National Defense Reserve Fleet Anchorages Environmental Excellence Initiative Best Management Practices

May 5, 2008

Introduction:

In January of 2007, the Maritime Administrator directed the Agency to embark on an Environmental Excellence Initiative (EEI) to enhance the Agency's stewardship of the environment. Although the EEI is broad in scope, covering all Agency programs and operations, the initial emphasis was placed on the National Defense Reserve Fleet Program as its operations are viewed as those posing the highest risk of direct impacts to the environment. Further, over the past few years, it has become evident that the Maritime Administration's role as the disposal agency for government owned vessels now includes the responsibility for longer-term management and maintenance of those vessels pending disposal. The Agency's current mission and programs were not designed for this new role.

The Maritime Administration operates three reserve fleet anchorages commonly know as the Suisun Bay Reserve Fleet (SBRF), the Beaumont Reserve Fleet (BRF), and the James River Reserve Fleet (JRRF) (collectively the "Fleets"). In addition to the vessels in the anchorages, the Fleets have supporting waterfront and shoreside operations.

On March 15, 2007, the Maritime Administration started a review of all three Fleets and supporting waterfront and shoreside operations in an effort to identify operations, conditions, and processes that pose the greatest risks to the environment and to develop Best Management Practices (BMP) that would assist the Agency in reducing those risks. In doing so, the Agency engaged the assistance of outside environmental professionals.

In performing this review it is evident that the majority of the risks to the environment stem from the challenges the Agency has faced with respect to the pace of disposal of non-retention ships. Many of the key BMPs focus on activities related to the vessels themselves. In that regard, the Maritime Administration continues to believe that the best method for limiting risks to the environment and expending public resources is to remove as quickly as possible the non-retention vessels from the fleet sites entirely.

Blending the Agency's ship operations, management, and disposal experience with the insights and experience of the environmental professionals, the Maritime Administration has identified the BMPs set out below. In many cases, the BMPs reflect and document existing practices. In other cases, the BMPs build upon existing practices (identified by an asterisk "*"). In still other cases, the BMPs are directly related to the emerging role as the longer-term custodian of vessels awaiting disposal (identified by a double asterisk "**").

1.0 Implementation

Over the long-term, the BMPs will be incorporated into the Fleets' Environmental Management System (EMS), which will provide an overarching policy and process for managing and tracking environmental performance at the Fleets. An EMS provides a method for regularly reviewing and improving environmental performance and implementing appropriate structural or procedural changes. It will provide a mechanism for centralizing fleet-wide procedures, as

appropriate, and maintaining environmental documentation to meet Maritime Administration, and Department of Transportation information needs.

2.0 Best Management Practices

2.1 Vessel Arrival

Vessels will be inspected and prepared for arrival at the Fleets. Vessel arrival procedures are explicit in the instructions to forms MA-496 and MA-496A. Those forms are currently used to ensure that customers using the anchorage services provided by the Maritime Administration prepare their vessels to the described standards. The vessel arrival BMPs will ensure that all vessels arriving at the Fleets are subject to the same minimum preparation standards. To help achieve this, the procedures in MA-496 and MA-496A will be consolidated.

2.1.1 Pre-arrival inspections will be scheduled and performed at an appropriate off-site location prior to vessel arrivals at the Fleets to identify and document any critical discrepancies. Before arrival, the following actions will occur.

