
HM	hazardous material
HMIS	Hazardous Material Information System
in.	inch
LST	tank landing ship
MCM	mine countermeasures ship
mm	millimeter
MSDS	Material Safety Data Sheet
NAVSEA	Naval Sea Systems Command
NEHC	Navy Environmental Health Center
NSN	national stock number
nm	nautical mile
NSWCCD	Naval Surface Warfare Center, Carderock Division
oz.	ounce(s)
P2	pollution prevention
psi	pounds per square inch
PSNS	Puget Sound Naval Shipyard
RAS	replenishment-at-sea
RHIB	rigid-hull inflatable boat
SHMD	Shipboard Hazardous Material Database
RAST	Recovery, Assist, Securing and Traversing System
UNDS	Uniform National Discharge Standards
USCG	United States Coast Guard
WLM	coastal buoy tender
WPB	patrol boat

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Weather Deck Runoff Platform Categories

Ship Class	Number of Ships	Ship Type Number	Ship Function	Length	Platform Category
NAVY					
CV 59	1	CV 62	Forrestal class aircraft carrier	1052'	air capable, carrier
CV 63	3	CV 64	Kitty Hawk class aircraft carrier	1052'	air capable, carrier
CVN 65	1	CVN 65	Enterprise class aircraft carrier(nuc)	1101'	air capable, carrier
CVN 68	7	CVN 72	Nimitz class aircraft carrier (nuclear)	1092'	air capable, carrier
LHA 1	5	LHA 3	Amphibious assault ship (gen.purps)	833'	air capable, amphibious assault
LHD 1	4	LHD 4	Amphibious assault ship (multi-purps)	844'	air capable, amphibious assault
LPH 2	2	LPH 9	Amphibious assault ship (helo carr)	602'	air capable, amphibious assault
AGF 11	1	AGF 11	Flagship, 6th Fleet. conv. LPD	568'	air capable, amphibious assault
AGF 3	1	AGF 3	Flagship, 3rd Fleet. conv. LPD	521'	air capable, amphibious assault
LCC 19	2	LCC 19	Amphibious command ship	636'	air capable, amphibious assault
LPD 14	2	LPD 15	Amphibious transport docks	568'	air capable, amphibious assault
LPD 4	3	LPD 4	Amphibious transport docks	568'	air capable, amphibious assault
LPD 7	3	LPD 8	Amphibious transport docks	568'	air capable, amphibious assault
LSD 36	5	LSD 36	Anchorage class dock landing ship	553'	air capable, amphibious assault
LSD 41	8	LSD 48	Whidbey Island class dock landing	609'	air capable, amphibious assault
LSD 49	3	LSD 50	Harpers Ferry class dock landing	609'	air capable, amphibious assault
LST 1179	3	LST 1179	Newport class tank landing ship	522'	air capable, amphibious assault
CG 47	27	CG 54	Ticonderoga class Cruiser	567'	surface combatant
CGN 36	2	CGN 36	California class Cruiser (nuclear)	596'	surface combatant
CGN 38	1	CGN 41	Virginia class Cruiser (nuclear)	585'	surface combatant
DD 963	31	DD 968	Spruance class Destroyer	563'	surface combatant
DDG 51	18	DDG 51	Arleigh Burke class Destroyer	504'	surface combatant
DDG 993	4	DDG 994	Kidd Class Destroyer	563'	surface combatant
FFG 7	43	FFG 34	Oliver Hazard Perry class Frigate	445'	surface combatant
AO 177	5	AO 177	Fleet oiler	708'	axiliary
AOE 1	4	AOE 2	Fast combat support-Sacramento cls	795'	axiliary
AOE 6	3	AOE 8	Fast combat support-Supply class	755'	axiliary
AFDB 4	1	AFDB 7	Large aux. floating drydock	413'	service craft
AFDB 8	1	AFDB 8	Large aux. floating drydock	825'	service craft
AFDL 1	2	AFDL 23	Small aux. floating drydock	288'	service craft
AFDM 14	1	AFDM 14	Medium aux. floating drydock	598'	service craft
AFDM 3	4	AFDM 6	Medium aux. floating drydock	622'	service craft
ARD 2	1	ARD 5	Aux. repair drydock	486'	service craft
ARDM	3	ARDM 5	Medium aux. repair drydock	492'	service craft
ARS 50	4	ARS 53	salvage vessel	255'	service craft
AS 33	1	AS 33	submarine tender	644'	service craft
AS 39	3	AS 39	submarine tender	646'	service craft
EX YFU	1	IX 514	Basic Flgt. Training--Helo	125'	service craft
BH	8	BH 1	Boom Handling	24'	service craft
DB	4	DB 1	Distribution box	64'	service craft
DT	1	DT 1	Diving tender	74'	service craft
DW	7	DW 1	Dive workboat	50'	service craft
HH	7	HH 1	Hawser handling	30'	service craft
HL	3	HL 1	Hydrographic survey launch	var.	service craft
IX 308	2	IX 310	IX-308-torp trial,IX-310-barges	176'(308)	service craft
LH	3	LH 1	Line handling	var.	service craft
SLWT	24	SLWT 4013	Side loadable warping tug	84'	service craft
TD	2	TD 1	Target drone	56'	service craft
TR	24	TR 4	Torpedo retriever	var.	service craft
WT	1	WT 1	Warping tug	85'	service craft
YD	63	YD 113	Floating crane		service craft
YFB	2	YFB 83	Ferry boat or launch	180'	service craft
YFU 83	1	YFU 83	Harbor utility craft	135'	service craft
YFU 91	1	YFU 91	Harbor utility craft	115'	service craft
YM	2	YM 17	Dredge		service craft
YO 65	3	YO 220	Fuel oil barge	174'	service craft
YOG 5	3	YOG 78	Gasoline barge	174'	service craft
YSD 11	1	YSD 74	Seaplane wrecking derrick	104'	service craft
YTB 752	1	YTB 752	Edenshaw class large harbor tug	101'	service craft
YTB 756	3	YTB 759	Pontiac class large harbor tug	109'	service craft
YTB 760	68	YTB 826	Natick & Tuscumbia class lrg. har. tug	109'	service craft

Weather Deck Runoff Platform Categories

YTL 422	1	YTL 602	small harbor tug	66'	service craft
YTM	11	YTM 1	medium harbor tug		service craft
YTT 9	3	YTT 10	torpedo trials craft	186'	service craft
YLC	1	YLC 1	Salvage lift craft, light		service craft
YMN	1	YMN 1	dredge		service craft
YPD	4	YPD 37	Floating pile driver		service craft
ASDV	2	ASDV 2	Auxiliary swimmer delivery vehicle	134'	service craft
CT	14	CT 1	craft of opportunity COOP trainer	80'	service craft
MC	2	MC 1	Mine countermeasure support	27'	service craft
MCM 1	14	MCM 12	Avenger class mine warfare	224'	service craft
MHC 51	4	MHC 52	Osprey class mine warfare	188'	service craft
APL	16	APL 15	Barracks craft		towed support
BT	4	BT 1	Bomb target	18'	towed support
IX 35	2	IX 502	Barracks ship	328'	towed support
IX 501	1	IX 501	Barracks ship	230'	towed support
WH	12	WH 1	Wherry	var.	towed support
YC	254	YC 1027	Open lighter		towed support
YCF	1	YCF 16	Car float		towed support
YCV	9	YCV 10	Aircraft transportation lighter		towed support
YDT	3	YDT 16	Diving tender		towed support
YFN	157	YFN 1102	covered lighter		towed support
YFNB	11	YFNB 30	Large covered lighter		towed support
YFND	2	YFND 29	Dry dock companion craft		towed support
YFNX	8	YFNX 15	Special purpose lighter	110'	towed support
YFP	2	YFP 11	Floating power barge		towed support
YFRN	3	YFRN 1	Refrigerated covered lighter		towed support
YFRT	2	YFRT 287	Range tender	133'	towed support
YGN 80	3	YGN 80	Garbage lighter		towed support
YNG	2	YNG 11	Gate craft		towed support
YOGN	12	YOGN 10	gasoline barge		towed support
YON	48	YON 100	fuel oil barge		towed support
YOS	14	YOS 10	oil storage barge		towed support
YR	25	YR 26	Floating workshop		towed support
YRB	4	YRB 1	Repair and berthing barge		towed support
YRBM	39	YRBM 1	Repair, berthing and messing barge		towed support
YRDH	1	YRDH 6	floating drydock workshop 'hull'		towed support
YRR	9	YRR 1	radiological repair barge		towed support
YRST	3	YRST 1	salvage craft tender		towed support
YSR	14	YSR 11	sludge removal barge		towed support
YWN	6	YWN 147	water barge		towed support
AC	2	AC 2	Area command cutter	50'	patrol/small craft
HS	70	HS 1	Harbor security (Boston Whaler)	24'	patrol/small craft
LCAC 1	91	LCAC 1	Landing craft (air cushion)	88'	patrol/small craft
PB	31	PB 25	Patrol boat (w/e PBR)	var.	patrol/small craft
PBR	25	31RP664	Riverene Patrol craft	32'	patrol/small craft
PC 1	13	PC 9	Coastal defense ship	170'	patrol/small craft
PF	3	PF 1	Patrol craft, fast	51'	patrol/small craft
PK	1	PK1	Picket boat	45'	patrol/small craft
YP 654	1	YP 667	Patrol craft, training	80'	patrol/small craft
YP 676	27	YP 676	Patrol craft, training	108'	patrol/small craft
AP	6	AP 1	Area point system search craft	27'	patrol/small craft
AR	6	AR 1	Aircraft rescue		patrol/small craft
AT	21	AT 1	Armored troop carrier	36'	patrol/small craft
ATC	20	36AT721	Armoured troop carrier	36'	patrol/small craft
BW	4	BW 1	Boston Whaler	var	patrol/small craft
CA	1	CA 1	catamaran	26'	patrol/small craft
CC	4	CC 1	cabin cruiser (commercial)	var.	patrol/small craft
CM	151	CM 1	Landing craft, mechanized	var.	patrol/small craft
CU	40	CU 4	Landing craft, utility	135'	patrol/small craft
LA	1	LA 1	Landing craft, assault	96'	patrol/small craft
LCM(3)	2	LCM(3) 1	Mechanized landing craft		patrol/small craft
LCM(6)	60	LCM(6) 1	Mechanized landing craft	56'	patrol/small craft
LCM(8)	100	LCM(8) 1	Mechanized landing craft	74'	patrol/small craft
LCPL	130	LCPL 1	Landing craft personnel light	36'	patrol/small craft
LCU 1610	40	LCU 1614	Landing craft, utility	134'	patrol/small craft

Weather Deck Runoff Platform Categories

LCVP	10	LCVP 1	Landing craft vehicle and personnel	36'	patrol/small craft
ML	3	ML 1	Motor launch	var.	patrol/small craft
MM	5	MM 1	Marine mammal support craft	25'	patrol/small craft
MW	121	MW 25	Motor Whaleboat	26'	patrol/small craft
NM	1	NM 1	Noise measuring	73'	patrol/small craft
NS	120	NS 1	Non-standard (commercial)	var.	patrol/small craft
PE	211	PE 16	personnel craft	var.	patrol/small craft
PL	147	PL 1	Landing craft, personnel light	var.	patrol/small craft
PR	8	PR 1	Plane personnel and rescue	var.	patrol/small craft
PT	266	PT 6	Punt	var.	patrol/small craft
RB	270	RB 1	Rigid Inflatable boat	var.	patrol/small craft
RX	15	RX 1	Rigid inflatable (non-standard)	var.	patrol/small craft
SC	6	SC 1	Support craft	var.	patrol/small craft
SS	12	SS 1	swimmer support	var.	patrol/small craft
TC	19	TC 1	Training craft	var.	patrol/small craft
UB	793	UB 7	small utility boat	var.	patrol/small craft
VP	12	VP 1	Landing craft, vehicle personnel	36'	patrol/small craft
WB	338	WB 1	Work boat	var.	patrol/small craft
AGSS 555	1	AGSS 555	Dolphin deep research sub	165'	submersible
DSRV-1	2	DSRV 2	Deep submergence rescue vessel	50'	submersible
DSV 1	3	DSV 2	Deep submergence vehicle	22'	submersible
SSBN 726	17	SSBN 731	Trident class Strategic missle sub	560'	submersible
SSN 637	13	SSN 678	Sturgeon class Attack sub	292'	submersible
SSN 640	2	SSN 645	Franklin class Strategic missle sub	425'	submersible
SSN 671	1	SSN 671	Narwhal class Attack sub	314'	submersible
SSN 688	56	SSN 753	Los Angeles class Attack sub	360'	submersible
SES 200	1	IX 515	Operational Demo. air supported hull	160'	research vessel
AGER 2	1	AGER 2	Enviromental research ship		research vessel
AGOR 21	1	AGOR 22	Oceanographic research	204'	research vessel
AGOR 23	2	AGOR 24	Oceanographic research	274'	research vessel
SB	1	SB 1	Sound/sail	41'	not applicable
ST	34	ST 1	Sail training craft	44'	not applicable
YL	7	YL 1	Yawl	30'	not applicable
MSC					
AH 19	2	TAH 20	Hospital Ship	894'	air capable, amphibious assault
AE 26	8	TAE 27	Ammunition ship	564'	auxiliary
AFS 1	8	TAFS 5	Combat Store Ships	581'	auxiliary
AKR 287	8	TAKR 287	Sealift ship	946'	auxiliary
AO 187	12	TAO 198	Oiler	677'	auxiliary
ARC 7	1	TARC 7	Cable repair ship	502'	service craft
ATF 166	7	TATF 172	Oceangoing Tug	240'	service craft
AG 194	2	TAG 195	Misc. Auxiliary	246'	research vessel
AGM 22	2	TAGM 23	Missle Rng. Instrumentation Ship	563'	research vessel
AGOS 1	5	TAGOS 12	Ocean Surveillance Ships	224'	research vessel
AGOS 19	4	TAGOS 20	Ocean Surveillance Ships	234'	research vessel
AGS 26	2	TAGS 27	Survey Ships	285'	research vessel
AGS 45	1	TAGS 45	Survey Ships	442'	research vessel
AGS 51	2	TAGS 52	Survey Ships	208'	research vessel
AGS 60	4	TAGS 62	Survey Ships	328'	research vessel
AKR 295	3	TAKR 296			
USCG					
WHEC	12	WHEC 715	High Endurance Cutter	378'	surface combatant
WMEC	13	WMEC 901	Medium Endurance Cutter "Bear"	270'	surface combatant
WMEC	16	WMEC 615	Medium Endurance Cutter "Reliance"	210'	surface combatant
WMEC	1	WMEC 38	Medium Endurance Cutter "Storis"	230'	surface combatant
WMEC	2	WMEC 167	Medium Endurance Cutter "Acushnet"	213'	surface combatant
WAGB	2	WAGB 10	Ice Breaker "Polar"	399'	service craft
WAGB	1	WAGB 83	Ice Breaker "Mackinaw"	310'	service craft
WLB	2	WLB 201	Seagoing Buoy Tender "Juniper"	225'	service craft
WLB	10	WLB 277	Seagoing Buoy Tender "Balsam" [Ser. A]	180'	service craft
WLB	2	WLB 297	Seagoing Buoy Tender "Balsam" [Ser. B]	180'	service craft
WLB	15	WLB 388	Seagoing Buoy Tender "Balsam" [Ser.C]	180'	service craft
WLM	6	WLM 551	Coastal Buoy Tender "Ida Lewis"	175'	service craft

Weather Deck Runoff Platform Categories

WLM	5	WLM 685	Coastal Buoy Tender "Red"	157'	service craft
WLM	6	WLM 540	Coastal Buoy Tender "White"	133'	service craft
WLIC	4	WLIC 800	Inland Construction Tender "Pamlico"	160'	service craft
WLIC	3	WLIC 298	Inland Construction Tender "Cosmos"	100'	service craft
WLIC	2	WLIC 75301	Inland Construction Tender "Anvil" [A]	75'	service craft
WLIC	3	WLIC 75303	Inland Construction Tender "Anvil" [B]	75'	service craft
WLIC	4	WLIC 75306	Inland Construction Tender "Anvil" [C]	75'	service craft
WLI	1	WLI 313	Inland Buoy Tender "Cosmos"	100'	service craft
WLI	1	WLI 642	Inland Buoy Tender "Buckthorn"	100'	service craft
WLI	2	WLI 65400	Inland Buoy Tender "Improved Berry"	65'	service craft
WLI	2	WLI 65303	Inland Buoy Tender "Berry"	65'	service craft
WLR	1	WLR 311	River Buoy Tender "Sumac"	115'	service craft
WLR	5	WLR 75500	River Buoy Tender "Kankakee"	75'	service craft
WLR	9	WLR 75401	River Buoy Tender "Gasconade"	75'	service craft
WLR	6	WLR 65501	River Buoy Tender "Ouachita"	65'	service craft
WTGB	9	WTGB 101	Icebreaking Tug "Bay"	140'	service craft
WYTL	14	WYTL 65601	Small Harbor Tug	65'	service craft
ANB	20		Aids to Navigation boat	58'	service craft
ANB	25		Aids to Navigation boat	55'	service craft
ANB	32		Aids to Navigation boat	45'	service craft
ANB	58		Aids to Navigation boat	21'	service craft
?	17		Buoy servicing boat	49'	service craft
?	9		Buoy servicing boat	46'	service craft
WPB	16	WPB 1301	Patrol Boat "Island" [series A]	110'	patrol/small craft
WPB	21	WPB 1317	Patrol Boat "Island" [series B]	110'	patrol/small craft
WPB	12	WPB 1338	Patrol Boat "Island" [series C]	110'	patrol/small craft
WPB	1	WPB 82312	Patrol Boat "Point" [series A]	82'	patrol/small craft
WPB	31	WPB 82333	Patrol Boat "Point" [series C]	82'	patrol/small craft
WPB	7	WPB 82371	Patrol Boat "Point" [series D]	82'	patrol/small craft
WFCI	5	WFCI 43501	Fast Coastal Interceptor	44'	patrol/small craft
PC	24		Raider type patrol craft	22'	patrol/small craft
MLB	4	MLB 52312	Motor lifeboat	52'	patrol/small craft
MLB		MLB 47200	Motor lifeboat	47'	patrol/small craft
MLB	105		Motor lifeboat	44'	patrol/small craft
	1	SAR	Search and rescue	50'	patrol/small craft
	14	SAR	Search and rescue	21'	patrol/small craft
	207		Utility boat	41'	patrol/small craft
	2		Utility boat	38'	patrol/small craft
	28		Port Security Boat	31'	patrol/small craft
	19		Surf rescue boat	30'	patrol/small craft
	2	Hammerhead	Hammerhead Patrol craft	24'	patrol/small craft
USAF					
MR	5	MR-120-8801	Missile retriever boat	120'	service craft
MR	1	MR-85-1603	Missile retriever boat	85'	service craft
TG	1	TG-45-1919	Small Harbor Tug	45'	service craft
MLC	4	C-74-2205	LCM(8) type mech. Lndg. Crft.	74'	patrol/small craft
US ARMY					
C1MT123A	1	C1-MT-123A type	Heavy Lift ship, James McHenry	279'	auxiliary
LSV	6	LSV 01	Vehicle Landing Ship "Besson Class"	273'	auxiliary
LT	8	LT 130	Large Harbor Tug	128'	service craft
LT	18	LT 1937	Large Harbor Tug	107'	service craft
ST	11	ST 1988	Small Harbor Tug	70'	service craft
LCU	35	LCU 2001	Landing craft "LCU 2000 class"	174'	patrol/small craft
LCU	13	LCU 1667	Utility Landing Craft "LCU 1610 Class"	135'	patrol/small craft
LCM	126	LCM(8)	Mechanized Landing Craft "LCM(8)"	74'	patrol/small craft
LARC	30	LARC XV	Amphibious Vehicle	45'	patrol/small craft
LARC	19	LARC LX	Amphibious Vehicle	63'	patrol/small craft
LARC	3	LARC V	Amphibious Vehicle	35'	patrol/small craft

Weather Deck Runoff Discharges
Constituent Mass Loading and Characterization of Deck Runoff

Table of Contents

Background

The Uniform National Discharge Standards (UNDS) weather deck runoff shipboard assessment team visited 13 ships representing 9 different U.S. Navy and U.S. Coast Guard ship classes to determine how various topside maintenance processes contribute to weather deck runoff within the contiguous zone, i.e., within 12 nautical miles (nm) of the U.S. and territorial coastlines. The shipboard assessment team, composed of three topside equipment experts, conducted pierside and at-sea assessments to observe and document topside equipment and processes, general housekeeping practices and their associated materials. In addition, the team solicited crew feedback regarding methods to reduce or eliminate discharge constituents.