- 2.1.1.1 Documentation will be provided showing that underwater hull cleaning of biological growth has occurred during preparations for arrival at a Fleet anchorage. The cleaning will occur in no case greater than three months prior to arrival. **
- 2.1.1.2 Hydraulic cargo gear machinery on deck will have been drained or removed. Any hydraulic machinery that can not be drained or removed will have been provided with appropriate secondary containment. **
- 2.1.1.3 All debris and exfoliated paint will have been removed from the weather decks. *
- 2.1.1.4 On retention vessels, all strainers, pump casings, drain tanks, hydraulic lines and service tanks in a vessel's interior spaces will be made leak free.
- 2.1.1.5 On non-retention vessels, existing drain valves, petcocks and drain plugs on all machinery, pipelines, and heat exchangers throughout the vessel will be opened, and all strainers, pump casings, drain tanks, hydraulic lines and service tanks will be drained of fluids.
- 2.1.1.6 All interior spaces, including engine and boiler rooms, will be thoroughly cleaned to remove dirt, loose paint and scale, oil, grease, water, and other foreign materials. *
- 2.1.1.7 Except for in-class operational vessels, tanks containing petroleum products, slops and contaminated liquid ballast will have had their content removed to low suction.
- 2.1.1.8 Drip pans containing petroleum products, slops and contaminated liquids will have been cleaned.
- 2.1.1.9 All damaged or deteriorated asbestos will have been abated or encapsulated so as to prevent the spread of airborne asbestos fibers.
- 2.1.1.10 Vessel deck houses, engine room access, and cargo hold hatches will be sealed to prevent rain water intrusion and prevent birds from

nesting on interior structures. In some cases, dehumidification of interior spaces will be provided to enhance long-term preservation.

2.1.1.11 External hull blanks will be installed to positively close underwater hull penetrations normally used to provide water in support of engine room machinery. **

2.1.1.12 Stern glands will be made watertight, will have sufficient packing in support of future tightening, will have oil lubricated stern bearing sealing systems serviced with reservoirs and tanks filled, and will ensure that sealing systems are leak free.

2.1.1.13 All containerized hazardous materials not necessary for maintenance or preservation of the vessels will have been removed and an inventory of all containerized hazardous materials that remain on board will be provided. The inventory will include, names, quantities, locations, and purchase and expiration dates, as appropriate. This inventory will be included in Emergency Response Plans to update them as necessary.

2.1.1.14 Material Safety Data Sheets for inventoried hazardous materials will be provided.

2.1.1.15 Appropriate storage of the remaining inventoried hazardous materials will have been provided with secondary containment systems to ensure there is a back-up barrier capable of preventing releases of hazardous materials into the water. *

2.1.1.16 Except for in-class operational vessels, an arrival hazardous material survey report will be provided for all structures and equipment showing a thorough analysis of hazardous material. The report will include: *

2.1.1.16.1 Airborne asbestos sampling results and location of sampling points;

2.1.1.16.2 Results of radiological monitoring; *

2.1.1.16.3 PCB (non-liquid media) sampling results and an inventory of equipment potentially containing liquid PCBs; *

2.1.1.16.4 Mercury survey results; *

2.1.1.16.5 Sodium chromate survey of tanks;

2.1.1.16.6 An inventory of ozone depleting substances;

2.1.1.16.7 A descriptive report of paint coating systems and the last date of large-scale coating application; *

2.1.1.16.8 Location and types of permanent ballast; and

2.1.1.16.9 Tank soundings.

2.1.2 Arrival inspections will take place upon vessel arrivals at the Fleets to identify and document vessel arrival condition relative to cleanliness, orderliness, sanitation, security, status of hazardous materials, water tight integrity, and safety.

2.1.2.1 Upon arrival, a vessel's exterior surfaces will be free of heavy scale and loose or flaking paint. In cases where heavy scale and loose or flaking paint are not removed, the surface will have been encapsulated in a manner that will last at least five years. **

2.1.3 Soon after arrival, except for in-class operational vessels, vessels will be prepared for long-term storage.

2.1.3.1 After arrival, scupper strainers will be installed and all scupper deck drains will be cleared of debris and working properly. *

2.1.3.2 After arrival, an impressed current cathodic protection system will be installed to slow underwater hull deterioration.

2.2 Vessel Maintenance

An essential component of the EEI BMPs is maintaining an effective level of environmental stewardship during the vessel maintenance cycle. Although a substantial inspection system for protection of the environment currently exists at the Fleets, a more rigorous set of inspections will augment the maintenance actions on a given vessel. These inspections will be documented and findings will be reported to management.

NDRF vessels are owned by the Maritime Administration and are maintained as dictated by the performance-based Fleet Contract. Other federal government agency customers that take advantage of the services provided by the Fleet anchorages are governed by the instructions to form MA-496. This provides for the establishment of specific maintenance requirements that are to be performed. In some cases, a memorandum of agreement provides for additional specific maintenance activities associated with the vessel. Maintenance will include at least the following:

2.2.1 A Vessel Condition Summary Report will be updated quarterly. The summary is a compilation of several sources of information that are accumulated over the course of preservation system maintenance. It contains information on the overall hull condition, hull spot corrosion, the amount of fuel on board, the overall interior condition, and the overall topside condition, including the amount of deteriorated paint coatings. MA-279 Vessel Condition Survey Reports record survey inspection data when vessels arrive and depart, and upon significant condition changes.

2.2.2 On retention vessels, all equipment strainers, pump casings, drain tanks and service tanks will be maintained in leak-free condition.

2.2.3 On non-retention vessels, all equipment strainers, pump casings, drain tanks and service tanks will be inspected to ensure there are no residues from the drained system openings.

2.2.4 After retention vessels are designated non-retention, all equipment strainers, pump casings, drain tanks and service tanks will be drained. **

2.2.5 Where ship equipment is removed for other operational or historic purposes, bilges and surrounding floor plates will be cleaned and hazardous materials inventories will be updated.

2.2.6 Secondary containment systems will be inspected regularly and maintained, especially prior to and after storm events. *

2.2.7 Decks will be maintained such that loose debris is collected and removed from the vessel. *

2.2.8 Deck drain scuppers and screens will be kept clean and free of debris. *

2.2.9 Hull gauging will be conducted on a regular basis according to a vessel's hull condition to assist in determining the overall condition of the hull. Hull-gauging surveys will be conducted at up to 50 specified locations on each ship

semi-annually for hull condition 0 – 2, annually for hull condition 3 – 4, and biannually for hull condition 5.

2.2.10 All ships will have flood alarm sensors that detect flooding in the bilges of engineering spaces and any spaces that have sea connections. The sensors will trip alarms that can be seen and heard at a manned location. Flooding marks are painted on the hull at the bow and stern waterline and maintained. They are also monitored by waterborne security daily.

2.2.11 Dewatering will be accomplished on ships to remove accumulated water in bilges and cargo holds. Machinery space bilges will have less than six inches of liquid and cargo hold bilge wells will have less than twelve inches of liquid.

2.2.12 Hull and topside watertight leaks will be repaired.

2.2.13 An impressed current cathodic protection system will be maintained to enhance hull preservation.

2.2.14 Exterior coatings will be maintained to prevent releases of exfoliated paint into the local waterways. **

2.2.14.1 A coatings condition report will be prepared to identify those vessels at risk for releasing exfoliated paint and to prioritize the severity of the risk.

2.2.14.2 Vessels with the worst freeboard and topside coatings condition will be remediated first and a monitoring schedule will be developed to plan for additional remediation of the remaining painted surfaces.

2.2.14.3 A ship's sponsor making arrangements for custody of a vessel in a Fleet anchorage will agree on a schedule for coatings maintenance before the vessel arrives to ensure that coatings are maintained and are not released.

2.2.15 Interior conditions will be monitored through regular inspections to ensure awareness of hazardous material spills and to maintain good housekeeping.

2.2.16 Hazardous materials will be monitored so they remain identified and properly stowed.

2.2.17 The condition of hazardous materials containers will be inspected and deteriorated containers and their contents will be removed and properly disposed. *

2.2.18 Outdated hazardous materials will be properly removed and disposed on a regular basis. *

2.2.19 Hazardous material inventories will be updated as materials are added to storage areas, used or disposed. *

2.2.19.1 Any ships without hazardous material inventories that have hazardous materials will be inspected and inventories created within six months of issuing these BMPs.