Prior to performing the shipboard assessments, a comprehensive evaluation of all ship classes applicable to UNDS was conducted. All ships listed in the document *"Ships Applicable to UNDS – Vessel Class Listing with Number of Vessels per Class (Active Vessels Only)"*were analyzed to determine similarities. The analysis included ship mission, topside equipment, weather deck surface area, and age and number of ships in class. As a result of the analyses, each class of ship was placed into one of nine platform categories: (1) air capable, carrier; (2) air capable, amphibious assault; (3) surface combatant; (4) auxiliary; (5) service craft; (6) towed support; (7) patrol/small craft; (8) submersible; and (9) research vessel.

A list was developed to identify class-specific topside processes and equipment having the potential to contribute to weather deck runoff. All data were reduced to identify specific classes of vessels to survey; ensuring data was obtained multiple times on each topside process. A copy of the class-specific process matrix is provided Enclosure (1). After completing this process, it was determined that ships representative of the towed support, submersible and research vessel categories would not be surveyed. The rationale for this decision was: (1) they do not have unique topside equipment; (2) they do not perform unique maintenance processes topside; and (3) it would not be cost effective since their study is not expected to provide any new data not available from the study of the other six platform categories. The shipboard assessment team presented the survey approach to the UNDS Weather Deck Runoff Discharge Assessment Team (DAT) and obtained their concurrence. The DAT is comprised of representatives from the U.S. Navy (USN), U.S. Coast Guard (USCG), and the Environmental Protection Agency (EPA).

It is critical to the UNDS process to obtain quantitative as well as qualitative datato aid the identification of marine pollution control devices to control the discharge. To achieve this, the shipboard assessment team queried each Sailor performing maintenance on topside equipment regarding the amount of material used as well as the amount remaining that is exposed to the environment after the maintenance process is complete. Unfortunately, responses varied significantly during the first two shipboard assessments. For example, a team member asked a Sailor how much grease he had applied to a 5" gun chase; his response was two ounces. The team then queried several Sailors who were also working on the gun mount and responses ranged from two ounces to one pound. Since the grease on the gun chase was exposed, the team visually examined the gun chase and concluded that it contained approximately one pound of grease. This scenario occurred several times when investigating different maintenance processes. As a result, the shipboard assessment team concluded that quantitative data would be documented for material exposed to the environment only when a team member could verify the amount. The team again presented their findings and recommendations to the UNDS Weather Deck Runoff DAT and obtained their concurrence. To ensure the team could accurately estimate the amount of material exposed to the environment,

the team conducted laboratory tests designed to provide a visual baseline for comparison purposes.

It is important to recognize the following:

- The shipboard assessment team found the weather decks of all surveyed ships clean, including those that perform industrial processes. The Navy has made vast strides in promoting a cultural change that has greatly improved environmental awareness and individual responsibility. It was readily evident all levels of the chain-of-command are concerned and diligent in their efforts to maintain shipboard cleanliness.

- Information was obtained on each identified process until the survey team reached a consensus that enough data had been gathered to be representative of the Fleet. Once a consensus was reached, the shipboard assessment team ceased gathering data related to that specific process on subsequent shipboard assessments. For example, data on small boats was not gathered during the final assessments (LHD and CV/CVN).

- As previously discussed, the shipboard assessment team and the Weather Deck Runoff DAT decided that although quantitative data was desirable, it could not be consistently obtained. The data presented in this report are estimates based on assessment team observations only unless otherwise noted.

- This data can be considered accurate for the specific ship surveyed. However, due to individual ship operational scenarios, maintenance requirements and practices, it is necessary to assume that the data is representative of all vessels in the same ship class.

- It is the opinion of the shipboard assessment team that the data contained in this report does not lend itself to mass loadings calculations and analyses.

Processes That Contribute Constituents to Weather Deck Runoff.

All topside processes and associated equipment and materials that have the potential to contribute to weather deck runoff have been identified by the shipboard assessment team. As shown below, all topside processes are grouped, for reporting purposes, into four categories depending on contributing constituents: (1) petroleum, oil and lubricants; (2) cleaning compounds; (3) paint debris; and (4) no contributing constituents.

Topside Processes and Contributing Constituents

Petroleum, Oil and Lubricants	Cleaning Compounds	Paint Debris	No Contributing Constituents
Aircraft elevators	Aircraft washdown	Buoy handling systems	Electronic intelligence/navigation systems
Aircraft fueling	Deck washdown	Deck/superstructure maintenance	Fire assist vehicles
Aircraft launch and recovery equipment (ALRE)	General housekeeping	Ships boats	Flight deck safety nets
Aircraft operations, fixed wing	Ships boats		Firemain systems
Aircraft operations, rotary wing	Weapons systems		LST bow ramp
Buoy handling systems			Towing and mooring
Fuel transfer systems			
Ground support equipment			
Mine handling systems			
Recovery, assist, securing and traversing (RAST) system			
Ships boats			
Ships boats launching systems			
Stores handling			
Weapons systems			

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Aircraft Elevators

CV/CVN Class. Aircraft are transported between the hangar and flight deck levels using the four aircraft elevators. Each aircraft elevator is 4,000 square feet ($ft^{2)}$ and is capable of transporting up to 3 aircraft at one time depending on aircraft type/size. All safety stanchions, locks, and cables are cleaned and lubricated by hand using MIL-G-23549, MIL-G-24139, and MIL-G-18458 greases. The amount used is dependent upon the maintenance action performed and the person performing the maintenance, but information gathered from the crew revealed an average of 2 – 5 gal. of grease per elevator. The largest contributor to deck runoff resulting from the operation and maintenance of aircraft elevators is MIL-G-23549 grease that used to lubricate elevator's operating cables. Although four gallons of grease is used to lubricate each elevator, only a small amount has the potential to wash-off and go overboard.

LHD-1 Class. Aircraft are transported between the hangar and flight deck levels using the two aircraft elevators. Elevator cables, safety stanchions and rails are lubricated using MIL-G-23549, DOD-G-24508, and MIL-G-18458 greases. As with the CV/CVN class ship, the amount of material used is dependent upon the maintenance action being performed and the person performing the maintenance; however, information gathered from the crew revealed an average of 2 – 5 gal. of grease is applied quarterly to each elevator. Although 2 – 5 gal. of grease is applied, only a small amount has the potential to wash-off within the contiguous zone during heavy seas or a rainfall event.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Aircraft Fueling

AOE-6 Class. All aircraft fueling operations are performed by embarked squadron personnel; ships company is responsible for performing all maintenance on the fueling station. After refueling the aircraft, the fueling hose is drained into a bucket and the fuel is poured into the contaminated fuel tank. The assessment team observed the aircraft refueling process several times and did not observe any spillage. Very small amounts of cleaning and lubricating materials are used on the aircraft fueling station, including: MIL-D-16791 general purpose detergent; DOD-G-25408 grease; and anti-seize compound MIL-A-907. The team concluded that this process does not have the potential to contribute to weather deck runoff.

CV/CVN Class. Maintenance performed on equipment located topside includes inspecting and lubricating hose reel assemblies, inspecting hose and nozzle assemblies, and lubricating the defuel pump. The majority of fueling/defueling station maintenance is performed on equipment that is located below decks. Aircraft fueling stations are cleaned on a weekly basis using Spray & Wipe™ and rags. Preservation is accomplished during periods of repair availability only. Drains located in the fueling station discharge directly overboard.

The crew stated an average of 20 gal. of MIL-T-5624T jet fuel from aircraft tank vents and tank relief valves/dumps is spilled on the deck during a 24 hour period. A dedicated fuel spill cart is maintained on the flight deck in order to provide rapid spill response, the recovered fuel is transferred to the contaminated fuel tank. All fuel remaining in the fuel hose is evacuated prior to hose release from the aircraft. As a result, the assessment team did not notice any fuel spilled during the numerous (>20) aircraft fueling evolutions they observed. Fuel that has spilled onto the deck from the tank vents and valves may become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone

LHD-1 Class. Maintenance performed on topside equipment includes: lubricating the defuel pump; inspecting and lubricating the hose reel assemblies; and inspecting and lubricating the hose and nozzle assemblies. Most of the maintenance is performed on equipment that is located below decks and not exposed to the environment. Aircraft fueling stations are cleaned on a weekly basis using Spray & Wipe™. Preservation is accomplished during periods of repair availability.

Sources of MIL-T-5624T jet fuel spills are aircraft tank vents and tank relief valves/dumps. The crew maintains a dedicated fuel spill cart on the flight deck in order to provide rapid spill response; the recovered fuel is transferred to the contaminated fuel tank. Drip pans are not used when fueling/defueling aircraft because they have the potential to become drawn into the aircraft engine intake, resulting in catastrophic engine failure. All fuel remaining in the fuel hose is evacuated prior to hose release from the aircraft. As a result, the assessment team did not note any fuel spillage during the aircraft fueling evolutions observed. The fueling station drains discharge directly overboard. Although the drains are open when underway, they are closed when the ship is in-port.

Residual amounts of MIL-T-5624 jet fuel that has spilled onto the deck from the tank vents and valves may become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Aircraft Launch and Recovery Equipment (ALRE)

CV/CVN Class. Aircraft carriers are the only ships that have Aircraft Launch and Recovery Equipment (ALRE). It consists of catapults for launching aircraft and arresting gear for recovering aircraft. Process information is as follows:

Catapults. All currently active carriers are equipped with four steam-powered catapults. Each catapult consists of a launching engine, control system, retraction engine, and associated deck equipment including the jet blast deflectors.

Launching Engine. The launching engine is enclosed in the catapult trough located immediately below the flight deck. The trough drains are equipped with a strainer basket that is cleaned prior to entering port, during quarterly maintenance, or as required due to a accumulation of constituents resulting from heavy rain or flight deck washdowns. In an effort to mitigate build-up in the strainer basket, a rubber, track slot-seal is installed to close the catapult track slot when in port, during non flight operations, between flight events, and during flight deck washdown. The materials used to maintain and preserve the launching engine equipment have the potential to enter surrounding waters through the catapult drain system, including: Aeroshell Grade 120 lubricating oil (no Military Specification available); DOD-G-85733 high temperature grease; and P-D-680 Type III degreasing solvent.

Control System. The control system for the catapult includes the deck edge launching control station, jet blast deflector control panel, center deck control station, and the Integrated Catapult Control Station (ICCS). The ICCS is completely enclosed and is raised and lowered during operations. All other control stations are electrical control panels except the steam pressure gages in the center deck control station. The control system does not have the potential to contribute to weather deck runoff.

Retraction Engine. The retraction engine for the catapult is located on the 03 level in the catapult machinery spaces. The retraction engine's four cables are connected to the grab assembly located in the catapult trough. The retraction engine provides a means of returning the catapult shuttle and launching engine piston assembly to the battery position in preparation for the next launch. The cables and grab assemblies are cleaned using P-D-680 Type III degreasing solvent, and greased using DOD-G-85733 high temperature grease. Both of these products have the potential to enter surrounding waters through the catapult trough drain.

Associated Deck Equipment. Other equipment related to catapult operations include the catapult launching accessories. Oil and greases used to maintain and preserve this equipment are normally applied to the equipment below decks. Although this equipment is used on the flight deck during operations, the materials used during maintenance do not have the potential to enter surrounding waters.

Jet Blast Deflectors. Each of the four catapults has a jet blast deflector to deflect the high velocity and high temperature exhaust away from personnel and equipment on the flight deck. The areas of the jet blast deflector that require lubrication are contained within the jet blast deflector enclosure. The enclosure drains are equipped with a strainer basket that is cleaned prior to entering port, during quarterly maintenance, and as required. Examples of conditions that would require the strainer basket to be cleaned include an accumulation of

constituents resulting from heavy rain, flight deck washdown, or fuel spill near the jet blast deflector. The aircraft exhaust soot on the jet blast deflector has the potential to enter surrounding water during deck washdown or during a rainfall event in port.

Arresting Gear. Arresting gear equipment includes: sheave dampers, fairlead sheaves, barricade stanchions, and various deck equipment.

Sheave Dampers. The sheave dampers are located on the 03 level immediately below the retractable sheave. The primary function of the sheave damper is to absorb the initial peak shock of the aircraft engaging the arresting gear wire. The damper also guides the arresting gear engine purchase cable to the flight deck. The sheave damper components do not contribute to weather deck runoff.

Fairlead Sheaves. The fairlead sheaves are also located on the 03 level and guide the arresting gear engine purchase cable from the engine to the sheave damper assembly prior to transiting to the flight deck. The fairlead sheaves do not have the potential to contribute to weather deck runoff.

Barricade Stanchions. The barricade stanchions are housed flush in the flight deck and used to rig and raise the aircraft emergency barricade recovery nylon webbing assembly. When raised to the full vertical position, the barricade stanchions are 22 ft. high. Each stanchion houses two cable winch assemblies used to tension the barricade webbing. The cables are stainless steel and require no lubrication. The winch assembly gears and stanchion pivoting pins are greased using small amounts Mobilgrease 28 arresting gear grease (no Military Specification). The stanchions are raised hydraulically using the hydraulic cylinder located in the barricade stanchion well. The grease on the tensioning winches and pivoting pins may wash-off during heavy rainfall or during deck washdown evolutions; however, the amount is negligible.

Deck equipment. Deck equipment includes retractable deck sheaves, wire supports, barricade stanchion components, crossdeck pendant (arresting gear wire), and purchase cable. The gravity drains for the barricade stanchions and the retractable deck sheaves discharge directly overboard. The retractable deck sheaves guide the arresting gear wire as it retracts following an aircraft recovery. The maintenance materials that have a potential to enter surrounding waters, include: Mobilgrease 28 arresting gear grease (no Military Specification), Gricote 31EP lubricating oil (no Military Specification), and MIL-T-22361 anti-seize compound.

As discussed above, materials used to maintain the catapults and jet blast deflector enclosures have the potential to enter surrounding waters. The catapult trough enclosure drains present the largest potential for contribution to deck runoff. The design and open track slot of the catapult trough serves a collection point for all constituents used topside, including aircraft fuel, hydraulic fluid, soot, rain, sea water, and drainage from flight deck washdown evolutions. In addition, the accumulated materials in the barricade stanchion wells and retractable sheave enclosure areas in the arresting gear also have a potential to enter surrounding waters. These areas serve as collection and discharge points for deck runoff; however, most of these discharges occur outside 12 nm during flight operations. It is impossible to estimate the amount of the material that could enter surrounding waters, variables include: number of aircraft launched/recovered, operating temperatures, frequency and amount of rainfall, frequency and

amount of "green water" (sea water that washes onto the deck in rough seas), and amount of material used when performing maintenance (each person applies a different amount; no quantity is identified on the maintenance requirement card). Ships force is aware that these materials have a potential to go overboard and have implemented various management practices to prevent / reduce deck runoff from ALRE components when in port. These practices include ensuring the drain strainer baskets for the trough and jet blast deflector enclosure are cleaned, ensuring the catapult track slot-seal used to close the catapult track slot is installed, cleaning the barricade stanchion and retractable sheave drains, and removing and stowing (below decks) flight deck equipment used to launch aircraft.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Aircraft Operations, Fixed Wing

CV/CVN Class. The flight decks of aircraft carriers are large (>4.5 acres), flat surfaces with a small (70 ft. x 25 ft.) island structure that houses the flight deck control tower, primary flight control, various bridges, and 2 auxiliary jet fuel stations. Unlike other ships, the carrier flight deck has limited fixed topside equipment. Fixed equipment consists of arresting wires and barricade stanchions, jet blast deflectors, and catapult trough components. Most topside processes are performed using mobile equipment that is intermittently topside, e.g., aircraft, flight deck scrubber, and ground support equipment. During the assessments, the CV/CVN had 62 fixed wing aircraft onboard:

10 F-14 Tomcats	36 F/A-18 Hornets	8 S-3 Vikings
4 EA-6B Prowlers	4 E-2 Hawkeyes	

Two C-2 aircraft that are not included in the ship's air wing were also onboard the ship daily. The C-2 Greyhounds are used for Carrier Onboard Delivery (COD), i.e., transporting Navy and civilian personnel to an underway aircraft carrier. In order to safely perform aircraft operations and maintenance, only 48 – 52 aircraft are on the fight deck at one time, the remaining aircraft are housed in the hangar deck. Aircraft are normally flown-off the ship at the end of a deployment when the ship is 150 – 300 nm from land to provide ships force time to conduct the flight deck washdown and subsequent staging of equipment for offload. Process information related to fixed wing aircraft is as follows:

Maintenance. The aircraft are inspected and periodic maintenance/corrosion control is conducted on a 14/28 day cycle. Major maintenance actions are performed based on engine hours of operations. Although the aircrew is diligent in their efforts to maintain the aircraft in excellent condition, leaks in the hydraulic lines are common; however, they are corrected as soon as they are detected. All aircraft use MIL-H-83282D aircraft hydraulic fluid and MIL-G-81322 aircraft grease. Major maintenance actions performed on aircraft engines and airframes are conducted in the hangar bay located on the main deck.

Engine Cleaning. All aircraft engines are cleaned by washing the engines with MIL-C-85704 gaspath cleaner. After completing the engine wash, the engines are rinsed using fresh water. The fresh water is supplied from the ships fresh water system using a ¾ inch (in.) garden hose with spray nozzle attached. The gaspath cleaner and rinse water that run onto the flight deck is recovered using wet vacuums to prevent the water and cleaning solution from spreading to other areas of the flight deck resulting in unsafe conditions. This water/detergent mixture is subsequently poured overboard.

Maintenance materials that have become trapped in the rough deck surface have the potential to subsequently become entrained in rainfall and go overboard within the contiguous zone, including MIL-H-83282 aircraft hydraulic fluid; MIL-G-81322 aircraft grease; and MIL-C-85704 gaspath cleaner.

LHD-1 Class. The ship carries five AV-8 Short Take-Off/Vertical Landing (STOVL) harrier aircraft operated and maintained by embarked Marine aviation combat element personnel.

Maintenance. The aircraft are inspected and periodic maintenance/corrosion control is performed on a 7/14/28 day cycle. Major maintenance actions are performed based on

engine hours of operation, typically in 25 – 50 hour cycles. Engine and airframe maintenance actions are performed in the hangar bay located on the main level, one level below the flight deck. Although the aircrew is diligent in their efforts to maintain the aircraft in excellent condition and correct leaks immediately, leaks in the hydraulic lines that contain MIL-H-83282 hydraulic fluid are common.

Engine Cleaning. Aircraft engines are washed every 25 hours of flight operations using approximately 1 to 1½ gal. of MIL-C-85704 gaspath cleaner per aircraft. The mixture is poured over and into the engine and then flushed with fresh water until all visible signs of soap are removed from the engine compartment. A pneumatic wet vacuum cleaner is used to contain and recover the cleaning compound/water mixture; the recovered mixture is subsequently poured overboard.

Materials used during aircraft maintenance and engine cleaning have the potential to become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone. These materials include MIL-H-83282 aircraft hydraulic fluid and MIL-C-85704 gaspath cleaner.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Aircraft Operations, Rotary Wing

AOE-6 Class. The ship carries two CH-46 helicopters operated and maintained by squadron personnel assigned to the ship during underway periods. The helicopters primary mission is to transport cargo and personnel; its secondary mission is to perform search and rescue operations. Aircraft maintenance information is as follows:

Maintenance. The struts of the aircraft are greased every 7 days or 24 hours of flight operations using MIL-G-81322. All access doors are greased every 56 days using MIL-G-81322; however; if the aircraft are frequently deployed, the access doors are greased every 14 days. Rotor heads are greased every 7 days or 24 hours of flight operations using MIL-G-23827. The engine oil, MIL-PRF-23699, is changed every 100 hours of flight operations. The hydraulic system for the aircraft's flight controls is inspected for contamination every 400 hours of flight operations. The flight control system uses aircraft hydraulic fluid MIL-H-83282. The search and rescue winch, which uses MIL-H-83282 hydraulic fluid, is inspected daily prior to each flight.

Engine cleaning. A fresh water rinse is performed on the engines and rotors upon return from each flight to remove salt build-up. The helicopter engines are washed every 25 hours of flight operation; every 14 hours when operating at-sea. The engines are washed gal. fresh water. The mixture is poured over and into the engine and then flushed with fresh using ½ gal. of MIL-C-85704 aircraft cleaning compound mixed with one water until all visible signs of soap are removed from the engine compartment . The runoff travels down the side of the aircraft, onto the helicopter deck and directly overboard.

All aircraft debark prior to entering the contiguous zone. As a result, the discharges generated during aircraft cleaning and maintenance are not subject to Uniform National Discharge Standards. However, negligible amounts of maintenance and cleaning materials could potentially become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone.

CV/CVN Class. The seven SH-60 Seahawk helicopters carried onboard the ship are operated and maintained by squadron personnel. As shown below, process information related to rotary wing aircraft is the same as fixed wing aircraft:

Maintenance. The helicopters are inspected and periodic maintenance/corrosion control is conducted on a 14/28 day cycle. Major maintenance actions are performed based on engine hours of operations. All scheduled maintenance actions are performed in the hangar bay. The SH-60 helicopter uses MIL-H-83282D aircraft hydraulic fluid.

Engine Cleaning. Aircraft engines are washed using MIL-C-85704 gaspath cleaner every 60 hours of flight operations using approximately 1½ gal. of cleaner. The engines are rinsed using fresh water. The fresh water is supplied from the ships fresh water system using a ¾ in. garden hose with spray nozzle attached. Although the gaspath cleaner and rinse water run onto the flight deck, squadron personnel use wet vacuums to prevent the water and cleaning solution from spreading to other areas of the flight deck resulting in unsafe conditions. This water/detergent mixture is subsequently poured overboard.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

As with fixed wing aircraft, maintenance materials that have become trapped in the rough deck surface have the potential to subsequently become entrained in rainfall and go overboard within the contiguous zone, including MIL-H-83282D aircraft hydraulic fluid and MIL-C-85704 gaspath cleaner.

DDG-51 Class. Rotary wing aircraft embark and debark DDG-51 class ships when the ship is well beyond the contiguous zone. Since the assessment was conducted pierside, air wing personnel were not aboard the ship and the assessment team was unable to gather information.

LHD-1 Class: During the assessment, the LHD had 24 rotary wing aircraft onboard: four CH-53 Sea Stallions; four AH-1 Sea Cobras; two UH-1 Hueys; and fourteen CH-46 Sea Knights

All of the aircraft, except two CH-46 helicopters, are operated and maintained by embarked Marine aviation combat element personnel. As shown below, process information related to rotary wing aircraft is the same as fixed wing aircraft

Maintenance. The helicopters are inspected and periodic maintenance/corrosion control is based on engine hours of operation in addition to a 7/14/28 day cycle. Major maintenance actions are performed in the hangar bay. As with fixed wing aircraft, leaks in the hydraulic lines of rotary wing aircraft are common and are corrected as soon as they are detected.

Engine Cleaning. Rotary wing aircraft engines are also cleaned using MIL-C-85704 gaspath cleaner. The mixture is poured over and into the engine and then flushed with fresh water until all visible signs of soap are removed from the engine compartment. A pneumatic wet vacuum cleaner is used to contain and recover the cleaning compound/water mixture that is subsequently poured overboard.

Materials used during aircraft maintenance and engine cleaning that become trapped in the rough deck surface have the potential to subsequently become entrained in rainfall and go overboard within the contiguous zone. These materials include MIL-H-83282 aircraft hydraulic fluid and MIL-C-85704 gaspath cleaner.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Buoy Handling Systems

WLM Class. Cranes and cross-deck winches haul the buoys, chains, and sinkers aboard the tender. The buoys are then secured to the tender's buoy deck for inspection, cleaning, and maintenance. The buoy, anchor chain and sinker are hoisted aboard the ship using a crane and cross deck winches. Wire rope on the cranes and cross deck winches is lubricated with grease MIL-G-18458. The hydraulic system supplying the cranes and winches uses Texaco Rando HD 32 hydraulic fluid MIL-H-17672, NSN 9150-01-087-3510. The potential constituents contributing to deck runoff are hydraulic fluid MIL-H-17672 and MIL-G-18458.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Fuel Transfer Systems

AOE-6 Class. During refueling-at-sea (FAS) operations, MIL-F-16884 marine diesel fuel or MIL-T-5624 jet fuel (JP-5) is pumped from a delivery ship to a receiving ship. The ship receives fuel through its three starboard side fuel receiving stations when pierside and has a capacity to carry 6.5 million gal. of fuel. The ship has two fuel transfer stations on the starboard side and three fuel transfer stations on the port side for conducting FAS operations. The topside equipment for each FAS station is independently operated and controlled. Each FAS station has 5 winches; three of the winches contain 800 ft. of 7/8 in. wire rope, two contain 800 ft. of ¾ in. wire rope. Each winch is greased with 5 gal. of MIL-G-24139 general purpose grease. In addition, each FAS station has three saddle winches which control the tension of the saddle whips; each saddle winch contains 400 ft. of ½ in. wire rope lubricated with 2 ½ gal. of MIL-G-24139. Prior to refueling operations, plastic bags filled with oil absorbentmaterial are double-bagged and placed in all topside scuppers to prevent an overboard discharge in the event of a spill. Upon completion of each fueling evolution, the fuel hose "nozzle" is placed in a large (38 in. wide x 24 in. deep) drip pan immediately after it is retrieved onboard. The drip pan remains in place until no fuel leakage is detected; the contents of the drip pan are then poured into the contaminated fuel tank. Although some spillage during hose disconnect is normal during refueling operations, the amount spilled is insignificant in relation to the amount of fuel being transferred. The ship's crew was diligent in their efforts to ensure no contaminants went overboard during FAS operations. One member of each FAS crew stood-by during operations to clean up excess grease that dropped from the wire rope to the weather deck. Although underway replenishment operations are conducted outside the contiguous zone, the potential does exists for the wire rope grease to be washed-off during rainfallwithin the contiguous zone; therefore, MIL-G-24139 general purpose grease has the potential to contribute to deck runoff.

DDG-51 Class. The DDG-51 class has four refueling stations which are not enclosed by a containment device. All fuel pumps and control systems are located below deck. Due to recent changes in the planned maintenance system, valves located topside are maintained on an "as required" basis. In addition to locating the spill kit close to the refueling station, the crew takes the following precautions to prevent fuel from entering surrounding waters: (1) plastic bags are filled with water and placed in scupper drains during refueling operations, and (2) buckets are placed under hose connection points during refueling operations. However, contaminants resulting from refueling operations have the potential to contribute to weather deck runoff in the event of a significant spill or if the crew does not take precautionary measures.

MCM-1 Class. The MCM-1 class ship normally receives fuel from a shoreside refueling truck when the ship is pierside. All fuel transfer pumping gear is located below decks and is common to both refueling stations; above-deck valves and piping are enclosed within a containment device. The crew takes the following precautions to prevent fuel from entering surrounding waters: (1) threaded plugs are installed in the containment device to allow the controlled drainage of collected rainfall or fuel in the event of a leak; (2) an oil boom is placed around the ship; (3) all deck drains are plugged during refueling operations; and (4) a spill kit is maintained onboard. Since the ship does not carry or maintain fueling hoses onboard, the shoreside fuel depot provides equipment (fuel hoses equipped with cam lock quick disconnect fittings) required for refueling operations. As a result, there is minimal potential for the fuel transfer system to contribute to weather deck runoff. A potential for spillage exists only when connecting or disconnecting the transfer hoses or in the event of a fuel hose rupture; however these would be

attributed to catastrophic equipment failure and are not incidental to normal operation of a vessel.

WLM Class. The WLM class ship is typically fueled from its operating pier via hoses. The ship has the capability to transfer fuel from its storage tanks to other ships; however, this method is never employed due to the ships operational zone. All fuel transfer pumping gear is located below decks, with the above deck valves and piping located in a containment. The potential to contribute to weather deck runoff exist only if the diesel fuel is inadvertently spilled when connecting or disconnecting the transfer hoses.

WPB Class. The WPB class is typically fueled through hoses from a refueling truck while the ship is pierside. Refueling stations are located on the forward section of the ship's superstructure, both port and starboard. All fuel transfer pumping gear is located below deck and is common to both refueling stations, with the above-deck valves and piping located in a containment enclosure. The refueling stations are covered with canvas zip-down covers secured to the ship with snaps to protect the equipment from the elements. In addition, the crew installed threaded plugs in the containment enclosure. During refueling evolutions, an oil boom is placed around the ship and all deck drains are plugged. The area around the refueling station is lined with sandbags to assist in containment in the event of an accidental spill. The fuels depot personnel maintain spill kits on the pier. There is potential for the fuel transfer system to contribute to weather deck runoff. However, such potential exists only in cases of inadvertent fuel spills while connecting or disconnecting the transfer hoses or in the event of a fuel hose rupture. Both inadvertent spills and hose ruptures are attributable to equipment failure and are not incidental to normal operations of a vessel.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Ground Support Equipment.

AOE-6 Class. Minimal ground support equipment is required to support aircraft operations onboard this class of vessel. The GSE includes: one hydraulic service unit; 4 aircraft hydraulic jacks; one portable hydraulic test stand; and one nitrogen oxide cart. The GSE is inspected daily for proper operation and is washed with a mild solution of fresh water and MIL-C-85704 aircraft cleaning compound on the helicopter deck on an as-needed basis. The runoff generated from washing the equipment discharges directly overboard. As with other maintenance related to aircraft, the GSE is not washed within 25 nm of land

CV/CVN Class. Ground support equipment carried onboard the CV/CVN class ship is shown below

Equipment	Quantity
Mobile electric power plant	1
Gas turbine engine enclosure	1
Flight deck scrubber	1
Hydraulic servicing cart	1
Hydraulic power supplies	3
Maintenance stands	2
Aircraft jacks	3
Weapons loading hoist	1
Aircraft towing tractors	10
Crash and salvage crane*	1
Forklifts*	2
Flight deck fire trucks	1
Coolant oil servicing cart	1

*Also listed in Fire Assist Vehicle report section

All of the equipment listed was not on the flight deck at one time. The amount of equipment topside was dependent on equipment availability and operational requirements. The GSE is washed on the flight deck on an as-required basis using aircraft cleaning compound and fresh water. The cleaner/water mixture is recovered using the flight deck scrubber and poured overboard. All GSE is washed for the last time after the air wing debarks, typically greater than 200 nm from land. Although lubricants may leak from the equipment, they are cleaned-up as soon as they are detected. However, some maintenance materials may become entrained in the deck surface enter surrounding waters within the contiguous zone during a rainfall event, including MIL-L-46152 oil; Dexron II automatic transmission fluid; MIL-H-83282 hydraulic fluid; MIL-L-17331 hydraulic fluid; and A-A-52624 antifreeze.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

LHD-1 Class. The LHD-1 class ship had the following equipment: four tow tractors; one tow tractor unit; four 6,000 lb. forklifts; one 20,000 lb. crash crane; two pressure washers; one nitrogen oxide cart; one hydraulic service unit; one mobile electric power plant, one corrosion control cart, and one flight deck scrubber. As with the CV/CVN, all of the equipment was not on the flight deck at one time and the amount of equipment topside was dependent on equipment availability and operational requirements. The GSE is washed on the flight deck on an as-required basis using aircraft cleaning compound or Simple Green™ (depending on availability) and fresh water. The wastewater drains directly overboard. All GSE is washed for the last time after the air wing debarks, typically greater than 50 nm from land.

Although lubricants may leak from the equipment, they are cleaned-up as soon as they are detected. However, some maintenance materials may become entrained in the deck surface enter surrounding waters within the contiguous zone during a rainfall event, including MIL-L-2104 lubricating oil, MIL-L-2105 lubricating oil, MIL-H-83282 hydraulic fluid, A-A-52624 antifreeze; MIL-F-17111 power transmission fluid; and Dexron III automatic transmission fluid (no Military Specification).

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Mine Handling Systems

MCM-1 Class. Topside equipment includes: four cable reel assemblies; five winch assemblies; three winch control stations; three outrigger booms; two cranes; three mine tensioner payout systems; and a mine neutralization system (MNS) remotely operated vehicle. A 55-gallon drum of Lubricating Oil, Gear, Multi-Purpose MIL-L-2105, was carried onboard the ship when underway to replenish the acoustic and magnetic cable reels and the stern crane. The bases of each of the three outrigger booms contained approximately one pound of Grease, Water Resistant, General Purpose MIL-G-24139, that has the potential to contribute to weather deck runoff. In addition, the drive gear located on the acoustic cable reel was thinly coated with grease MIL-G-24139. The areas surrounding the base of hydraulically operated cranes and cable reels did not have containment devices to contain fluid; therefore, a potential does exist for constituents to enter surrounding waters in the event of a spill resulting from a ruptured line or hose.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Recovery, Assist, Securing and Traversing (RAST) Systems

The Recovery, Assist, Securing and Traversing (RAST) system is designed for installation onboard ships equipped with SH-60B helicopters. It is used to assist the helicopter to land safely on the flight deck, secure the helicopter immediately upon landing, enable the helicopter to be safely transported between the flight and hangar decks, and enable the helicopter to be safely launched during adverse weather conditions. Although the RAST system is not installed aboard DDG-51 class ships, it is installed on other ships in the surface combatant category, i.e., DD-963 (single and dual track), FFG-7, and CG-47 class ships, therefore it is included in this report. Subsequent to the DDG-51 class assessment, two members of the assessment team went aboard a CG-47 class to examine the RAST system and to determine if it has the potential to contribute to weather deck runoff.

The majority of the RAST system equipment is located below decks. Components located topside include the rapid securing device, electric cable reels, tail guide winch assembly, tracks, slot seals, and control console. The rapid securing device (RSD) is housed inside the hangar bay while in port and is moved to the flight deck only when necessary. If the RSD is moved to the flight deck when the ship is in port, the RSD is covered with a form-fitting cover to prevent exposure to the environment. Track slot seals are installed in the traverse track slot to control the migration of water into the track during non-flight hours, between flight events when underway, when in port, and within 12 nm of shore. The RAST system is not operated within the contiguous zone. As a result, only MIL-G-81322 grease applied to the traverse cables, located inside the tracks which are covered with slot seals, has the potential to contribute (minimally) to weather deck runoff.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Ships Boats

AOE-6 Class. The AOE-6 class carries six small boats that are equipped with Cummings engines: two 20 ft. rigid hull inflatable boats (RHIBs), one 40 ft. and one 50 ft. fiberglass utility boats, one 35 ft. aluminum work boat, and one 33 ft. fiberglass captains gig. All small boat engines are started and operated weekly for a period of 15 – 30 minutes. Upon retrieval, the bilges are checked to ensure there is no oil in the bilge before the bilge plug is removed and the boat is hoisted onboard. If oil is present, it is collected and turned in to the HAZMINCEN for disposal ashore. Non-oily bilge water is discharged directly overboard. The small boats are removed from the ship and painted when in port only, except for minor touch-up painting. All small boats are cleaned with a solution of 1 cup MIL-D-16791 general purpose detergent mixed with 5 gal. fresh water followed by a fresh water rinse. The constituents which have the potential to contribute to weather deck runoff are the detergent/water mixture used to clean the boats and small boat engine wet exhaust resulting from the weekly onboard operations. Small boat engine wet exhaust will be addressed separately under UNDS.

DDG-51 Class. The DDG-51 class has two 24 ft. Rigid Hull Inflatable Boats (RHIBs) equipped with a diesel inboard/outboard engine which uses MIL-T-5624T (JP-5) fuel. The RHIBs are removed from the ship and taken to the intermediate maintenance activity for painting; however, minor repairs to the fiberglass hull are performed by the crew. When the RHIB is hoisted on board after operations, the bilge pump is disabled and residual bilgewater is wiped-up with a sponge and deposited in a bucket, the contents of the bucket are then emptied into a deep sink that drains to the ships wastewater tank. The hull is cleaned with fresh water and general purpose detergent. There is minimal potential of topside contamination from the RHIBs as evidenced by the cleanliness of the deck area immediately below the boats.

MCM-1 Class. Each MCM maintains two 17 ft. 10 in. RHIB for use by the mine-disposal divers. The MCM assessed pierside carried one RHIB with a 90 hp outboard engine and one with a 60 hp outboard engine. The MCM assessed underway had two RHIBS, each with a 90 hp outboard engines. The RHIBs are refueled using 6 gal. gas cans filled from the 30 gal. motor gasoline tank located on a jettison platform and surrounded by a containment device with plug and lanyard which allows the crew to drain the containment device as required. The outboard engines are operated daily for 2 – 3 minutes or as long as 15 minutes depending on the ship's crew. The external surfaces and the bilge of the RHIBs are washed down with fresh water and Simple Green™ following every use and during major ship cleanings. The primary constituents that have the potential to contribute to weather deck runoff are: (1) gasoline spilled when refueling the RHIB onboard ship; and (2) contaminants resulting from the onboard operation of the outboard engines on a daily basis. (Small boat engine wet exhaust will be addressed by a separate UNDS Discharge Assessment Team.)

WLM Class. The WLM had one 18 ft. RHIB with a Yanmar four cylinder engine and a Hamilton Jet inboard/outboard. The RHIB refueling station is enclosed by a 12 in. high containment. The RHIB is washed down following every use and during major ship cleanings using Simple Green™. The primary constituent which has the potential to contribute to weather deck runoff is diesel fuel spilled during fueling operations and/or leaking fuel system fittings on the power plant.

WPB Class. The WPB class carries one 17 ft. RHIB with a 90 horsepower outboard engine with a through-prop exhaust system. The RHIB is refueled using gasoline supplied from 6 gal.

cans. Two 6 gal. cans of gasoline and one 2½ gal. can of Shell 30W motor oil are maintained inside the RHIB and eight 6 gal. cans of gasoline are maintained topside. The crew washes down the RHIB following every use and during major ship cleanings using Simple Green™ detergent. The crew places a cover over the RHIB when the ship is in port to protect it from the elements. The engine on each RHIB is operated for 2 –3 minutes each time the RHIBs are brought onboard (approximately 15 times a month). The primary constituents that have the potential to contribute to weather deck runoff are: (1) gasoline spilled when refueling the RHIB onboard ship; and (2) contaminants resulting from the onboard operation of the outboard engines on a daily basis. (A separate UNDS Discharge Assessment Team will address small boat engine wet exhaust.)

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Ships Boats Launching Systems

AOE-6 Class. The captain's gig and utility boats are retrieved and deployed using a double arm, pivoting, gravity davit that contains two drums housing ¾ in. wire rope. A boat lifting boom that contains one drum of wire rope 125 ft. in length is used to raise and lower the RHIB's. The cables are cleaned using MIL-T-5624 (JP-5) and lubricated MIL-G-18458 wire rope grease. Prior to conducting maintenance, a tarp is spread on the deck to contain the cleaning compound and greases. The contributing constituents to weather deck runoff from the ships boats launching system are MIL-G-18458 and MIL-T-5624 (JP-5).

DDG-51 Class. One electro/mechanical slewing arm davit (SLAD) with 110 ft. of ¾ in. wire cable is used to launch and recover the RHIBs. The cable is manually cleaned on an annual basis using 2 – 3 gal. of P-D-680 Type III and lubricated with one lb. of MIL-G-23549 grease. A tarp is spread on the deck prior to conducting the maintenance in an effort to contain the materials and prevent the hazardous constituents from contacting the deck. Because the wire cable is exposed to the environment it is possible that some of the of MIL-G-23549 grease may drip from the cable to the weather deck under certain conditions, such as extreme temperature or rainfall.

MCM-1 Class. One anti-magnetic electric hoist winch type BE-09 with 1 in. nylon rope with lifting capacity of 2,000 lb. is used to launch and recover the RHIBs. The nylon rope is static tested at twice the lifting capacity and operational testing is performed during the actual hoisting of the RHIBs. All load testing is performed by an outside activity when in port. The nylon rope is cleaned using fresh water; the hoist assembly is cleaned with fresh water and Simple Green™.

WLM Class. One Allied D6000 articulating crane with 1/2in. galvanized steel cable is used to launch and recover the RHIB from surrounding waters. The galvanized steel cable does not require lubrication. The hydraulic fluid used in the crane is Texaco Rando HD 32 hydraulic fluid. The primary constituent which contributes to weather deck runoff as a result of ships boats launching systems is Texaco Rando HD 32.

WPB Class. One Electro/Hydraulic Sealift Appleton Marine Crane with ¾ in. cable is used to launch and recover the RHIB from surrounding waters. This crane uses NAPA Dextron III hydraulic fluid with a normal operating pressure of 1,800 psi, supplied from the crane's 15 gal. reservoir located below deck. The crane has a lifting capacity of 1,750 lb. A cover is placed over the crane while the ship is in port to protect the equipment from the weather and reduce corrosion. The cable is cleaned using P-D 680 Type III and greased using MIL-G-18458. A tarp is spread on the weather deck prior to cleaning and greasing the cable to contain the materials. The contributing constituent to weather deck runoff from the crane is the MIL-G-18458 grease used to lubricate the cable.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Stores Handling Systems

Information on equipment used to handle and transfer stores was obtained during the AOE-6 and DDG-51 assessments only. Since stores are transferred by hand on MCM-1, WLM and WPB class ships, they do not have stores handling systems.