2.2.20 Emergency response kits and equipment will be provided at hazardous material storage areas and maintained in good condition. *

2.2.21 Fuel remaining on vessels in the Fleets will be essentially removed through the process of ship disposal. Additionally, vessel condition will be monitored to manage the risk of releasing fuel oil. The following management and condition variables will be considered to determine the need to remove fuel before a vessel is removed for disposal: the period of time before removal for

disposal will occur, the amount of fuel on a vessel, the type of fuel on a vessel, the location of fuel, and the vessel's hull condition.

2.3 Vessel Departure

Vessel departure procedures are followed when a vessel is temporarily or permanently removed from a Fleet anchorage. Preparations are made relative to the expected weather conditions where lines connected to other vessels may be removed or singled, anchors may be broke free of the bottom, electrical power cables may be removed, equipment and materials inventories are reviewed, and seaworthiness may be increased by stowage of items and strengthening of various components. On the day of scheduled departure, anchors are stowed, wires are disconnected, lines to other vessels are removed, and tugs pull the ship from its mooring row. The following activities will also occur:

2.3.1 Except for in-class operational vessels, all containerized hazardous materials not necessary for maintenance during towing or for further operational use of the vessel will be removed. *

2.3.2 Loose paint and any debris that may have accumulated between maintenance activities will be collected and removed prior to retrieving anchor chains and electrical cable. **

2.3.3 Anchor chain and electrical cables will be washed to remove sediment and biological growth. *

2.3.4 A copy of the containerized hazardous materials inventory will be provided upon delivery to the vessel recipient. **

2.3.5 A copy of the arrival hazardous material survey on structures and equipment will be provided upon delivery to the vessel recipient. **

2.3.6 Except for in-class operational vessels, all vessels departing Fleet anchorages will have their underwater hulls cleaned of biological growth before departing the local biogeographic area. Hull cleaning may or may not occur at a Fleet anchorage location. **

2.4 Safety Management and Emergency Response

2.4.1 Spill Prevention Control and Countermeasures Plans (SPCCP) and Oil Spill Response Plans (OSRP) will be designed to facilitate quick action in addressing spills of hazardous materials and petroleum to limit the severity of spills and implement appropriate remedial actions. The plans will be reviewed at least annually and updated as necessary with current hazardous material inventories.

2.4.2 The OSRP will incorporate the capabilities of the RRF/NDRF Vessel Oil Spill Insurance contract where processes exist to rapidly employ a Spill Management Team that can take measures to control Fleet spills. **

2.4.3 The Fuel Oil Transfer Plans (FOTP) will document how to conduct fuel oil transfers to and from shoreside above-ground storage tanks (ASTs), and to equipment with integrated fuel tanks. It contains both general transfer procedures that apply to all transfers conducted onshore and unique

procedures written for specific locations. Fuel oil transfer procedures and related checklists and postings will require that some form of secondary containment be provided for tanker trucks delivering fuel or vacuum trucks removing used oil and bilge water.

2.4.4 The FOTP will be amended to specify providing secondary containment by portable spill containment curbing placed around a truck during transfer operations and a spill kit that is appropriate for onshore oil response operations will be readily available during all transfers. **

2.4.5 The FOTP will be reviewed at least annually and updated as appropriate based on US Coast Guard and OSHA guidelines. **

2.4.6 Stormwater Pollution Prevention Plans (SWPPP) will establish measures to formalize the methods of preventing rainwater from washing materials into land areas and from the decks of ships. It will be reviewed at least annually and updated as appropriate. **

2.4.7 Emergency response plans will incorporate updated versions of hazardous material inventories. **

2.5 Shoreside Operations

Shoreside operations occur on the land-based areas of each Fleet, which do not include the service craft piers that extend over the water. This group is consolidated because the potential contaminant release mechanisms could affect the land areas surrounding the property being used by the Fleets. These properties are close to navigable waterways, so the potential also exists for materials releases into those waterways. Preventative measures to help control land-based releases are similar in nature.

2.5.1 All shoreside fuel oil transfers will be conducted in accordance with the FOTP.

2.5.2 An inventory report of shoreside hazardous materials and containers will be maintained.

2.5.3 Management of shoreside hazardous materials and petroleum products will be based on Fleet specific inventory usage and operational requirements and include provisions for gathering, staging, and properly disposing of outdated and obsolete hazardous materials. *

2.5.4 An inspection procedure will be established for tracking the amount and condition of shoreside hazardous materials and petroleum products and their containers. *

2.5.4.1 Monthly documented inspections of all shoreside containers, especially those for holding liquids of 30 gallons or more will be conducted. The inspections will ensure that containers are properly labeled, have operating alarm systems, as appropriate, and have proper secondary containment if they hold hazardous materials or petroleum products. This requirement includes underground storage tanks (USTs), above ground storage tanks (ASTs), and equipment with integrated fuel tanks, such as transformers and emergency generators. Monthly inspections will be performed based on industry standards,

including American Petroleum Institute Standard 653 (API 653) and Steel Tank Institute standard SP001. A site-specific checklist will be required to document the inspections.

2.5.5 Shoreside hazardous materials will be consolidated at points of use (POUs) where materials are needed and appropriate secondary containment will be provided. To the extent possible, the amount of material stored at the POU will be limited to that necessary to perform the work being undertaken and procedures will be established to prevent unsupervised movement of hazardous materials to various work locations. Upon completion of the work, unused materials will be returned to a long-term storage location or properly disposed. The POUs will be provided with adequate containment, a spill kit, and protection from the weather. A process for safely moving the items to the POUs will be established. *

2.5.6 All hazardous materials and petroleum products will be stored within secondary containment structures. This includes providing secondary containment for single-walled ASTs and equipment with integrated, single-walled fuel tanks, such as transformers and emergency generators. Secondary containment may include double-walled ASTs, permanent secondary containment structures, temporary secondary containment structures, or placing smaller containers in a hazardous materials storage locker or on a spill containment pallet. The holding capacity of the secondary containment will not be compromised by the stored items. Secondary containment structures will be protected from the weather, well maintained, and free of debris. *

2.5.7 A monitoring and maintenance process will be established to track the condition of portable metal transfer ASTs and hazardous materials storage lockers. The process will include documented routine inspections and maintenance activities to prevent corrosion. **

2.5.8 Shoreside hazardous materials storage lockers and ASTs that show signs of wear will be replaced or repaired. *

2.5.9 Portable storage equipment, including hazardous materials storage lockers and cabinets not designed for extended external use, will be located in covered areas and protected from the weather. *

2.5.10 Equipment containing oil or hazardous materials, including forklifts, tractors, and other fleet service vehicles, will be stored on concrete and provided with drip pans or other secondary containment and protection from the weather. **

2.5.11 All piping between ASTs and associated emergency generators will be durable, fixed, sturdy enough to withstand the weather, protected from impact, compatible with the product stored and double-walled or equipped with secondary containment. *

2.5.12 Emergency shutoffs and locks will be provided for all pumps dispensing gasoline, diesel fuel, or other hazardous materials. *

2.5.13 Barrier protection for all ASTs will be provided, including permanently installed equipment with integrated fuel tanks, such as transformers and emergency generators that are located near vehicular traffic areas to prevent vehicles from accidentally damaging the ASTs. *

2.5.14 Secondary containment and protection from the weather will be provided for all hazardous material drums by either placing these drums on secondary

containment pallets in a covered area protected from the weather or placing them in a hazardous material storage locker designed for extended outdoor use. *

2.5.15 Procedures will be employed to ensure materials stored within each shoreside hazardous materials storage locker or storage area are compatible and good housekeeping practices will be maintained to ensure the integrity of the storage lockers or areas. *