AOE-6 Class. The stores transfer system consists of four Replenishment-At-Sea (RAS) stations. The RAS stations consist of a kingpost assembly and four winches that provide and control the cable required to conduct highline transfer of stores. Each of the winches contain differing lengths and sizes of wire rope: (1) 900 ft. of 1 in. wire rope; (2) 900 ft. of ¾ in. wire rope; (3) 700 ft. of ¾ in. wire rope; and (4) 1200 ft. of ½ in. wire rope. Each winch station is lubricated with approximately 5 gal. of MIL-G-24139 general purpose grease; each RAS station is lubricated with approximately 10 gal. Although underway replenishment operations are conducted outside the contiguous zone, the potential does exists for the grease to be washed-off during rainfall within the contiguous zone. (Note: The crew reported that the MIL-G-24139 grease on the kingpost "sloughed-off" when exposed to the high temperatures in the Persian Gulf.)

DDG-51 Class. Two kingpost sliding padeyes are located amidships: one port, one starboard. The sliding padeye is used to transfer materials between ships during underway replenishment operations, which are never conducted within 12 nm. Each of the sliding padeyes is comprised of a stanchion with a 25 ft. lead screw assembly, an easing-out cleat, and an easing-out stabilizer. The constituent which has the potential to contribute to weather deck runoff from the kingpost sliding padeye is approximately one quart of MIL-G-23549 grease (per padeye) used to lubricate the lead screw which is exposed to the environment. It is important to note that routine shipboard operations within the contiguous zone will not result in grease entering surrounding waters. The conditions under which a portion of the grease could be transferred from the kingpost to the weather deck include extreme temperature and/or rainfall.

Processes that Contribute Constituents to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Weapon Systems

The largest guns now fitted in active U.S. Navy ships are the 5 in. MK 45 lightweight guns in cruisers and destroyers; these weapons are considered primarily shore bombardment weapons and have limited anti-air capability. The 76 mm guns in Navy frigates and the larger Coast Guard cutters are primarily anti-aircraft weapons and also have limited anti-air capability. Most Navy surface warships are armed with the MK 15 20 mm Close-In Weapon System (CIWS) for close-in defense against anti-ship missiles. In addition, various types of 25 mm, 20 mm and .50 caliber and 7.62 mm machine guns are fitted in naval ships, primarily for defense against small craft in restricted waters. Weapon system information was obtained on the AOE-6, DDG-51, MCM-1 and WPB class ships. The WLM ship does not have weapon capability.

AOE-6 Class. The AOE-6 class have two MK38 25 mm machine guns, four 50 caliber M2HP machine guns, two close-in weapon systems (CWIS), and one dual box missile launcher. All gun mounts are cleaned using fresh water and MIL-D-16791 general purpose detergent. MIL-L-63460 cleaner lubricant and preservative is applied to the 50 caliber gun mounts and the MK38 25 mm gun mount. The gun mounts are covered when not in use; however, the crew indicated the covers do not maintain integrity so rusting gun mount components is a continual problem. Since the weapon systems are covered and minimal materials are used to maintain the systems, they do not have the potential to contribute to weather deck runoff.

DDG-51 Class. DDG-51 class weapon systems include: one MK 45 5"/54 caliber lightweight gun mount; two MK 41 vertical launch systems (VLS); two phalanx close-in weapon systems (CIWS); two MK 32 MOD 14 triple-barrel torpedo tubes; two 50 caliber machine gun mounts, and two MK 36 MOD 12 super rapid-blooming offboard CHAFF launchers (SRBOC). The majority of materials, e.g., grease and oils that are used on the weapons systems are used on internal components and therefore do not have the potential to contribute to weather deck runoff. However, two materials used on the external surfaces of DDG-51 class weapons system were identified as having the potential to contribute to weather deck runoff : (1) MIL-G-21164 grease; and MIL-L-63460 cleaner, lubricant and preservative. Interviews with the crew revealed that approximately 30 – 35% of the 16 oz. of MIL-G-21164 that is applied to the gun mount chase is washed-off during a normal rainfall. The crew also estimated that approximately 50% of the two oz. of MIL-L-63460 cleaner, lubricant and preservative applied to the 50 caliber gun mount is washed-off during a normal rainfall.

During the assessment the team observed the crew using a chemical paint remover on the CIWS. The material, *Peel Away 7* (manufactured by Dumond Chemicals Inc., New York, NY 10036), was applied with a brush and allowed to stand for 30 minutes then removed with a putty knife. The resulting paint/Peel Away 7 mixture was placed into plastic bags and turned into the HAZMINCEN for disposal.

MCM-1 Class. Systems employed aboard MCM-1 class ships are two .50 caliber machine guns and two M60 machine guns mounted port and starboard. All gun mounts are cleaned using fresh water and Simple Green™. MIL-L-63460 cleaner, lubricant and preservative is applied to the gun mounts. Covers are installed on the gun mounts when the ship is in port to protect the equipment from the weather and to prevent corrosion.

WPB Class. Systems employed aboard the WPB class are one MK38 25 mm machine gun and two 50 caliber M2HP machine guns. All machine guns are cleaned using fresh water and

Simple Green™. Approximately 2 oz. of MIL-L-63460 cleaner, lubricant and preservative is applied to the 50 caliber gun mounts and the MK38 25 mm gun mount. Covers are installed on the guns when the ship is in port to protect the equipment from the weather and prevent corrosion. Since machine guns are covered when in port the only constituent that has the potential to contribute to weather deck runoff is MIL-L-63460; however, the potential only exists if the ship is operating in the contiguous zone during rainfall or heavy seas.

Processes that Contribute Constituents to Weather Deck Runoff

Group 2 – Cleaning Compounds

Aircraft Washdown

Aircraft washdown evolutions were observed and documented during the AOE-6, CV/CVN and LHD-1 shipboard assessments.

AOE-6 Class. Aircraft washdowns are dependent upon flight operations and location. Fresh water washes are performed after all flights over salt water to remove salt deposits. This washdown focuses on the windshield and rotor assembly, and normally takes only two minutes using a ¾ in. garden hose at 20 psi with a nozzle attached. Although the hose is equipped with an on/off nozzle, it is left in the "on" position so the crewmember can spray the helicopter as he walks from the front to the back of the aircraft. A complete fresh water washdown is performed every 7 days; however, if operations are conducted in the Persian Gulf region the helicopters are washed every 3 days due to sand build-up on the aircraft. When a complete washdown is performed, the aircraft is washed using approximately 8 oz. of MIL-C-87936 aircraft cleaning compound added to a one gal. of fresh water. If the aircraft is extremely dirty two gal. of the solution may be required. During complete washes, the fresh water is applied using a 155 psi pressure washer and a ¾ in. garden hose. The wash water/aircraft cleaning compound mixture drains directly overboard. While the crew is washing the top portion of the aircraft with the pressure washer, the crew below the aircraft captures the effluent in buckets and uses it to wash the lower portion of the craft in an effort to reduce freshwater consumption and overboard discharges. Since the aircraft are not onboard when the ship is operating in the contiguous zone, the discharges generated as a result of aircraft washdown are not subject to UNDS. However, residual MIL-C-87936 that has become trapped in the rough deck surface has the potential to subsequently become entrained in rainfall and go overboard within the contiguous zone

CV/CVN Class. Aircraft washdowns are dependent on operational tempo and ship location. While the aircraft are attached to the ship and in an underway operating status, a complete fresh water washdown is performed every 14 days with the exception of the SH-60 helicopter that is washed every 7 days. Spot washing is conducted daily as required using aerosol aircraft cleaning compound. When a complete washdown is performed the aircraft is washed using aircraft cleaning compound MIL-C-85570 Type II; fresh water is supplied using a ¾ in. garden hose with spray nozzle attached. Approximately 100 – 150 gal. of water are used per aircraft. MIL-G-81322 grease is applied via the grease fittings prior to the washdown evolution to expel old grease and again after the washdown to expel grease contaminated with the washwater. Previous laboratory testing conducted by the assessment team using a grease gun from the supply system identical to grease guns used onboard ship revealed that 1.3 grams of grease is expelled each time the grease gun is pumped. Each aircraft grease fitting is lubricated by pumping the gun 3 – 4 times, therefore 3.9 –5.2 grams of grease is used per fitting prior to and after each washdown for a total of 7.8 – 10.4 grams per fitting per washdown. The expelled grease falls to the flight deck and is recovered with the washwater and discharged overboard. Even though all aircraft debark when the ship is well beyond the contiguous zone, MIL-G-81322 aircraft grease and MIL-C-85570 aircraft cleaning compound may have become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone.

LHD-1 Class. Aircraft washdowns are dependent upon the ships location and operating tempo. Fresh water washes are performed daily when underway to remove salt deposits; the washdown lasts two minutes and is performed using a ¾ in. garden hose at 20 psi with a spray nozzle attached. A fresh water rinse is also performed on aircraft that have flown over water at

altitudes less than 500 ft. for extended periods of time. MIL-G-81322 grease is applied via the grease fittings prior to the washdown to expel old grease and again after the washdown to expel grease contaminated with the washwater. Using the data generated during laboratory testing, 7.8 – 10.4 grams of grease is used per fitting per washdown; each helicopter has 10 grease fittings. The expelled grease falls to the flight deck and is recovered with the washwater and discharged overboard.

Each aircraft receives a complete fresh water washdown every 7 days. During the complete washdown of an AH-1 aircraft the team observed, the crew mixed approximately 8 oz. of MIL-C-85570 aircraft cleaning compound with three gal. of fresh water and applied the mixture to the aircraft using long telescoping poles with a flat scrubbing head. A ¾ in. garden hose with a spray nozzle attached was used to wet and rinse the aircraft. The entire process took 40 minutes, with the water running for 14 minutes. The waste water drained directly overboard.

Even though all aircraft debark when the ship is well beyond the contiguous zone, MIL-C-85570 aircraft cleaning compound and MIL-G-81322 grease may have become trapped in the rough deck surface and subsequently become entrained in rainfall and go overboard within the contiguous zone.

Processes that Contribute Constituents to Weather Deck Runoff

Group 2 – Cleaning Compounds

Buoy Handling Systems

WLM Class. Typical maintenance performed on each buoy/sinker includes: remove marine growth using scraper and pressure washer; cleaning of solar power panel with Simple Green™ and rag. The buoy is washed using salt water only and no cleaning compound solution, therefore only minor amounts of Simple Green™ have the potential to contribute to deck runoff.

Processes that Contribute Constituents to Weather Deck Runoff

Group 2 – Cleaning Compounds

Deck Washdown

The assessment team gathered deck washdown information during all ship assessments.

AOE-6 Class. The crew washes the deck once a week with fresh water when underway at distances greater than 25 nm from shore. When in-port, the deck is swept and swabbed only, therefore no effluent is generated. When washing the 02 level, a ¾ in. garden hose operating at 20 psi with a nozzle attached is used. A 1½ in. fire hose with a pressure of 125 psi at 95 gal. per minute is used on the 01, 03, and 04 levels. The crew uses corn brooms and scrub brushes to clean the deck with a mild solution of MIL-D-16791 general purpose detergent and fresh water. Approximately 1½ gal. of general purpose detergent is used to clean the entire ship. The washdown evolution for the entire ship (except helicopter deck) takes approximately 6 hours with the water running approximately 50 percent of the time. The helicopter deck is cleaned with the same detergent/water mixture using a ¾ in. garden hose at 20 psi without a nozzle and requires approximately 25 minutes. The amount of time and detergent used when conducting the washdown was provided by crewmembers. The team was unable to observe and document a washdown to record exact times and volumes because a washdown was not performed due to harsh weather conditions during the assessment period. As previously stated the entire ships crew displayed a strong environmental ethic, nonetheless, the assessment team was surprised to observe the crew swabbing the deck immediately after each rainsquall using only the rainwater (no detergent) remaining on the deck surface, thereby cleaning the deck and reducing the ship's fresh water usage. Since the washdown occurs outside 25 nm, the only contaminants entering surrounding waters inside the contiguous zone are contaminants that become trapped in the rough deck surface during the washdown and subsequently become entrained in rainfall and go overboard.

CV/CVN Class. The ship had been at-sea conducting flight operations for two months at the time of the first assessment and six months at the time of the second assessment. The objective of the second assessment was to document preparations taken to ensure flight deck cleanliness prior to the ship entering the contiguous zone at the end of a six-month deployment. During both assessments, the team expected to find a build-up of jet fuel, grease and oil on the flight deck; however visual and contact observations revealed that most of the stains on the deck were tire residue from the thousands of aircraft launch and recovery evolutions. The flight deck was contaminated with only minor amounts of fuel, grease and oil.

Flight deck cleanliness is paramount. Liquid remaining on the flight deck can be drawn into the aircraft intake and can be as damaging to an aircraft as a solid object. The ship maintains constant and tight control over flight deck cleanliness by providing detailed written instructions and recording cleaning evolutions.

The team observed and documented a section of the flight deck being cleaned the team's first night at-sea. Team members recorded all maintenance actions performed on the area for four days then visually examined the area to identify potential contaminants. Stains from materials that had leaked onto the deck and were absorbed in the non-skid deck surface were visible. No accumulation was noted. During the four day period 100 aircraft refuelings, 8 aircraft engine washes, and 60 routine maintenance processes (e.g., change tires, service hydraulic system, etc.) were performed on the section.

Below is a synopsis of observations made during the assessments:

Processes that Contribute Constituents to Weather Deck Runoff

Group 2 – Cleaning Compounds

First At-Sea Assessment. It was readily evident that the crew was successful in maintaining flight deck cleanliness. The crew uses two methods to clean the fight deck: a nightly scrubbing exercise referred to as a "SCRUB-X", and continuous cleaning using a mechanical flight deck scrubber.

- SCRUB-X. At the beginning of the deployment, a diagram was developed to divide the flight deck into eight sections. Each embarked air squadron is responsible for one section; the sections are cleaned on a rotational basis. A log book that identifies the responsible squadron and records when each section is cleaned is maintained in Flight Deck Control.

  One section of the flight deck is scrubbed each night after flight operations. During a SCRUB-X, approximately 5 gal. of B&B 88 cleaning compound is spread onto the deck after it has been wetted with seawater supplied from the ships firemain (95 psi) via a 2½ in. fire hose. Approximately 20 – 30 Sailors use push-style brooms with long, stiff bristles to "scrub" the flight deck. The Sailors form a line and scrub the deck with the brooms, making 10 – 15 horizontal and 10 – 15 vertical passes. The deck is sprayed with seawater to remove residual soap. The remaining cleaner/water mixture is suctioned into the flight deck scrubber's recovery tank and poured overboard. The nightly SCRUB-X requires 1 – 1 ½ hours to clean a 120 x 80 ft. section, depending on material accumulation.

  Each morning before flight operations begin, squadron personnel use pneumatic vacuum cleaners to remove liquids and other foreign objects from the aircraft tie-down fixtures located in their assigned section of the flight deck. When this task has been completed, the date, time and responsible individual are recorded in the log book.

- Mechanical Flight Deck Scrubber. A flight deck scrubber equipped with a vacuum system that provides suction (11,800 rpm fan) for residual solution recovery is used to clean the flight deck and remove standing water. The scrubber is equipped with: a portable vacuum wand that is used to clean areas inaccessible to the scrubber, two hydraulically powered scrub brushes, a 140 gal. solution tank, and a 120 gal. recovery tank. The crew adds ½ gal. Simple Green™ to 140 gal. of water. The scrubber applies the cleaning solution in front of dual high-speed opposed rotation brushes. The brushes scrub the soiled area and sweep-up debris. The dirty water and debris is contained by the rear vacuum squeegee and suctioned into the recovery tank. The recovered cleaner/water mixture is poured overboard. The assessment team noted that the flight deck scrubber was used daily during and between scheduled flight operations in order to maintain a high level of cleanliness.

Second At-Sea Assessment. A second assessment was conducted at the end of a six month deployment to observe and document a SCRUB-X of the entire flight and hangar decks. The SCRUB-X was conducted after the air wing debarked and ship was 200 nm from land. Since the ship had launched and recovered more than 10,000 aircraft there was a significant accumulation of tire residue but not of hazardous constituents.

Processes that Contribute Constituents to Weather Deck Runoff

Group 2 – Cleaning Compounds

- Flight Deck SCRUB-X. The entire flight deck was cleaned with B&B 88 flight deck cleaner using seawater supplied from the ships fire main at 95 gpm through a 2½ in. fire hose. The cleaner was applied to the flight deck from a 55 gal. drum using a foaming nozzle. Approximately 40 scrubbers made numerous horizontal and vertical passes over each section of the deck. Following the scrubbing, the deck was sprayed with seawater to remove residual soap. The cleaner/water mixture flowed directly overboard. Ten drums of cleaner were used to wash the entire flight deck. The length of time the hoses were on when applying the cleaner and rinsing the deck was recorded. They were in use for 23 minutes 27 seconds to clean a 31,000 ft^2 (approximate) section of the flight deck, resulting in a usage of approximately 2,228 gal. of water. The section documented represents 15% of the entire flight deck area.

- Hangar Deck SCRUB-X. The hangar deck SCRUB-X also occurred approximately 200 nm from land immediately after the air wing debarked. A 55 gal. drum of B&B 88 cleaning compound was placed on a forklift, punctured, then the fork lift was driven around the hangar bay to disperse the contents. Concurrently, **fresh** water supplied at 95 gpm through a 1½ in. fire hose was sprayed on the deck. Approximately 25 Sailors used push-style brooms with long, stiff bristles as scrubbing devices and made several vertical and horizontal passes over sections of the deck prior to spraying the deck with fresh water to remove residual soap. The soap/water mixture flowed directly overboard. Six 55 gal. drums of cleaning compound were used to clean the hanger deck.

Flight and hangar deck scrubbing exercises occur well beyond (>200 nm) the contiguous zone. Nonetheless, residual cleaner may dry on the deck surface or become trapped in the non-skid material and subsequently become entrained in rainfall and go overboard within the contiguous zone

DDG-51 Class. The deck is washed weekly when the ship is underway; however, in accordance with Naval Station San Diego requirements, the deck is not washed when the ship is in port. When underway, the washdown occurs beyond 12 nautical miles from land and requires approximately two hours to clean all weather deck surfaces. A solution of approximately one pint of MIL-D-16791 general purpose detergent is mixed with fresh water supplied by the ships 50 – 70 psi fresh water system. The washdown process is as follows: a ½ in. garden hose (without a on/off nozzle) is used to wet the deck, the water/detergent solution is lightly dispersed on the deck and the deck is scrubbed with brooms and brushes. Upon completion of the scrubbing evolution, the garden hose is used to rinse the water/detergent mixture from the deck. Since no detergents are used when in port and the deck is swept several times a day, only minimal amounts of residual soap and debris has the potential to contribute to weather deck runoff as a result of deck washdown within 12 nm.

LHD-1 Class. A flight deck washdown was not conducted while the assessment team was aboard; however, the process was discussed. The crew indicated that flight deck is cleaned via two methods: a scrubbing exercise (SCRUB-X) and a mechanical flight deck scrubber.

SCRUB-X: During a SCRUB-X, a cleaning compound is spread onto the flight deck after it has been wetted with seawater supplied from the ships firemain. Approximately 20 – 30 Sailors use push-style brooms with long, stiff bristles to "scrub" the flight deck. The Sailors form a line and scrub the deck with the brooms, making 10 –15 horizontal and 10 – 15

vertical passes. The deck is sprayed with seawater to remove residual soap. The remaining cleaner/water mixture is suctioned into the flight deck scrubber's recovery tank and poured overboard. The procedure is the same for a hangar deck SCRUB-X except fresh water is used.

The LHD had been at-sea for three months and had conducted two flight deck scrubbing exercises concurrent with scheduled testing of the firemain system. Each SCRUB-X lasted 6 to 8 hours, with the water in use 50 percent of the time. Visual observations made during the assessment revealed that the flight deck was stained with an accumulation of tire, grease and oil residue.

Flight Deck Scrubber. All LHD-1 class ships are equipped with a mechanical flight deck scrubber. The flight deck scrubber has a vacuum system that provides suction for residual solution recovery, a portable vacuum wand that is used to clean areas inaccessible to the scrubber, two hydraulically powered scrub brushes, a solution tank, and a recovery tank. The scrubber applies the cleaning solution in front of dual high-speed opposed-rotation brushes. The brushes scrub the soiled area and sweep-up debris. The dirty water and debris is contained by a rear vacuum squeegee and suctioned into the recovery tank. The recovered cleaner/water mixture is poured overboard.