2.5.16 All old, obsolete, out-of-date, or unneeded hazardous materials and petroleum products will be removed and properly disposed on a regular basis. Hazardous material stores will be reviewed at least annually for appropriate characterization and handling. *

2.5.17 All empty drums will be disposed in a timely manner after they are emptied. Empty drums that contained hazardous materials or petroleum products will be stored within secondary containment areas until properly disposed. *

2.5.18 An equipment decommissioning procedure will be provided to ensure that equipment with integrated fuel tanks, such as forklifts, are adequately contained or protected from causing a release while awaiting disposal. **

2.5.19 Site stormwater will be managed in a manner that does not permit it to drain directly to adjacent wetlands or sensitive areas by installing or constructing stormwater detention systems and following the storm water pollution prevention plan. *

2.6 Waterfront Operations

Waterfront operations are associated with those operational areas at the Fleets that are over water, such as materials storage barges, and service craft. Some ships are located in a Fleet anchorage temporarily and require special treatment because they are in-class and operational. The service craft piers are also included in this section. This group is consolidated because the most prevalent potential contaminant release mechanisms may directly affect the waterways used by associated equipments and structures.

2.6.1 All waterfront fuel oil transfers will be conducted in accordance with the FOTP.

2.6.2 An inventory report of waterfront hazardous materials and containers will be maintained.

2.6.3 Management of waterfront hazardous materials and petroleum products will be based on Fleet specific inventory usage and operational requirements and include provisions for gathering, staging, and properly disposing of outdated and obsolete hazardous materials. *

2.6.4 An inspection procedure will be established for tracking the amount and condition of waterfront hazardous materials and petroleum products and their containers. *

2.6.4.1 Monthly documented inspections of all waterfront containers, especially those for holding liquids of 30 gallons or more will be conducted. The inspections will ensure that containers are properly labeled, have operating alarm systems, as appropriate, and have proper

secondary containment if they hold hazardous materials or petroleum products. This requirement includes underground storage tanks (USTs), above ground storage tanks (ASTs), and equipment with integrated fuel tanks, such as transformers and emergency generators. Monthly inspections will be performed based on industry standards, including American Petroleum Institute Standard 653 (API 653) and Steel Tank Institute standard SP001. A site-specific checklist will be required to document the inspections.

2.6.5 Waterfront hazardous materials will be consolidated at points of use (POUs) where materials are needed and appropriate secondary containment will be provided. To the extent possible, the amount of material stored at the POU will be limited to that necessary to perform the work being undertaken and procedures will be established to prevent unsupervised movement of hazardous materials to various work locations. Upon completion of the work, unused materials will be returned to a long-term storage location or properly disposed. The POUs will be provided with adequate containment, a spill kit, and protection from the weather. A process for safely moving the items to the POUs will be established. **

2.6.6 Except as provided for POU storage, waterfront hazardous materials will be moved to shoreside storage locations, where appropriate. Hazardous materials being readied for disposal will be moved to shoreside storage locations. Hazardous materials being collected and made ready for disposal or movement to shoreside storage locations will be consolidated and contained in 30-gallon and larger hazardous waste storage drums and stored in locations with one of the following secondary containment features: a welded or prefabricated curb or a prefabricated continuous secondary containment structure, or in portable hazardous material storage lockers. The storage locations will be protected from the weather, stabilized to prevent motion, and maintained to prevent corrosion. *

2.6.7 Procedures will be employed to ensure materials stored within each waterfront hazardous materials storage locker or storage area are compatible and good housekeeping practices will be maintained to ensure the integrity of the storage lockers or areas. *

2.6.8 A monitoring and maintenance procedure and schedule for inspecting and maintaining portable metal transfer ASTs and hazardous materials storage lockers will be developed to ensure that they remain in good condition. The procedure will include documented routine inspections and require repainting or other measures to protect against corrosion. *