The LHD-1 assessment provided team members the opportunity to compare the LHD flight deck conditions and best management practices to those observed and documented aboard the CV/CVN class carrier. The LHD has 5 fixed and 24 rotary wing aircraft with a moderate operating tempo; the CV/CVN had 62 fixed and 7 rotary wing aircraft with a busy operating tempo. Although the CV/CVN had far more aircraft and a heavier operating schedule than the LHD, the level of flight deck cleanliness was significantly different between the two ships. In order to achieve and maintain flight deck cleanliness, the CV/CVN crew manually scrubbed a section of the flight deck daily. In addition, a mechanical flight deck scrubber was continuously in use onboard the CV/CVN both during and after air operations. The assessment team was onboard the LHD for six days and did not observe the flight deck scrubber in use, nor was the flight deck manually scrubbed. As a result, the team concluded that the best management practices observed onboard the CV/CVN should be considered for transition to all large platform air capable ships.

LHD-1 flight deck personnel stated it is routine practice for all air capable ships to conduct a thorough SCRUB-X of the flight and hangar decks using B&B 88 flight deck cleaner at the end of a deployment and prior to entering the contiguous zone. Although flight and hangar deck scrubbing exercises occur outside the contiguous zone only, residual cleaner may dry on the deck surface or become trapped in the non-skid material and subsequently become entrained in rainfall and go overboard within the contiguous zone

MCM-1 Class. The weather decks of both MCMs were remarkably clean. As a result of all the mine sweeping and handling equipment located topside, the surface area that is washed is significantly smaller than other warships in the same platform category. The frequency of deck washdowns is dependent upon the amount of saltwater accumulation. Washdowns are normally conducted once every three weeks. Sixty percent of washdowns are conducted pierside, 20% within the 0 – 3 nm range and 20% within the 3 – 12 nm range. Two types of washdown evolutions were described by the crew, i.e., rinses and full washdowns, both use freshwater. Full washdowns are conducted using approximately two gal. of Simple Green™

detergent. The crew prefers to conduct full washdowns while the vessel is in port and receiving pierside services. The full washdown evolution takes approximately 2½ hours using a ½ in. garden hose with a water pressure of 35 – 60 psi, the nozzle is normally left open so the water runs continuously. If a full washdown is conducted when underway, the water pressure is 55 – 65 psi and an on/off nozzle is used so the water does run continuously in an effort to conserve the ship's fresh water supply. The crew scrubs the deck with corn brooms, scrub brushes and detergent during a full washdown evolution.

WLM Class. The buoy deck is rinsed after each buoy maintenance evolution to remove the residual marine growth. At the completion of each workday and prior to entering port, the buoy deck is thoroughly washed-down using seawater supplied by the ships firemain. In accordance with local policy, no detergents are used. The deck is washed using a 3,000 psi pressure washer and fire hoses; the wash-down evolution takes approximately 45 minutes. Freshwater washdowns are performed infrequently, only in port, and use pier-supplied fresh water (no detergents).

There are no constituents which contribute to weather deck runoff as a result of daily deck washdown because the only material that enter the surrounding water is marine growth, which is indigenous to the waters it is returned to. A potential for contamination exists only if a material is accidentally released onto the deck.

WPB Class. The team conducted assessments at two ports: two ships at homeport A, one at Homeport B. Due to the unique mission of WPB class ships, they are required to holdand transport illegal migrant personnel on the weather deck of the ship. It is important to note that the illegal migrants remain on the weather deck and do not enter the skin of the ship at any time. In addition, crewmembers must stand guard over the ilegal migrants to ensure they do not jump overboard and swim ashore (which can easily be accomplished due to the lack of a topside enclosure to contain the migrants). As a result, a portable, unenclosed toilet is placed on the weather deck and remains topside until the illegal migrants disembark. The portable toilet quickly fills to capacity because it is not piped to the ships plumbing. The crew is then required to drain the toilet overboard and hose-down the area, resulting in topside conditions that are extremely unsanitary. The crew also brings food and blankets topside to feed and shelter the migrants. It is not uncommon for these vessels, especially the ships at Homeport B, to carry as many as 30 – 50 illegal migrants for a period of several days. The time the illegal migrants are aboard the ship is dependent upon several factors, e.g., how far away from a larger receiving vessel the ship is, how long it takes for legal issues to be resolved, and, in the case of Homeport B, how long it will take the ship to transit if they are required to return the migrants to their homeland. In either case, the illegal migrants are housed on the aft section of the weather deck and only moved forward during deck washdowns. The crew reported that fibers from blankets and clothes, as well as human hair and food particles litter the deck and are washed overboard; this most frequently (85%) occurs within the contiguous zone. The crew indicated that most weather deck runoff occurs during deck washdowns conducted after alien migration interdiction operations.

The ships at each homeport conducted deck washdown operations differently. The deck washdown processes for each homeport are described below.

Homeport A: When pierside, the crew uses fresh water supplied from pierside services to rinse the ship twice weekly. This rinsing process takes two hours using a ¾ in. garden hose

at a pressure of 40 – 50 psi, normally without a on/off nozzle attached. No detergents are used when pierside. When underway, washdowns are conducted prior to entering port, approximately 17 times per month. The crew estimated 75% of underway washdowns are conducted within the contiguous zone. The crew uses fresh water and ½ gal. of Simple Green™ concentrated detergent and a small amount (2 – 3 oz.) of Brite Creme™ on the hull. The washdown process takes eight hours (depending on how dirty the deck is) using fresh water and a garden hose equipped with an on/off nozzle. The crew estimated that the water is on for approximately 3 of the 8 hours.

Homeport B: When pierside, weekly washdowns are conducted using fresh water and ½ gal. of Simple Green™ concentrated detergent. This process takes approximately four hours using a ¾ in. garden hose with a water pressure of 50 – 70 psi and a on/off nozzle attached. When underway the crew uses salt water supplied from the ships 160 psi firemain only; this process takes approximately 2 – 3 hours depending on how dirty the deck is.

The assessment team found general housekeeping to have a positive rather than a negative impact. During every shipboard assessment, the team observed the crews performing general housekeeping throughout the day. On every ship visited, the team noted clean weather decks with no visible dirt or debris and attributed this to good housekeeping practices. The following information was obtained during the AOE-6, DDG-51, MCM-1, WLM and WPB shipboard assessments.

Processes that Contribute Constituents to Weather Deck Runoff

Group 2 – Cleaning Compounds

General Housekeeping

AOE-6 Class. The assessment team observed the crew sweeping the deck throughout the day as part of the ship's daily routine. The decks are swabbed using fresh water and small amounts of general purpose cleaner. Additionally, the assessment team observed the crew swab all weather decks immediately after each rainsquall using only the rainwater on the weather deck (no cleaning compounds). This practice is indicative of the proactive approach the command takes to ensure the ship remains clean using all available resources. The assessment team concluded that general housekeeping does not contribute to weather deck runoff.

DDG-51 Class. The assessment was conducted when the ship was pierside, as a result, the decks were swabbed using fresh water only (no detergent) and care was taken to prevent the water from flowing overboard. During the assessment all dirt and debris were swept and containerized. It is important to note that when a ship is in port the weather deck is normally swept several times a day. As a result of the crew's attention to cleanliness, there is minimal debris topside which has the potential to enter surrounding waters.

MCM-1 Class. All dirt and debris was swept and containerized for shoreside disposal. The decks were swabbed using a small amount (3 – 4 oz.) of Simple Green™ mixed with fresh water in a 5 gal. bucket. None of the water/Simple Green™ mixture was discarded overboard. As a result general housekeeping does not contribute to weather deck runoff.

WLM Class. The crew reported that small amounts (less than 1 quart per month) of Simple Green™ are used when performing general housekeeping. During the shipboard assessment, the entire crew focused on buoy maintenance and retrieval, hence no housekeeping was observed. Although only small amounts of Simple Green™ are used, it is the primary constituent which has the potential to contribute to weather deck runoff as a result of general housekeeping.

WPB Class. Three pierside assessments were conducted at two homeports. During all the assessments, dirt and debris was swept, containerized and turned in to the homeports Hazardous Materials Minimization Center. Since the overboard discharge of detergents at the first homeport is prohibited, the crew swabs their decks using a mop dampened with fresh water and a very small amount of Simple Green™. The crew ensures excess water containing the detergent does not drain overboard in port. The primary constituent resulting from general housekeeping is a small amount of Simple Green™ detergent.

Processes that Contribute Constituents to Weather Deck Runoff

Group 2 – Cleaning Compounds

Ships Boats

AOE-6 Class. The AOE-6 class carries six small boats that are equipped with Cummings engines: two 20 ft. rigid hull inflatable boats (RHIBs), one 40 ft. and one 50 ft. fiberglass utility boats, one 35 ft. aluminum work boat, and one 33 ft. fiberglass captains gig. All small boat engines are started and operated weekly for a period of 15 – 30 minutes. Upon retrieval, the bilges are checked to ensure there is no oil in the bilge before the bilge plug is removed and the boat is hoisted onboard. If oil is present, it is collected and turned in to the HAZMINCEN for disposal ashore. Non-oily bilge water is discharged directly overboard. The small boats are removed from the ship and painted when in port only, except for minor touch-up painting. All small boats are cleaned with a solution of 1 cup MIL-D-16791 general purpose detergent mixed with 5 gal. fresh water followed by a fresh water rinse. The constituents which have the potential to contribute to weather deck runoff are the detergent/water mixture used to clean the boats and small boat engine wet exhaust resulting from the weekly onboard operations. Small boat engine wet exhaust will be addressed separately under UNDS.

DDG-51 Class. The DDG-51 class has two 24 ft. Rigid Hull Inflatable Boats (RHIBs) equipped with a diesel inboard/outboard engine which uses MIL-T-5624T (JP-5) fuel. The RHIBs are removed from the ship and taken to the intermediate maintenance activity for painting; however, minor repairs to the fiberglass hull are performed by the crew. When the RHIB is hoisted on board after operations, the bilge pump is disabled and residual bilgewater is wiped-up with a sponge and deposited in a bucket, the contents of the bucket are then emptied into a deep sink that drains to the ships wastewater tank. The hull is cleaned with fresh water and general purpose detergent. There is minimal potential of topside contamination from the RHIBs as evidenced by the cleanliness of the deck area immediately below the boats.

MCM-1 Class. Each MCM maintains two 17 ft. 10 in. RHIB for use by the mine-disposal divers. The MCM assessed pierside carried one RHIB with a 90 hp outboard engine and one with a 60 hp outboard engine. The MCM assessed underway had two RHIBS, each with a 90 hp outboard engines. The RHIBs are refueled using 6 gal. gas cans filled from the 30 gal. motor gasoline tank located on a jettison platform and surrounded by a containment device with plug and lanyard which allows the crew to drain the containment device as required. The outboard engines are operated daily for 2 – 3 minutes or as long as 15 minutes depending on the ship's crew. The external surfaces and the bilge of the RHIBs are washed down with fresh water and Simple Green™ following every use and during major ship cleanings. The primary constituents that have the potential to contribute to weather deck runoff are: (1) gasoline spilled when refueling the RHIB onboard ship; and (2) contaminants resulting from the onboard operation of the outboard engines on a daily basis. (Small boat engine wet exhaust willbe addressed by a separate UNDS Discharge Assessment Team.)

WLM Class. The WLM had one 18 ft. RHIB with a Yanmar four cylinder engine and a Hamilton Jet inboard/outboard. The RHIB refueling station is enclosed by a 12 in. high containment. The RHIB is washed down following every use and during major ship cleanings using Simple Green™. The primary constituent which has the potential to contribute to weather deck runoff is diesel fuel spilled during fueling operations and/or leaking fuel system fittings on the power plant.

WPB Class. The WPB class carries one 17 ft. RHIB with a 90 horsepower outboard engine with a through-prop exhaust system. The RHIB is refueled using gasoline supplied from 6 gal.

cans. Two 6 gal. cans of gasoline and one 2½ gal. can of Shell 30W motor oil are maintained inside the RHIB and eight 6 gal. cans of gasoline are maintained topside. The crew washes down the RHIB following every use and during major ship cleanings using Simple Green™ detergent. The crew places a cover over the RHIB when the ship is in port to protect it from the elements. The engine on each RHIB is operated for 2 – 3 minutes each time the RHIBs are brought onboard (approximately 15 times a month). The primary constituents that have the potential to contribute to weather deck runoff are: (1) gasoline spilled when refueling the RHIB onboard ship; and (2) contaminants resulting from the onboard operation of the outboard engines on a daily basis. (A separate UNDS Discharge Assessment Team will address smal boat engine wet exhaust.)

Processes that Contribute Constituents to Weather Deck Runoff

Group 2 – Cleaning Compounds

Weapon Systems

The largest guns now fitted in active U.S. Navy ships are the 5 in. MK 45 lightweight guns in cruisers and destroyers; these weapons are considered primarily shore bombardment weapons and have limited anti-air capability. The 76 mm guns in Navy frigates and the larger Coast Guard cutters are primarily anti-aircraft weapons and also have limited anti-air capability. Most Navy surface warships are armed with the MK 15 20 mm Close-In Weapon System (CIWS) for close-in defense against anti-ship missiles. In addition, various types of 25 mm, 20 mm and .50 caliber and 7.62 mm machine guns are fitted in naval ships, primarily for defense against small craft in restricted waters[8]. Weapon system information was obtained on the AOE-6, DDG-51, MCM-1 and WPB class ships. The WLM ship does not have weapon capability.

AOE-6 Class. The AOE-6 class have two MK38 25 mm machine guns, four 50 caliber M2HP machine guns, two close-in weapon systems (CWIS), and one dual box missile launcher. All gun mounts are cleaned using fresh water and MIL-D-16791 general purpose detergent. MIL-L-63460 cleaner lubricant and preservative is applied to the 50 caliber gun mounts and the MK38 25 mm gun mount. The gun mounts are covered when not in use; however, the crew indicated the covers do not maintain integrity so rusting gun mount components is a continual problem. Since the weapon systems are covered and minimal materials are used to maintain the systems, they do not have the potential to contribute to weather deck runoff.

DDG-51 Class. DDG-51 class weapon systems include: one MK 45 5"/54 caliber lightweight gun mount; two MK 41 vertical launch systems (VLS); two phalanx close-in weapon systems (CIWS); two MK 32 MOD 14 triple-barrel torpedo tubes; two 50 caliber machine gun mounts, and two MK 36 MOD 12 super rapid-blooming offboard CHAFF launchers (SRBOC). The majority of materials, e.g., grease and oils that are used on the weapons systems are used on internal components and therefore do not have the potential to contribute to weather deck runoff. However, two materials used on the external surfaces of DDG-51 class weapons system were identified as having the potential to contribute to weather deck runoff : (1) MIL-G-21164 grease; and MIL-L-63460 cleaner, lubricant and preservative. Interviews with the crew revealed that approximately 30 – 35% of the 16 oz. of MIL-G-21164 that is applied to the gun mount chase is washed-off during a normal rainfall. The crew also estimated that approximately 50% of the two oz. of MIL-L-63460 cleaner, lubricant and preservative applied to the 50 caliber gun mount is washed-off during a normal rainfall.

During the assessment the team observed the crew using a chemical paint remover on the CIWS. The material, *Peel Away 7* (manufactured by Dumond Chemicals Inc., New York, NY 10036), was applied with a brush and allowed to stand for 30 minutes then removed with a putty knife. The resulting paint/Peel Away 7 mixture was placed into plastic bags and turned into the HAZMINCEN for disposal.

MCM-1 Class. Systems employed aboard MCM-1 class ships are two .50 caliber machine guns and two M60 machine guns mounted port and starboard. All gun mounts are cleaned using fresh water and Simple Green™. MIL-L-63460 cleaner, lubricant and preservative is applied to the gun mounts. Covers are installed on the gun mounts when the ship is in port to protect the equipment from the weather and to prevent corrosion.

WPB Class. Systems employed aboard the WPB class are one MK38 25 mm machine gun and two 50 caliber M2HP machine guns. All machine guns are cleaned using fresh water and

Processes that Contribute Constituents to Weather Deck Runoff

Group 2 – Cleaning Compounds

Simple Green™. Approximately 2 oz. of MIL-L-63460 cleaner, lubricant and preservative is applied to the 50 caliber gun mounts and the MK38 25 mm gun mount. Covers are installed on the guns when the ship is in port to protect the equipment from the weather and prevent corrosion. Since machine guns are covered when in port the only constituent that has the potential to contribute to weather deck runoff is MIL-L-63460; however, the potential only exists if the ship is operating in the contiguous zone during rainfall or heavy seas.

Processes that Contribute Constituents to Weather Deck Runoff

Group 3 – Paint Debris

Buoy Handling

WLM Class. USCG WLM/WLB buoy tenders retrieve, maintain, and re-deploy coastal navigation buoys, primarily inside 12 nm.

Navigation buoy servicing consists of: (1) buoy retrieval and re-deployment, and (2) inspection, cleaning, and maintenance. Major repairs, including full buoy repainting, are conducted at shoreside facilities.

Marine growth, sediment, and paint chips resulting from buoy cleaning and washing are swept overboard using shovels and a 3,000-psi pressure washer using seawater supplied by the ship's 160-psi firemain system. Constituents found in this discharged material are likely to include biological material (e.g., algae and fouling organisms), organic and inorganic sediments of various sizes, and weathered paint chips (including metals and biocides contained in the buoy paints). Although the Survey Team was unable to estimate the exact composition, they observed sediment and marine growth to comprise >99.5% of this mixture. Because the vessel remains stationary during buoy handling, all of the marine growth and sediment is washed over the side at the same location from where the buoy was retrieved originally. Based on discussions with crew, all USCG Buoy Tenders operate in the same fashion, returning bottom debris to the location from where it originated.

Other products routinely used for buoy inspection, cleaning, and maintenance includes touch-up paint and Simple Green™. All major repainting is performed off ship; occasionally minor touch-up painting is performed underway during the buoy maintenance process. During the day of the assessment, none of the six buoys retrieved required touch-up painting. As a result of discussions with crewmembers, the assessment team concluded that touch-up paint does not contribute constituents to deck runoff.

Processes that Contribute Constituents to Weather Deck Runoff

Group 3 – Paint Debris

Deck/Superstructure Maintenance and Preservation

The assessment team obtained information on deck/superstructure maintenance and preservation during every shipboard assessment.

AOE-6 Class. The crew removes deck and superstructure paint using needle guns, disc sanders, grinders, sandpaper and wire brushes. No chemical paint removers are used. Waste paint debris is containerized and turned into the Hazardous Material Minimization Center (HAZMINCEN) for disposal ashore. Surfaces are painted using brushes and rollers; they are rough sanded and wiped-down with a mixture of general purpose detergent and fresh water prior to painting. Tarps are suspended between the ship and the pier to catch paint debris if painting the hull when in port. The primary constituent that has the potential to contribute to weather deck runoff as a result of deck/ superstructure maintenance and preservation is paint chips that may become airborne (when the crew is sweeping-up the paint debris) and carried overboard

CV/CVN Class. The flight deck is covered with a non-skid surface coating which is removed and applied by a contractor during ships periods of availability. Only spot repairs of small areas are made while underway. If spot repairs are required, the crew removes the non-skid using hand operated deck grinding machines, no chemical removers are used. Waste materials from the non-skid removal are swept, containerized and turned into the HAZMINCEN for disposal ashore. Deck maintenance and preservation does not contribute to weather deck runoff.

DDG-51 Class. Deck and superstructure paint is applied using brushes and rollers. De-painting methods include needle guns, disc grinders, sandpaper and wire brushes. Neither the needle guns nor the disc grinders are vacuum-assisted. During the assessment, the team observed a Sailor de-painting a metal door using a grinder. The Sailor had taken the precaution of placing the metal door on a tarp to contain the debris; upon completion of his task, the debris that had projected beyond the tarp was swept, containerized and turned in to the ships HAZMINCEN. All weather deck surfaces are coated with non-skid material which is applied/removed by contractor personnel during the ships repair availability period. Although no chemical paint remover is used on the deck and superstructure, the product *Peel-Away 7*, is used on the close-in weapons system. Even though the crew exercises caution and takes preventive measures to ensure paint debris does not enter the surrounding water, paint, paint chips and metal chips do have the potential to contribute to weather deck runoff during deck and superstructure maintenance and preservation.

LHD-1 Class. A fresh non-skid surface coating was applied to the flight deck ten months prior to the assessment. All of the ships surveyed have indicated that only spot repairs are made when underway; new non-skid is removed and applied by a contractor during ships periods of availability. No spot repairs had been made since the ship began its deployment three months ago. The crew stated that if spot repairs are required prior to returning to port, they will remove the non-skid using hand operated deck grinding machines, no chemical removers will be used. Waste materials will be swept, containerized and turned into the HAZMINCEN for disposal ashore. As a result, flight deck maintenance and preservation does not contribute to weather deck runoff.

MCM-1 Class. MCM-1 class ships are constructed of glass reinforced plastic sheathed wood, i.e., laminated oak framing, douglas fir planking, and deck sheathing with reinforced fiberglass

covering. Great care is taken to maintain and preserve the vessels' hull, decks, and superstructure. Surfaces are cleaned with fresh water and Simple Green™ detergent prior to painting, and, a majority of the time (80%), only sandpaper is used to prepare the surface for painting. Deck/superstructure paint is applied using brushes and rollers and removed using sandpaper, grinders, or vacuum-assist disc sanders; no chemical paint removers are used in the ships preservation process. Spray painting is not performed onboard ship and no solvents are thinners are used when painting. Waste materials are swept and containerized for shoreside disposal. Approximately 90 – 95% of the painting is performed while pierside, the remaining 5 – 10% is limited to touch-up work which is performed when underway. Brushes and rollers are solvent-cleaned in the paint locker which is not accessible from the weather deck.

WLM Class. No painting is performed when underway other than touch-up painting of buoys. The ships hull and superstructure are painted in port only and is normally limited to touch up painting; complete hull painting is performed during periods of repair availability. Surface preparation is performed using a wire brush. All residual paint chips are swept-up and containerized for disposal ashore. In the previous 14 months, the hull has been painted once. Paint used by the by the WLM is manufactured by Interlux; specific color information is Interlac 800, white; Interlux premium yacht enamel #344, international orange; and Interlux brightside polyurethane #4253, ocean blue. These paints are the primary constituent which contributes to weather deck runoff as a result of deck/superstructure maintenance and preservation.

WPB Class. The crew removes deck and superstructure paint using needle guns, disc sanders with recovery vacuum, palm sanders with dust collection bags, sandpaper and wire brushes; no chemical paint removers are used. Paint debris is swept and containerized for disposal ashore. The hull above the water line is painted every six months and is rough-sanded and wiped-down with denatured alcohol and rags prior to painting the surfaces with brushes and rollers; the ship is waterborne during the 7 – 10 day preparation and painting process. The crew uses paint manufactured by Interlux; specific color information is Interlac 800, White; Interlux Premium Yacht Enamel #344, International Orange; and Interlux Brightside Polyurethane #4253, Ocean Blue.

Processes that Contribute Constituents to Weather Deck Runoff

Group 3 – Paint Debris

Ships Boats

USN and USCG ships carry small boats ranging in size from dinghies to utility boats. These craft are used for ships mission support (e.g., liberty launches and captains gigs) and are not capable of making independent voyages on the high seas. Most boats are built of aluminum, plastic or fiberglass; a few are still made of wood. Rigid-hulled inflatable boats (RHIBs) are constructed of rubberized fabric pontoons with fiberglass hulls.

Each ship maintained their boats in a similar manner. Below are a listing of ships that the assessment team observed, the boats they carried onboard, and their practices.

AOE-6 Class:

- Two 20-ft. RHIBs
- One 40-ft. utility boat
- One 33-ft. Captains gig
- One 50-ft. utility boat
- One 35-ft. work boat

All boats are removed from the ship and taken to the Ship Intermediate Maintenance Activity (SIMA) for painting. Minor touch-up painting (using brushes) is occasionally performed underway at distances greater than 12 nm.

DDG-51 Class:

- Two 24-ft RHIBs

The RHIBs are removed from the ship and taken to the SIMA for painting and hull repair

MCM-1 Class:

- Two 17 ft. 10 in. RHIBs

The RHIBs are removed from the ship and taken to the SIMA for painting and hull repair.

WLM Class:

- One 18 ft. RHIB

The RHIB is removed from the ship and refurbished by the Maintenance Augmentation Team (MAT).

WPB Class:

- One 17 ft. RHIB

The RHIB is removed from the ship and refurbished by the MAT.

Processes that Contribute Constituents to Weather Deck Runoff

Group 4 – No Contributing Constituents

Electronic Intelligence/Navigation Systems

Processes information was obtained during the AOE-6, DDG-51, MCM-1, WLM and WPB shipboard assessments.

AOE-6 Class. The crew cleans the surface search and navigation radar rotating assemblies with fresh water and MIL-D-16791 general purpose detergent which is immediately wiped-off. Ship's force personnel do not conduct any maintenance or repairs to drive assemblies except to determine oil and grease levels in the AN/SPS-67 and AN/SPS-64 radar. As a result, electronic intelligence and search/navigational systems do not contribute to weather deck runoff.

DDG-51 class. The DDG-51 class surface search and navigation rotating assemblies are cleaned using fresh water supplied from ships 50 – 70 psi fresh water system; no cleaning compounds are used. The whip antennas are also washed using fresh water only and wiped dry with rags. No maintenance or repairs to drive assemblies are conducted by ships force other than checking oil and grease levels in the SPS-64 and SPS-67 radar. Whip antenna maintenance is limited to applying small amounts of silicone to the couplers and applying sealing compound, which hardens within 24 hours, to all connections. Preservation and painting of radar assemblies and whip antennas is limited to touch-up painting performed by the crew. These assemblies are removed form the ship and refurbished by an intermediate maintenance activity during ship availability periods. As a result, the electronic intelligence and search/navigation systems aboard a DDG-51 class destroyer do not contribute to weather deck runoff.

MCM-1 Class. MCM-1 dass ships are equipped with the following systems: AN/SSN-2 Precise Integrated Navigation System (PINS); AN/SQQ-32 Sonar; AN/SPS-55 Radar; and AN/WSN-2 Gyrocompass. The surface search and navigation radar rotating assemblies are cleaned using fresh water and Simple Green™ detergent. Since all surface search and navigation systems used onboard ship are self-contained, there are no constituents (other than a very small amount of Simple Green™ detergent) that have the potential to contribute to weather deck runoff.

WLM Class. The WLM has two remote control search and rescue lights and a self-contained Sperry commercial radar system. The ship's navigation system uses a Global Positioning System (GPS) and Differential Global Positioning System (DGPS) linked to a computer-controlled thruster propulsion setup to maintain position during buoy maintenance. Several fixed whip antennae support ship communications. The system is occasionally cleaned with fresh water during inspection to remove salt buildup. Because the radar arrays are self-contained, it does not contribute to weather deck runoff.

WPB Class. The crew cleans the WPB class surface search and navigation radar rotating assemblies using only fresh water supplied from the ship's fresh water system at approximately 50 – 70 psi. Ships force conducts no maintenance or repairs to drive assemblies except to determine oil and grease levels in the SPS-69 and SPS-73 radars. The WPB has two remote control search and rescue lights. The ship's navigation system uses a GPS. These systems do not have the potential to contribute to weather deck runoff.

Processes that Contribute Constituents to Weather Deck Runoff

Group 4 – No Contributing Constituents

Fire Assist Vehicles

CV/CVN Class. There are three flight deck fire trucks onboard the ship, two are located on the flight deck, the other in the hangar deck. Each vehicle carries 28 gal. of fuel, 70 gal. of water, and 60 gal. of aqueous film forming foam (AFFF). The fire assist vehicles are capable of applying the extinguishing agent in a fog, spray or stream to combat fires. Other vehicles used for aircraft fire fighting, crash, rescue, and salvage are the A/S 32A-35 crash and salvage crane, a 20,000 lb. forklift and a 6,000 lb. forklift. The operation and maintenance of this equipment does not have the potential to contribute to weather deck runoff.

LHD-1 Class. There are two A/S32P-25 fire trucks located on the flight deck. These vehicles have the capability to apply an extinguishing agent in a fog, spray or stream to combat fires. The operation and maintenance of this equipment does not have the potential to contribute to weather deck runoff.

Processes that Contribute Constituents to Weather Deck Runoff

Group 4 – No Contributing Constituents

Firemain Systems

Contaminants that may or may not result from using firemain systems are being addressed as a separate UNDS discharge. The shipboard assessment team was tasked to determine only if the firemain system contributes to weather deck runoff. Since the firemain system uses salt water obtained from surrounding waters, it does not have the potential to contribute constituents to weather deck runoff other than the constituents that become entrained in the salt water as it traverses the weather deck. The following information was obtained during the AOE-6, DDG-51, MCM-1,WLM and WPB assessments and is included in this report for information purposes only.

AOE-6 Class. The firemain system is designed to operate at 150 psi using the standard combination nozzle and hose stations. The system uses salt water from the ship's environment and applies it in a fog, spray, or stream to combat fires. An in-deck sprinkler system is installed in the helicopter deck for aircraft firefighting. The ship is equipped with a countermeasure washdown system for combating chemical, biological and radiological attack.

DDG-51 Class. The forecastle and helicopter decks have "in deck" sprinkler systems installed for fire suppression. These sprinkler systems are supplied by the ships firemain and aqueous film-forming foam (AFFF) systems. The firemain system is not operated or tested within the contiguous zone.

MCM-1 Class. The firemain system is designed to operate at 125 psi using the standard combination nozzle and hose stations. The system uses salt water from the ships environment and applies it in a fog spray or solid stream to combat fires. A total of 13 stations are located throughout the ship on the weather decks. The sprinkler system for weather deck countermeasure washdown is tested every 60 months in accordance with the planned maintenance system; however, the system is activated approximately once every six months for crew training.

WLM Class. The firemain system is capable of generating 160 psi using the standard combination nozzle and hose stations. The fire suppression system uses salt water from its environment and applies it in a fog, spray or stream to combat fires. This system is also usedto conduct ships washdown, particularly in the buoy deck area.

WPB Class. The firemain system is designed to operate at 160 psi using the standard combination nozzle and hose stations. The system uses saltwater from the ship's environment and applies it in a fog, spray or stream to combat fires.

Processes that Contribute Constituents to Weather Deck Runoff

Group 4 – No Contributing Constituents

Flight Deck Safety Nets

Flight deck safety nets are located on all air capable ships to provide a measure of protection against personnel falling overboard. The team observed and documented the maintenance of flight deck safety nets during the AOE-6, CV/CVN, DDG-51, and LHD-1 class assessments.

AOE-6 Class. Nylon safety nets are located on the area surrounding the helicopter deck. Safety net maintenance consists of load testing and inspecting the condition of the nylon strapping. The safety nets and frames are cleaned using a hand-held scrub brush wetted with a solution of 8 oz. MIL-D-16791 general purpose detergent mixed with one gal. of freshwater and rinsed-off with fresh water; this cleaning solution discharges directly overboard. Very small amounts of MIL-G-23549 is applied by hand to the hinge pins of the net frames after washing. The deck edge safety nets are washed beyond 25 nm from shore; therefore the effluent generated is not subject to UNDS.

CV/CVN Class. Stainless steel safety nets surround the flight deck. Net maintenance consist of load testing and inspection. The nets are cleaned using a hand held scrub brush moistened with a mixture of 8 oz. of MIL-D-16791 general purpose detergent in 1 gal. of fresh water. The cleaning solution is rinsed-off with fresh water that discharges directly overboard. A very small amount of MIL-G-23549 is hand-applied to the hinge pins. Since the deck edge safety nets are washed only while underway outside the contiguous zone and since they are not located directly over a deck, their maintenance does not contribute to weather deck runoff.

DDG-51 Class. Safety nets, located around the periphery of the helicopter deck, are made of nylon and attached to steel frames by nylon rope. Annual load testing and inspection are the only maintenance requirements. The nets are cleaned using a solution of approximately ½ gal. of general purpose detergent mixed with 2½ gal. of fresh water supplied by the ships 50 –70 psi fresh water system and scrubbed with a hand held brush. The safety nets are washed concurrent with the deck washdown evolution prior to entering port. Since the washdown occurs prior to entering the 12 nm zone, this process does not have the potential to contribution to weather deck runoff.

LHD-1 Class. Stainless steel safety nets surround the flight deck. The nets and frames are cleaned using a hand-held scrub brush moistened with a mixture of MIL-D-16791 general purpose detergent in one gal. of fresh water. The cleaning solution is rinsed with fresh water that discharges directly overboard. A very small amount of MIL-G-23549 is hand-applied to the hinge pins. Since the deck edge safety nets are washed only while underway outside the contiguous zone and since the nets are not located directly over a deck, their maintenance does not contribute to weather deck runoff.

Processes that Contribute Constituents to Weather Deck Runoff

Group 4 – No Contributing Constituents

LST Bow Ramp

Tank landing ships (LST) were previously used to transport and land tanks, amphibious vehicles and other rolling stock during an amphibious assault. LST ships offload cargo and vehicles by means of a 112 ft. ramp over their bow. A stern gate allows off-loading of amphibious vehicles directly into the water.

In order to ensure a comprehensive evaluation of all processes performed on amphibious assault ships, two members of the shipboard assesssment team visited a tank landing ship (LST) to determine if the bow ramp has the potential to contribute to weather deck runoff. At the time of the assessment the Navy had two LST class ships. As of this writing, the LST assigned to the Atlantic Fleet has been decommissioned; the last remaining LST is assigned to the Pacific Fleet Naval Reserve Force.

The LST bow ramp contains a exposed wire cable that runs the full length of the ramp and is routed around sheaves located at the top forward part of the boom on both sides. As the boom pays out, the boom and ramp roll forward as they traverse on the boom rails. Although the boom is operational, the crew indicated that routine maintenance and testing has been reduced to a quarterly basis because the bow ramp it is not used on a regular basis. The rollers, rails, sheaves, and cable assemblies that are continuously exposed to the outside elements were not lubricated. The assessment team concluded that the bow ramp does not have the potential to contribute to weather deck runoff.

Processes that Contribute Constituents to Weather Deck Runoff

Group 4 – No Contributing Constituents

Towing and Mooring Systems

Most routine towing jobs in the Navy are handled by harbor and fleet tugs. Combatant vessels can tow other vessels or be towed, but such operations are usually performed only in an emergency. The towing rig varies between ship classes, but includes the following in one form or another: the towing-pad eye, usually located on the centerline of the stern; a towing assembly consisting of a large pelican hook shackled to the towing pad and hawser; and the hawser itself (wire rope).

Mooring a ship to a pier, buoy or another ship requires the use of an anchor windlass, capstan, and mooring lines, winches, and fittings such as cleats, bits, chocks, shackles and towing pads. Mooring lines are typically located at the bow, stern and amidships. The assessment team obtained towing and mooring system information during the AOE-6, DDG-51, MCM-1, WLM and WPB shipboard assessments.

AOE-6 Class. The crew performs all towing and mooring using multi-strand nylon line. No preservation measures are taken other than to inspect the lines after each use and replace when required. Cleaning is limited to fresh or seawater rinses when required. All lines are stowed in the line locker or faked on deck. All grease fittings and mechanical components of the electrically operated capstans are internal. As a result, the towing and mooring system does not contribute to weather deck runoff.

DDG-51 Class. All towing and mooring is performed using multi-strand nylon line. No preservative measures are taken other than to inspect and replace the nylon line when required. Cleaning is limited to fresh water or seawater rinses when required. The towing and mooring system do not contribute to weather deck runoff.

MCM-1 Class. All towing and mooring is performed using multi-strand nylon line. No preservation measures are taken other than to inspect and replace the nylon line when required; cleaning is limited to fresh water rinses when required. The anchor chain capstan is equipped with a gypsy that can be de-clutched to allow independent operation and is used to assist in mooring. The towing and mooring system does not contribute to weather deck runoff.

WLM Class. Multi-strand nylon line is used for all towing and mooring. No preservative measures are taken other than to inspect and replace the nylon line when necessary. The line is rinsed with fresh or salt water as required. The towing and mooring system does not contribute to weather deck runoff.

WPB Class. The crew performs all towing and mooring using multi-strand nylon line. No preservation measures are taken other than to inspect and replace the nylon line when required. Cleaning is limited to fresh or seawater rinses when required. The towing and mooring system does not contribute to weather deck runoff.

Constituents That Have the Potential to Contribute to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Constituents that have the potential to contribute to weather deck runoff.

The following report section identifies the constituents and the amount that has the *potential*to enter surrounding waters.

Aircraft Elevators. The table below lists the grease type and amount used for each elevator. The estimated amounts were provided by ship crews; the team was unable to quantfy the amount.

Grease Type	Amount Used per Elevator per Year	Number of Aircraft Elevators CV/CVN	Number of Aircraft Elevators LHA, LHD, LPH
MIL-G-23549	24 gallons	48	22
MIL-G-24139	2 gallons	48	
MIL-G-18458	2 gallons	48	22
DOD-G-24508	Unknown		22

MIL-G-23549= 24 Gallons x 70 Elevators= 1680 gallons
MIL-G-24139= 2 Gallons x 48 Elevators= 96 gallons
MIL-G-18458= 2 Gallons x 70 Elevators= 140 gallons
DOD-G-24508= Unknown

Aircraft Fueling. CV/CVN class ships spill approximately 20 gallons of MIL-T-5624T jet fuel daily. This spill is caused by aircraft fuel tank venting and malfunctioning equipment. All fuel is immediately cleaned up by the crew. No spills were noted during the LHD-1 or AOE-6 shipboard assessments. It is important to note that all air operations occur outside the contiguous zone and the flight decks are thoroughly cleaned prior to entering the contiguous zone. The potential does exist for negligible amount of fuel to be that have become trapped in the rough non-skid deck surface to subsequently become entrained in raingall and go overboard within the contiguous zone.

Aircraft Launch and Recovery Equipment (ALRE). The amounts shown below indicate the *total* estimated amount used by the fleet for maintaining the operation of the ALRE systems. The amounts are based on carriers operating 50% of the year and conducting flight operations on 90% of the deployed days. Factors altering these assumptions will directly affect the estimated amounts shown. Significant amounts of materials will collect in the catapult troughs and add to deck runoff via the catapult trough drain system; no quantitative data was available. Amounts remaining on deck surfaces are cleaned during deck washdowns; however, residual amounts may contribute to deck runoff.

Constituents That Have the Potential to Contribute to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Material	NSN	Component	Estimated Annual Usage
Grease (GP)	9150-00-823-8047	Jet blast deflector Arresting Gear	6552 gallons
Grease (Bel Ray HT)	9150-01-145-1259	Catapult	3336 gallons
Grease (Aircraft)	9150-01-237-7468	Arresting Gear	6864 gallons
Oil, lubricating	9150-01-432-0511	Jet blast deflector	984 gallons
Oil, lubricating	9150-00-753-4937	Catapult	6432 gallons
Grykote (oil)	9150-00-935-4127	Arresting gear	1728 gallons
Dry Cleaning Solvent	6850-00-274-5421	Jet blast deflector Catapult Arresting Gear	13476 gallons
Anti-seize compound	8030-00-292-1102	Jet blast deflector Arresting gear	48 gallons

Aircraft Operations, Fixed Wing. Fixed wing air operations are conducted aboard CV/CVN and amphibious assault class ships. The processes that have the greatest potential to contribute to deck runoff are MIL-H-83282 aircraft hydraulic fluid and MIL-C-85704 gaspath cleaner. The data for these processes are shown below.

Aircraft Type	Engine Cleaning Frequency (hours of operation)	Gallons of Gaspath Cleaner used to Clean Engines	Hydraulic System Capacity (MIL-H-83282)
F-14	125	10	8 gallons
F/A-18	150	5	4 gallons
S-3	170	1	7.2 gallons
EA-6B	150	2	7 gallons
C-2	100	2 ½	12 gallons
E-2	100	2 ½	12 gallons
AV-8	Unknown	Unknown	4 gallons

MIL-H-83282 hydraulic fluid discovered on deck surfaces would result as a leak and be corrected and cleaned-up immediately. The potential exists for a residual amount to remain in the non-skid and contribute to deck runoff.

Constituents That Have the Potential to Contribute to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

Aircraft Operations, Rotary Wing. Rotary wing air operations are conducted aboard CV/CVN and Amphibious class ships. The processes that have the greatest potential to contribute to deck runoff are MIL-H-83282 aircraft hydraulic fluid and MIL-C-85704 gaspath cleaner. The data for these processes are shown below.

Aircraft Type	Engine Cleaning Frequency (hours of operation)	Gallons of Gaspath Cleaner used to Clean Engines	Hydraulic System Capacity (MIL-H-83282)
CH-53	25	1	4 gallons
CH-46	25	1	4 gallons
UH-1	25	1	4 gallons
AH-1	50	1	4 gallons

MIL-H-83282 hydraulic fluid discovered on deck surfaces would result as a leak and be corrected and cleaned-up immediately. The potential exists for a residual amount to remain in the non-skid and contribute to deck runoff.

Buoy Handling Systems. Buoy handling operations require the use of various cranes and winches to retrieve and reset buoys. MIL-G-18458 grease used to lubricate the wire rope on the cranes and winches as well as Texaco Rando HD 32 hydraulic fluid used to power the winches and cranes have the potential to enter surrounding waters. Although the potential exists, it is minimal. The grease would have to fall onto the deck and be subsequently washed overboard; the hydraulic hoses would have to experience a failure. The amount that has the potential to enter surrounding waters could not be quantified.

Fuel Transfer Systems. The type of fuel transfer systems used on the ships assessed varied in complexity and size. The MCM-1, WLM, and WPB are fueled from the pier and have containment structures surrounding the fuel receiving stations. The potential does exist for a spill to occur during a DDG-51 fueling evolution; however, the potential is minimal and the crew exercises measures to prevent the spill from entering surrounding waters. The fuel transfer system on AOE-8 class ships has the potential to contribute to weather deck runoff. The AOE-6 class vessel has five very large stations used for fueling-at-sea operations. Each station employs winch engines, wire rope, cable drums with sheaves and control systems required to conduct refueling at sea operations. The other vessels surveyed had receiving stations for fuel transfer and, as a general rule, do not transfer fuel to other vessels.

Ship Class	Equipment	Material	Amount Used
AOE-6	2400 ft. 7/8 inch wire rope	MIL-G-24139	15 gallons
AOE-6	1600 ft. ¾ inch wire rope	MIL-G-24139	10 gallons
AOE-6	1200 ft. ½ inch wire rope	MIL-G-24139	7.5 gallons

Ground Support Equipment. CV/CVN and amphibious assault ship classes of ships use ground support equipment to maintain and move aircraft on the flight deck. The equipment uses several types of lubricants and greases that have the potential to leak and present a potential contributor to deck runoff. Although lubricants may leak from the equipment, they are

cleaned-up as soon as they are detected. However, some maintenance materials may become entrained in the deck and enter surrounding waters within the contiguous zone, including MIL-L-46152 oil, Dexron automatic transmission fluid, MIL-H-83282 hydraulic fluid; MIL-L-17331 hydraulic fluid; and A-A-52624 antifreeze. The assessment team is unable to quantify the amount of material that has the potential to leak from the equipment and enter surrounding waters

Mine Handling Systems. The US Navy has a total of 18 ships that contain mine handling equipment. MIL-G-24139 grease is applied to the outrigger boom articulating pins. Each ship has three booms; each boom contains approximately one pound of MIL-G-24139. These pins are exposed to the weather and the potential exists for the grease to enter the water.

Recovery, Assist, Securing and Traversing (RAST) Systems. The RAST system, used to assist helicopters to land safely on the flight deck of small platform ships,is not used within the contiguous zone. The Navy has 98 ships equipped with the RAST system. The equipment uses MIL-G-81322 grease on the traverse cables, located inside the track covered with slot seals. Although the grease used is inside the track, the potential exists for grease to migrate to the non-skid surface and eventually enter surrounding waters. The quantity that has the potential to enter surrounding waters could not be quantified.

Ships Boats. All of the ships that were surveyed carried small utility and transport boats. The table below details the ships class, number and types of boats, power plant and potential constituents.

Ship Class	Boat Type	Number Onboard	Power Plant /Fuel	Potential Contributing Constituents
AOE-6	20 Ft. RHIB*	2	Diesel	JP-5/Diesel fuel MIL-T-5624T
AOE-6	40 Ft. Utility	1	Diesel	JP-5/Diesel fuel MIL-T-5624T
AOE-6	33 Ft. Captains Gig	1	Diesel	JP-5/Diesel fuel MIL-T-5624T
AOE-6	50 Ft. Utility	1	Diesel	JP-5/Diesel fuel MIL-T-5624T
AOE-6	35 Ft. Work Boat	1	Diesel	JP-5/Diesel fuel MIL-T-5624T
DDG-51	24 Ft. RHIB	2	Diesel	JP-5/Diesel fuel MIL-T-5624T
MCM-1	17 Ft. RHIB	2	Gasoline Outboard	Gasoline/outboard oil mixture 50:1 (Portable fuel containers) Gas/oil/water exhaust on deck during test/maintenance runs
WLM	18 Ft. RHIB	1	Gasoline Outboard	Gasoline/outboard oil mixture 50:1 (Portable fuel containers) Gas/oil/water exhaust on deck during test/maintenance

				runs
WPB	17 Ft. RHIB	1	Gasoline Outboard	Gasoline/outboard oil mixture 50:1 (Portable fuel containers) Gas/oil/water exhaust on deck during test/maintenance runs

*Rigid-Hull Inflatable Boat

The potential exists for leaking fuel or spilled fuel to contribute to deck runoff. This fuel could be either MIL-T-5624T or the gasoline/oil mixture for the outboard motors. Since the fuel tanks for the JP-5/diesel powered boats are permanent tanks with hard-piped connections, it would require a system failure to cause a significant leak or a spill. The outboard motors, which use portable fuel canisters plumbed with rubber hose to the engine, have a greater potential to leak than the hard-piped systems.

The maintenance/test runs for the outboards are conducted on deck. The outboards have through prop exhaust systems that discharge the engine cooling water and any residual gasoline/oil from the combustion process. The assessment team considered this discharge to be a significant contributor to deck runoff, however this discharge is being addressed separately under UNDS.

Ships Boats Launching Systems. The launching systems for small boats varied in design and materials used for maintenance. The table below details the ship class, type of launching system and materials used.

Ship Class	Launching System	Material Used
AOE-6	Double arm, pivoting, gravity davit with ¾ in. wire rope	MIL-G-18458 grease MIL-T-5624 (to clean the cable)
DDG-51	Electro/mechanical slewing arm davit With ¾ in wire cable	One lb. MIL-G-23549 grease 2-3 gal. P-D-680 Type III (to clean the cable)
MCM-1	Anti-magnetic electric hoist with nylon line	None
WLM	Articulating crane with ½ in galvalized steel cable	Cable not lubricated Texaco Rando HD 32 used in crane
WPB	Electro/hydraulic marine crane with ¾ in. cable	MIL-G-18458 grease P-D-680 Type III (to clean the cable)

The crew onboard the AOE and DDG stated that they spread a tarp on the deck prior to performing maintenance to containing the cleaning compound and grease. The potential exists

for some of the grease applied to the cables that are exposed to the environment to be washed off during a rainfall event and enter surrounding waters.

Stores Handling Systems. Stores are transferred by hand on MCM-1, WLM and WPB class ships. AOE-6 class vessels have four very large stations used for replenishment-at-sea operations. Each station employs kingposts, winch engines, wire rope, cable drums with sheaves and control systems. The DDG-51 surveyed had receiving stations for replenishment at sea consisting of a kingpost, easing-out-cleat, and easing-out-stabilizer. The materials used to lubricate the stores handling systems is shown below.

Ship Class	Equipment	Material	Amount
AOE-6	900 Ft. 1 inch wire rope	MIL-G-24139	5 gallons
AOE-6	900 Ft. ¾ inch wire rope	MIL-G-24139	5 gallons
AOE-6	700 Ft. ¾ inch wire rope	MIL-G-24139	5 gallons
AOE-6	1200 Ft. ½ inch wire rope	MIL-G-24139	5 gallons
AOE-6	Kingpost Assembly	MIL-G-24139	10 gallons
DDG-51	Kingpost/Sliding Pad-Eye Assembly	MIL-G-23549	¼ gallon

The DDG-51receiving station does not have a containment structure around the Kingpost assembly; however, replenishment-at-sea occurs only outside the contiguous zone. The grease is continuously exposed to the elements and presents a significant potential contribution to deck runoff if the grease washes off the lead screw assembly and onto the deck surface. Residual amounts of grease left on deck surfaces could contribute constituents to deck runoff. The assessment team could not quantify any amount for this process.

The grease used on stores handling systems onboard AOE-6 class ships is continuously exposed to the elements and has the potential to contribute a significant amount of material to deck runoff. However, m ost of the grease washed off would be deposited on the deck and the team observed the crew constantly cleaning the deck surfaces continually during RAS operation. The assessment team is unable to quantify amounts.

Weapon Systems. The assessment team concluded that other than the 5"/54 caliber lightweight gun mount and the close-in-weapon system, weapon systems do not contribute to deck runoff. The weapon system information is detailed in below.

Ship Class	Weapon System	Material
AOE-6	MK 38 25 mm machine guns (2)	MIL-L-63460
AOE-6	CIWS (2)	MIL-L-63460
AOE-6	M2HP .50 caliber machine guns (4)	MIL-L-63460
DDG-51	MK 45 5"/54 caliber lightweight gun mount (1)	MIL-G-21164
DDG-51	MK 41 vertical launch system (2)	None
DDG-51	MK 32 MOD 14 TRIPLE BARRELED TORPEDO LAUNCHER (2)	None
DDG-51	CIWS (2)	MIL-L-63460
DDG-51	M2HP .50 CAL. MACHINE GUN (2)	MIL-L-63460
MCM-1	M2HP .50 CAL. MACHINE GUN (2)	MIL-L-63460

Constituents That Have the Potential to Contribute to Weather Deck Runoff

Group 1 – Petroleum, Oil and Lubricants

WPB	MK 38 25MM RAPID FIRE, FIXED MOUNT (1)	MIL-L-63460
WPB	M2HP .50 CAL. MACHINE GUN (2)	MIL-L-63460

Based on ship survey evaluations and crew estimates, the fleet-wide discharge of MIL-G-21164 grease from the MK 45 5"/54 caliber lightweight gun mount is calculated as follows.

1. Approximately 5.0 oz. of grease is released during each rain event.
   (16oz/unit × 30%/event ≈ 5.0 oz/unit-event)
2. A weapon unit that is exposed to 24 rain events per year would generate an estimated annual grease release of 120 oz.
   (24 events/yr × 5.0 oz/unit-event ≈ 120 oz/unit-yr)
3. With 228 heavy weapon units in the fleet (166 of the 5"/54 guns and 62 of the MK 75 guns), the annual fleet-wide grease release is estimated to be 27,000 oz.
   (120 oz/unit-yr × 228 units/fleet ≈ 27,000 oz/fleet-yr)
4. Based on a fleet wide average of approximately 50% time spent pierside or transiting within 12 nm, the grease release within 12 nm is estimated to be 13,500 oz. (20,000 oz/fleet-yr × 50% ≈ 13,500 oz/fleet-yr)

The fleet-wide discharge of MIL-G-63460 grease from the 20-mm CIWS weapon is calculated as follows.

1. Approximately 1 oz of grease is released after each typical rain event.
   (2 oz/unit × 50%/event ≈ 1 oz/unit-event)
2. Assuming 24 rain events per year, the annual per weapon unit grease release is estimated to be 24 oz.
   (24 events/yr × 1 oz/unit-event ≈ 24 oz/unit-yr)
3. With 416 total weapon units in the fleet, the annual fleet-wide grease release is estimated to be 10,000 oz
   (24 oz/unit-yr × 416 units/fleet ≈ 10,000 oz/fleet-yr)
4. Based on a fleet-wide average of 50% time pierside or in 0-12 nm transit, grease release inside of 12 nm is 5000 oz
   (10,000 oz/fleet-yr × 50% ≈ 5,000 oz/fleet-yr).

Constituents That Have the Potential to Contribute to Weather Deck Runoff

Group 2 – Cleaning Compounds

Aircraft Washdown. Aircraft washdown was observed on the AOE-6, CV/CVN and LHD-1 class ships. MIL-G-81322 grease is applied via the grease fittings prior to the washdown evolution to expel old grease and again after the washdown to expel grease contaminated with the washwater. Each aircraft grease fitting is lubricated with 3.9 –5.2 grams of grease both prior to and after the washdown, for a total of 7.8– 10.4 grams of grease per fitting per washdown. The aircraft washdown data is as follows:

Ship Class	Aircraft Type	Number of Grease Fittings	Cleaner	Cleaner Amount
AOE-6 Class	All aircraft	10	MIL-C-87936	8 oz/gallon of water
CV/CVN Class	F-14	85	MIL-C-81302 Type II	2½ gallons
CV/CVN Class	F/A-18	60	MIL-C-81302 Type II	1½ gallons
CV/CVN Class	S-3	100	MIL-C-81302 Type II	2½ -3 gallons
CV/CVN Class	SH-60	10	MIL-C-81302 Type II	32 oz.
LHD Class	All aircraft	Unknown	MIL-RPP-8550-C, Type I	½ gal/5 gallons of water

Engine washes and rinses are conducted based on the number of hours the engines are operated. This cleaning evolution varied in frequency depending on the type of aircraft. All engines were washed using a mixture of Gas Path™ (TURCO 5484) MIL-C-85074, Type 1 or Type 11A gas turbine cleaner and water followed with fresh water rinses. The amount of Gas Path™ cleaner used varied with engine type as listed below. The water and cleaning solutions from both processes drained to the deck and overboard.

Aircraft Type	Cleaning Solution
F-14	10 gallons/aircraft
F/A-18	5 gallons/aircraft
AV-8	1.5 gallons/ aircraft
S-3	3 gallons/ aircraft
EA-6B	4 gallons/ aircraft
EC-2	5 gallons/ aircraft
SH-60	1.5 gallons/ aircraft
UH-1	1 gallon/ aircraft
AH-1	1 gallon/ aircraft
MH-53	2.25 gallons/ aircraft
CH-46	1 gallon/ aircraft

All airframe and engine wash evolutions are conducted outside of the contiguous zone. However, residual cleaning agents may remain entrapped in the nonskid surfaces of the flight

decks and go overboard during a rainfall event in the contiguous zone. It is important to understand the aircraft (Air Wing) leave the ship prior to entering the contiguous zone. Following aircraft departure, all ships surveyed conducted a total deck washdown while outside the contiguous zone. The amount of cleaning compounds used for aircraft and engine washdown was residual and could not be estimated.

Buoy Handling Systems. The only cleaning agent used during the buoy upkeep is Simple Green™. The cleaner is applied to the solar power panel using a spray bottle and immediately removed with a clean rag. All other cleaning was conducted with a high-pressure washer (saltwater) and mechanical scrapers. Debris and dirt removed from the buoy collected on the buoy working deck and was subsequently returned to the water prior to leaving the buoys location. The assessment team concluded cleaning agents used in the buoy handling/cleaning process do not contribute to weather deck runoff.

Deck Washdown. The deck washdown process varies in conduct from ship to ship. Ships that operate on the high seas in general, wash decks while underway and outside the contiguous zone. Ships operating within the contiguous zone often wash down decks while in port. Deck washdown practices listed below:

Ship Class	Cleaner	Amount	Washdown Conducted Inside / Outside Contiguous Zone	Water Used	Frequency
AOE-6	MIL-D-16791	1.5 gallons	Outside	Fresh water	Weekly
CV/CVN	B&B 88	550 gallons	Outside	Salt water	Prior to entering contiguous zone
DDG-51	MIL-D-16791	1 gallon	Outside	Fresh water	Weekly
LHD-1	B&B 88	Unknown	Outside	Salt water	Prior to entering contiguous zone
MCM-1	Simple Green™	2 gallons	Inside	Fresh water	3 week cycle
WLM	None	N/A	Inside	Fresh/Salt *	Daily
WPB	Simple Green™	0.5 gallon	Inside	Fresh water	Weekly

*WLM used salt water when underway and fresh water when inport.

Ships that perform deck washdowns outside the contiguous zone may have residual amounts of cleaners entrained in the deck surfaces. While this amount is unknown , it could contribute to deck runoff inside the contiguous zone. Cleaners used during inport deck washdowns do contribute to deck runoff. Human waste and debris are also contributors to deck runoff onboard the WPB class vessels.

The calculations for discharges inside the contiguous zone are as follows:

a. MCM-1. MCM-1 class ships are categorized as service craft platforms. Mine Handling ships do not necessarily provide an accurate representation of the remaining vessels in the service craft category. There are 18 MCM vessels. All assumptions are based on information gathered onboard the MCM class vessels surveyed.

- Assuming 60 % of the year is spent operating within the contiguous zone or inport, the following applies:

  31wks x 1 washdown every 3 weeks= 10 washdowns. Each washdown uses 2gal of Simple Green™. 20gal/ship/year x 18 ships= 360gal of Simple Green™.

b. WLM (USCG). WLM class ships are categorized as service craft platforms. Buoy Handling ships do not necessarily provide an accurate representation of the remaining vessels in the service craft category. There are 73 buoy handling vessels. All assumptions are based on information gathered onboard the WLM class vessels surveyed.

- WLM class ships use no cleaner for deck washdown.

c. WPB (USCG). WPB class ships are categorized as patrol/small craft platforms. USCG patrol craft do not necessarily provide an accurate representation of the remaining vessels in the patrol/small craft category. There are 88 patrol craft vessels. All assumptions are based on information gathered onboard the WPB class vessels surveyed.

- 90% of the year spent operating within the contiguous zone. 52wks x 90%= 47wks x 1wkly= 47wks. 47 x 0.5gal Simple Green™= 24gal/ship/year. 24gal x 88 ships= 2112gal of Simple Green™

Total volume of Simple Green™ = 2472 gallons.

General Housekeeping. The assessment team found general housekeeping to have a positive rather than a negative impact. During the shipboard assessments the team observed the crews performing general housekeeping throughout the day. On every ship visited, the team noted very clean weather decks with no visible paint chips, dirt or debris and attributed this to good housekeeping. As a result of our observations, general housekeeping should be considered a marine pollution control device (MPCD) to control paint debris from entering surrounding waters.

Sweeping: As part of the ships daily routine, it is common practice to sweep all decks at least twice daily and immediately following all depainting evolutions. The assessment team acknowledges sweeping the decks may generate airborne debris, as it would in the home environment. Some of this airborne debris may include paint chips having the potential to enter surrounding waters. The assessment team concluded the amount entering surrounding waters is insignificant. Immediately after sweeping, all debris is containerized and removed from the area; if visible debris remains on the deck, the area is vacuumed. All debris containing paint chips is turned in to the HAZMINCEN for disposal ashore.

Swabbing. Also as part of the ships daily routine, it is common practice to damp-swab topside decks. This process generates no airborne contamination and uses small

quantities of water that do not run overboard. In fact, swabbing the decks enhances the removal of residual paint debris.

Trash Removal. All debris containing paint chips is turned in to the shipboard HAZMINCEN for disposal ashore.

Ships Boats. MIL-D-16791 general purpose detergent is used to clean the small boats onboard the AOE-6 and DDG-51 class vessels. All other vessels surveyed reported using small amounts of Simple Green™. Cleaning was accomplished using a sponge or rag; bilges and exterior surfaces were wiped clean. The assessment team concluded that while cleaners were used in this process the amounts were insignificant and could not be quantified.

Weapons Systems. The gun mount surfaces are wiped-down with fresh water and Simple Green™. After cleaning the weapons, a small amount of MIL-L-63460 cleaner, lubricant and preservative is applied for corrosion protection. The assessment team concluded amounts are negligible and do not contribute significantly to deck runoff.

Constituents That Have the Potential to Contribute to Weather Deck Runoff

Group 3 – Paint Debris

Buoy Handling Systems. Although the assessment team was unable to accurately measure the exact composition, visual observations revealed that >99.5% of the mixture was sediment and marine growth; 0.5% or less of the mixture was assumed to be paint chips.

The fleet-wide discharge of marine growth, sediment, and paint chips from buoy maintenance is calculated as follows:

a. The assessment team visually estimated the volume of marine growth, sediment, and paint chips removed from an average sized buoy to be approximately 4 gallons per servicing. The USCG fleet of WLM/WLB buoy tenders is responsible for a total of 9000 buoys. USCG regulations require each buoy be inspected (serviced) at least every two years. USCG estimates that each year approximately 10 % of the buoys will be moved off station or damaged by storms. These buoys require inspection prior to resetting. Therefore, the USCG services approximately 4950 buoys each year.

9000 buoys + 10 % ≈ 9900 total buoys/2 years = 5000 buoys/yr

b. Based upon 4 gallons per buoy, and approximately 5000 buoys inspected each year, the annual marine growth, sediment, and paint chip release can be estimated at approximately 20,000 gallons.

5000 buoys/fleet-yr × 4 gallons/buoy = 20,000 gallons/fleet/yr.

c. Based upon the assumption that 0.5% of the marine sediment mixture is paint chips, the annual paint chip release can be estimated at approximately 100 gallons.

20,000 gallons/fleet/yr marine sediment mixture X 0.5% = 100 gallons/fleet/yr

Deck/Superstructure Maintenance & Preservation. Shipboard maintenance and preservation actions are conducted both in port and underway on all naval vessels. Factors that affect the frequency and scope of the maintenance and preservation requirements include:

- vessel size (e.g., larger vessels require more paint related maintenance)
- vessel age (e.g., older vessels require frequent upkeep)
- operational requirements (e.g., air capable ships require more repair/preservation due to aircraft operations)
- climatic conditions (e.g., ships operating in the Gulf are subjected to sand storms, ships operating in the North Atlantic are subject to ice storms)
- manning level and crew experience (e.g., lower manning levels may result in less preservation; lower experience levels may result poorer preservation practices)

When ships crew followed good work practices (which were observed on every ship) using tarps spread on the deck under/around the work area, the majority of the paint debris/non-skid remains on the tarp. However, some of the material becomes airborne and may not fall on the tarp. Factors affecting how much of the airborne material has the potential to enter surrounding waters

are dependent upon wind conditions, proximity of work area to vessel edge, and how high the work area is above the deck. Another factor is the type of mechanical device used for depainting/non-skid removal; the following devices are used: sandpaper, wire brushes, needle guns, grinders, chipping hammers, and deck crawlers. Some of these devices are equipped with vacuum recovery systems. During cleanup operations, the crew sweeps and containerizes the debris for disposal. Vacuum cleaners are then used to remove fine debris not recovered during sweeping. Immediately following the cleanup process, the assessment team visually observed the deck surfaces to identify the presence of paint chips on the deck surface; none were noted during any of the assessments. The team acknowledges that some material becomes airborne and enters surrounding waters, but is unable to accurately estimate the amount.

As a result, the assessment team cannot quantify, or reasonably estimate, a release or potential release of constituents resulting from this process.

Ships Boats. As previously discussed, USN boats are removed from the ship and taken to the Shore Intermediate Maintenance Activity for painting and hull repair. Coast Guard boats are removed from the ship and refurbished by the Maintenance Augmentation Team. If Navy boats require minor touch-up, they are depainted using sand paper and/or a wire brush. A tarp is typically spread on the deck under the work area during depainting/ painting. Following the repainting process, the work area is swept and vacuumed (if required); all paint debris is containerized and turned in to the HAZMINCEN for disposal ashore. Ships boats are typically located at ships edge, therefore, any airborne debris generated has the potential to enter surrounding waters. The assessment team concluded the amount entering surrounding waters is insignificant.

Constituents That Have the Potential to Contribute to Weather Deck Runoff

Group 4 – No Contributing Constituents

Electronic Intelligence/Navigation Systems. All ships surveyed cleaned the various arrays and antennae using the same method. The arrays are rinsed with fresh water to remove salt build-up as required. In the infrequent case of a heavy build-up, the crew uses Simple Green™ cleaner sprayed on a rag to wipe off the dirt. It is highly unlikely that any cleaner remains on the surfaces.

Fire Assist Vehicles. Fire assist vehicles are capable of applying the extinguishing agent in a fog, spray or stream to combat fires. Other vehicles used for aircraft fire fighting, crash, rescue, and salvage are the A/S 32A-35 crash and salvage crane, a 20,000 lb. forklift and a 6,000 lb. forklift. The operation and maintenance of this equipment does not have the potential to contribute to weather deck runoff.

Firemain Systems. The firemain system on all ships surveyed used saltwater as a fire suppression agent. The system supplies water at various pressures depending on ship class. Saltwater from this system is also used during the deck washdown evolution on some ships. Firemain stations throughout the ship are cleaned as part of the ships general housekeeping routine. Since the firemain system uses salt water obtained from surrounding waters, it does not have the potential to contribute constituents to weather deck runoff other than the constituents that become entrained in the salt water as it traverses the weather deck.

Flight Deck Safety Nets. The flight deck safety nets on the CV/CVN and LHD-1 class ships are constructed of stainless steel. The safety nets on all other ships surveyed are constructed of nylon. The safety nets and frames are cleaned using hand-held scrub brushes wetted with a solution of 8 oz. general purpose detergent (MIL-D-16791) mixed with one gallon of freshwater and rinsed-off with fresh water. The deck edge safety nets are washed while underway, outside the contiguous zone. The assessment team concluded that this process does not contribute to weather deck run-off.

LST Bow Ramp. The LST bow ramp contains a exposed wire cable that runs the full length of the ramp and is routed around sheaves located at the top forward part of the boom on both sides. As the boom pays out, the boom and ramp roll forward as they traverse on the boom rails. Although the boom is operational, the crew indicated that routine maintenance and testing has been reduced to a quarterly basis because the bow ramp it is not used on a regular basis. The rollers, rails, sheaves, and cable assemblies that are continuously exposed to the outside elements were not lubricated. The assessment team concluded that the bow ramp does not have the potential to contribute to weather deck runoff.

Towing and Mooring Systems. With the exception of the CV/CVN Class, all ships assessed had the capability to tow other ships. The towing process uses multi-strand nylon line that is also used as mooring line. The nylon line is rinsed using fresh water only. Any heavily fouled line is replaced. Since no cleaners other than fresh water are used, this process does not contribute to deck runoff.

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Summary of Constituents.

Aircraft Elevators

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-G-23549	Unknown	Unknown	Unknown	Unknown
MIL-G-24139	Unknown	Unknown	Unknown	Unknown
MIL-G-18458	Unknown	Unknown	Unknown	Unknown
DOD-G-24508	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Aircraft Fueling

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-T-5624T	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Aircraft Launch and Recovery Equipment (ALRE)

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
9159-00-823-8047	Unknown	Unknown	Unknown	Unknown
9150-01-145-1259	Unknown	Unknown	Unknown	Unknown
9150-01-237-7468	Unknown	Unknown	Unknown	Unknown
9150-01-432-0511	Unknown	Unknown	Unknown	Unknown
9150-00-753-4937	Unknown	Unknown	Unknown	Unknown
9150-00-935-4127	Unknown	Unknown	Unknown	Unknown
6850-00-274-5421	Unknown	Unknown	Unknown	Unknown
8030-00-292-1102	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Aircraft Operations, Fixed Wing

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-G-81322	Unknown	Unknown	Unknown	Unknown
MIL-H-83282	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the followingtable was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Aircraft Operations, Rotary Wing

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-G-81322	Unknown	Unknown	Unknown	Unknown
MIL-H-83282	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Buoy Handling Systems

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-G-18458	Unknown	Unknown	Unknown	Unknown
MIL-H-17672	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Fuel Transfer Systems

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-G-24139	Unknown	Unknown	Unknown	Unknown
MIL-L-2105	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Ground Support Equipment

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-T-5624T	Unknown	Unknown	Unknown	Unknown
9150-00-185-6681	Unknown	Unknown	Unknown	Unknown
9150-01-363-1192	Unknown	Unknown	Unknown	Unknown
8850-00-181-7929	Unknown	Unknown	Unknown	Unknown
9150-00-935-5851	Unknown	Unknown	Unknown	Unknown
9150-00-180-5290	Unknown	Unknown	Unknown	Unknown
9150-00-231-9071	Unknown	Unknown	Unknown	Unknown
9150-00-657-4959	Unknown	Unknown	Unknown	Unknown
9160-01-336-7174	Unknown	Unknown	Unknown	Unknown
9150-00-261-8314	Unknown	Unknown	Unknown	Unknown
9150-00-985-7099	Unknown	Unknown	Unknown	Unknown
9150-00-189-6727	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Mine Handling Systems

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-G-24139	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Recovery, Assist, Securing and Traversing (RAST) System

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-G-81322	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Ships Boats

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-T-5624T	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Ships Boats Launching Systems

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-G-18458	Unknown	Unknown	Unknown	Unknown
MIL-G-24139	Unknown	Unknown	Unknown	Unknown
MIL-G-23549	Unknown	Unknown	Unknown	Unknown
MIL-H-17672	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Stores Handling Systems

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-G- 24139	Unknown	Unknown	Unknown	Unknown
MIL-G-23549	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 1 – Petroleum, Oil and Lubricants

Weapons Systems

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
Grease (MIL-G-21164)	13500 oz./fleet-yr.	Unknown	Unknown	Unknown
Grease (MIL-G-63460)	5000 oz./fleet-yr.	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 2 – Cleaning Compounds

Aircraft Washdown

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-C-87936	Unknown*	Unknown	Unknown	Unknown
MIL-C-81302 Type II	Unknown*	Unknown	Unknown	Unknown
MIL-RPP-8550C Type I	Unknown*	Unknown	Unknown	Unknown

*Potential for residual does exist, however decks are washed down completely following Air Wing departure prior to entering the contiguous zone. The assessment team could not determine amount left on deck.

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely
Color	Unlikely to change
Floating Material	None
Nuisance Species	None
Nutrients	Unknown
Odor	Unlikely-did not evaluate
Oil and Grease	None observed, no sheen noted
Pathogens	Unlikely-not qualified to evaluate
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Does not change temperature
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 2 – Cleaning Compounds

Buoy Handling Systems

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
Simple Green™	Negligible	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely
Color	Unlikely to change
Floating Material	None
Nuisance Species	None
Nutrients	Unknown
Odor	Unlikely-did not evaluate
Oil and Grease	None observed, no sheen noted
Pathogens	Unlikely-not qualified to evaluate
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Does not change temperature
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 2 – Cleaning Compounds

Deck Washdown

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
Simple Green™	2472 gallons (estimated)	Unknown	Unknown	Unknown
Flight Deck Cleaner	Residual (No Estimate)	Unknown	Unknown	Unknown
MIL-D-16791	Residual (No Estimate)	Unknown	Unknown	Unknown
*Human Waste/Debris	Unknown	Unknown	Unknown	Unknown

* Human waste may affect narrative criteria below as indicated.

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely
Color	Unlikely to change
Floating Material	Potential Exists*
Nuisance Species	Potential Exists *
Nutrients	Unknown*
Odor	Potential Exists-did not evaluate*
Oil and Grease	None observed, no sheen noted
Pathogens	Potential Exists-not qualified to evaluate*
Settleable Materials	Potential Exists *
Suspended Solids	Potential Exists *
Taste	Unlikely-did not evaluate
Temperature	Does not change temperature
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 2 – Cleaning Compounds

General Housekeeping

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-D-16791	Negligible	Unknown	Unknown	Unknown
Simple Green™	Negligible	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely
Color	Unlikely to change
Floating Material	None
Nuisance Species	None
Nutrients	Unknown
Odor	Unlikely-did not evaluate
Oil and Grease	None observed, no sheen noted
Pathogens	Unlikely-not qualified to evaluate
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Does not change temperature
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 2 – Cleaning Compounds

Ships Boats

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-D-16791	Negligible	Unknown	Unknown	Unknown
Simple Green™	Negligible	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely
Color	Unlikely to change
Floating Material	None
Nuisance Species	None
Nutrients	Unknown
Odor	Unlikely-did not evaluate
Oil and Grease	None observed, no sheen noted
Pathogens	Unlikely-not qualified to evaluate
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Does not change temperature
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 2 – Cleaning Compounds

Weapons Systems

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
Simple Green™	Negligible	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely
Color	Unlikely to change
Floating Material	None
Nuisance Species	None
Nutrients	Unknown
Odor	Unlikely-did not evaluate
Oil and Grease	None observed, no sheen noted
Pathogens	Unlikely-not qualified to evaluate
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Does not change temperature
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 3 – Paint Debris

Buoy Handling Systems. *(buoys only)*

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
Paint chips/debris	100 gallons (estimated)	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely, but not qualified to evaluate.
Colloidal Matter	None observed.
Color	No change noted.
Floating Material	None observed; however, the potential does exist.
Nuisance Species	Sediment is indigenous to the waters it is retrieved from/returned to.
Nutrients	Unlikely, but not qualified to evaluate.
Odor	Unlikely, but did not evaluate.
Oil and Grease	None observed, paint chips would not cause a sheen.
Pathogens	Unlikely, but not qualified to evaluate.
Settleable Materials	None observed; however, the potential does exist.
Suspended Solids	None observed, but unlikely to exceed 25 mg/l daily average.
Taste	Unlikely, but did not evaluate.
Temperature	Does not change temperature.
Total Dissolved Gases	Unlikely, but not qualified to evaluate.
Transparency	Unlikely.
Turbidity	Unlikely.

Summary of Constituents

Group 3 – Paint Debris

Deck/Superstructure Maintenance & Preservation.

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
Paint chips/debris	Potential exists, but none observed	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely, but not qualified to evaluate.
Colloidal Matter	Unlikely, but none observed.
Color	Unlikely, but not observed.
Floating Material	None observed; however, the potential does exist.
Nuisance Species	None.
Nutrients	Unlikely, but not qualified to evaluate.
Odor	Unlikely, but did not evaluate.
Oil and Grease	None observed, paint chips would not cause a sheen.
Pathogens	Unlikely, but not qualified to evaluate.
Settleable Materials	None observed; however, the potential does exist.
Suspended Solids	None observed, but unlikely to exceed 25 mg/l daily average.
Taste	Unlikely, but did not evaluate.
Temperature	Does not change temperature.
Total Dissolved Gases	Unlikely, but not qualified to evaluate.
Transparency	Unlikely.
Turbidity	Unlikely.

Summary of Constituents

Group 3 – Paint Debris

Ships Boats.

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
Paint chips/debris	Minimal potential exists, but none observed	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely, but not qualified to evaluate.
Colloidal Matter	Unlikely, but none observed.
Color	Unlikely, but not observed.
Floating Material	None observed; however, the potential does exist.
Nuisance Species	None.
Nutrients	Unlikely, but not qualified to evaluate.
Odor	Unlikely, but did not evaluate.
Oil and Grease	None observed, paint chips would not cause a sheen.
Pathogens	Unlikely, but not qualified to evaluate.
Settleable Materials	None observed; however, the potential does exist.
Suspended Solids	None observed, but unlikely to exceed 25 mg/l daily average.
Taste	Unlikely, but did not evaluate.
Temperature	Does not change temperature.
Total Dissolved Gases	Unlikely, but not qualified to evaluate.
Transparency	Unlikely.
Turbidity	Unlikely.

Summary of Constituents

Group 4– No Contributing Constituents

Electronic Intelligence/Navigation Systems

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
None	N/A	N/A	N/A	N/A

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	N/A
Colloidal Matter	N/A
Color	N/A
Floating Material	N/A
Nuisance Species	N/A
Nutrients	N/A
Odor	N/A
Oil and Grease	N/A
Pathogens	N/A
Settleable Materials	N/A
Suspended Solids	N/A
Taste	N/A
Temperature	N/A
Total Dissolved Gases	N/A
Transparency	N/A
Turbidity	N/A

Summary of Constituents

Group 4– No Contributing Constituents

Fire Assist Vehicles

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
MIL-T-5624T	Unknown	Unknown	Unknown	Unknown
9150-00-185-6681	Unknown	Unknown	Unknown	Unknown
9150-01-363-1192	Unknown	Unknown	Unknown	Unknown
8850-00-181-7929	Unknown	Unknown	Unknown	Unknown
9150-00-935-5851	Unknown	Unknown	Unknown	Unknown
9150-00-180-5290	Unknown	Unknown	Unknown	Unknown
9150-00-231-9071	Unknown	Unknown	Unknown	Unknown
9150-00-189-6727	Unknown	Unknown	Unknown	Unknown

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	Unlikely-not qualified to evaluate
Colloidal Matter	Unlikely-not qualified to evaluate
Color	Unlikely
Floating Material	Potential exists
Nuisance Species	None
Nutrients	None
Odor	Unlikely-did not evaluate
Oil and Grease	Potential exists, none observed
Pathogens	None
Settleable Materials	Unlikely
Suspended Solids	Unlikely
Taste	Unlikely-did not evaluate
Temperature	Would not change
Total Dissolved Gases	Unlikely-not qualified to evaluate
Transparency	Unlikely
Turbidity	Unlikely

Summary of Constituents

Group 4– No Contributing Constituents

Firemain Systems

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
None	N/A	N/A	N/A	N/A

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	N/A
Colloidal Matter	N/A
Color	N/A
Floating Material	N/A
Nuisance Species	N/A
Nutrients	N/A
Odor	N/A
Oil and Grease	N/A
Pathogens	N/A
Settleable Materials	N/A
Suspended Solids	N/A
Taste	N/A
Temperature	N/A
Total Dissolved Gases	N/A
Transparency	N/A
Turbidity	N/A

Summary of Constituents

Group 4– No Contributing Constituents

Flight Deck Safety Nets

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
None	N/A	N/A	N/A	N/A

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	N/A
Colloidal Matter	N/A
Color	N/A
Floating Material	N/A
Nuisance Species	N/A
Nutrients	N/A
Odor	N/A
Oil and Grease	N/A
Pathogens	N/A
Settleable Materials	N/A
Suspended Solids	N/A
Taste	N/A
Temperature	N/A
Total Dissolved Gases	N/A
Transparency	N/A
Turbidity	N/A

Summary of Constituents

Group 4– No Contributing Constituents

LST Bow Ramp

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
NA	NA	NA	NA	NA

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	NA
Colloidal Matter	NA
Color	NA
Floating Material	NA
Nuisance Species	NA
Nutrients	NA
Odor	NA
Oil and Grease	NA
Pathogens	NA
Settleable Materials	NA
Suspended Solids	NA
Taste	NA
Temperature	NA
Total Dissolved Gases	NA
Transparency	NA
Turbidity	NA

Summary of Constituents

Group 4– No Contributing Constituents

Towing and Mooring

Discharge Material	Discharge Volume	Bulk Constituents	Composition (%)	Constituent Mass Loading
None	N/A	N/A	N/A	N/A

At the time of the assessment, the need for the information in the following table was not identified. The information is based on team recollection and consensus.

Narrative Criteria	Shipboard Assessment Team Observations
BOD/DO	N/A
Colloidal Matter	N/A
Color	N/A
Floating Material	N/A
Nuisance Species	N/A
Nutrients	N/A
Odor	N/A
Oil and Grease	N/A
Pathogens	N/A
Settleable Materials	N/A
Suspended Solids	N/A
Taste	N/A
Temperature	N/A
Total Dissolved Gases	N/A
Transparency	N/A
Turbidity	N/A

REFERENCES

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2 Wenzel, M. L., Surgeon, J. D., Baillargeon, J. W., *"Identification of Weather Deck Runoff Discharge Constituents Onboard a U. S. Navy CV/CVN Class Aircraft Carrier"* NSWCCD-63-TR-2000/191, Dec 00

3 Wenzel, M. L., *"Identification of Weather Deck Runoff Discharge Constituents Onboard a U. S. Navy Arleigh Burke Class Guided Missile Destroyer"*NSWCCD-63-TR-2000/01, Feb 00

4 Wenzel, M. L., Surgeon, J. D., Baillargeon, J. W., *"Identification of Weather Deck Runoff Discharge Constituents Onboard a U. S. Navy LHD-1 Class Amphibious Assault Ship"* NSWCCD-TR-2000/192, Dec 00

5 Wenzel, M. L., *"Identification of Weather Deck Runoff Discharge Constituents Onboard a U. S. Navy Mine Countermeasure (MCM-1) Class Ship"*NSWCCD-63-TR-2000/53, Feb 00

6 Surgeon, J. D., *"Identification of Weather Deck Runoff Discharge Constituents Onboard a U. S. Coast Guard WLM (Ida Lewis) Class Coastal Buoy Tender"* NSWCCD-63-TM-999/216, Jan 00

7 Wenzel, M. L., *"Identification of Weather Deck Runoff Discharge Constituents Onboard a U. S. Coast Guard Island Class (WPB) Patrol Boat"*NSWCCD-63-TR-2000/249, Jul 00

Class Specific Process Matrix

Class Specific Process	AOE-6	CV/CVN	DDG-51	LHD-1	MCM-1	WLI (USC)	WPB (USCG)
Air Operations							
Fixed Wing		X		X			
Rotary Wing	X	X	X	X			
Aircraft Elevators		X		X			
Flight Deck Safety Nets	X	X	X	X			
Fire Assist Vehicles		X		X			
Ground Support Equipment	X	X		X			
Aircraft Launch & Recovery Equip.		X					
Recovery, Assist, Securing & Traversing System *							
Aircraft Washdown	X	X	X	X			
Aircraft Fueling	X	X	X	X			
Bow Ramp**							
Buoy Handling Systems						X	
Deck/Superstructure Maintenance & Preservation	X	X	X	X	X	X	X
Deck Washdown	X	X	X	X	X	X	X
Electronic Intelligence Systems	X	X	X	X	X		X
Search/Navigational Systems	X	X	X	X	X	X	X
Firemain Systems	X	X	X	X	X	X	X
Fuel Transfer Systems	X	X	X	X	X	X	X
General Housekeeping	X	X	X	X	X	X	X
Mine Handling Systems					X		
Ships Boats/Ships Boats Launching Systems	X	X	X	X	X	X	X
Stores Handling Systems	X	X	X	X			
Towing & Mooring Systems	X	X	X	X	X	X	X
Weapon Systems	X	X	X	X	X		X

* RAST installed on CG 49-73; FFG-8, 28, 29, 32, 33, 36-43, 45-61; DD 963-973, 975, 977, 978, 980-982, 985, 987-989, 991, 992, 997

** Bow ramp on LST-9 class only.