2.6.9 Waterfront hazardous materials storage lockers and ASTs that show signs of wear will be repaired or replaced. *

2.6.10 Equipment containing oil or hazardous materials will be provided with drip pans or other secondary containment protected from the weather. **

2.6.11 Batteries awaiting recharge will be placed in prefabricated secondary containment structures protected from the weather. **

2.6.12 All batteries will be recharged either in place on equipment or within prefabricated secondary containment structures. *

2.6.13 All temporary transfer tanks that are not double-walled will be provided with

secondary containment structures that have lockable drainage ports. **

2.6.14 Hazardous materials storage lockers or secondary containment will be provided for all petroleum hydrocarbon products and hazardous materials used regularly in waterfront repair shop areas. *

2.6.15 During fleet service craft preparation for painting, a technique will be used that has an attached vacuum device to contain paint-related debris. **

2.6.16 Procedures to be used during fleet service craft painting operations will prevent paint and associated material from entering the water. *

2.6.17 Service craft bilge water will be monitored for the presence of petroleum products and the bilge water log for each service craft will be monitored for abnormal fluctuations. Spill containment equipment, including an oil containment boom, will be readily available during service craft bilge water discharge operations. *

2.6.18 All old, obsolete, out-of-date, and unneeded hazardous materials stored in waterfront areas will be removed and properly disposed. *

2.6.19 All unneeded waterfront ASTs will be removed and properly disposed. *

2.6.20 A waterfront equipment decommissioning procedure will be established to ensure that equipment with integrated fuel tanks, such as generators, are adequately contained or protected from causing a release while awaiting disposal. **

2.6.21 Pier MHE and vehicles will be stored on pads out of the weather. Oil-filled and fuel driven equipment stored on a pier will be provided with secondary containment, such as a small shed with a ramped entry and recessed floor. **

2.6.22 Vehicle pier parking for visitors and deliveries will be restricted to a maximum of 30 minutes, and the guard at the site entrance will inspect those vehicles for leaks before allowing them to be driven onto the pier. **

Appendix 1 Exfoliated Paint Removal Operations

Exterior exfoliated paint can be maintained to prevent loose paint from entering the water where the ships are anchored. This could be done by removal and disposal of the paint or encapsulation of the paint with a new coating. A combination of both processes is also possible where paint is partially removed to provide an adhesive surface for overcoating with an encapsulating material. The expected variety of practical paint removal options will be considered in a best value process to determine the use of government workforce and commercial contractor services or the mix of both. Selected approaches will depend on a number of factors including vessel location and condition, weather associated with the Fleet anchorages, and cost.

To prepare for implementing measures to address loose paint, the Maritime Administration has inspected each of its non-retention vessels to assess the condition of exterior coatings. From those inspections, the vessels have been grouped into three categories based upon the coating condition in an effort to prioritize loose paint removal operations. Those vessels designated as red, have coating conditions in the worst condition; those designated as yellow have coatings in moderate condition, and those designated as green have coatings that are in relatively good condition. The red designation is given when more than 25% of coated surfaces have loose paint and the yellow designation is given when more than 10% of coated surfaces are have loose paint.

In light of resource constraints, the Agency will proceed first to address loose paint on those vessels designated as red, removing loose paint from decks, superstructure and surfaces above the waterline. As vessels are finished, they will be incorporated into a regular schedule for inspection and maintenance as needed. Once all the red vessels are finished, the Agency will begin paint removal operations on vessels designated as yellow. Once those vessels have been addressed they will be included in the regular inspection process. Vessels designated as green, will be monitored for deterioration of the coatings and addressed as needed.

A preliminary review of available technologies for addressing loose paint was performed. Some of the expected activities involved in maintaining painted surfaces are discussed below. They include surface preparation, overcoating, and containment.

Surface Preparation

Surface preparation is the practice of removing loose paint and metal residue or scale from the hull's freeboard and topside. Surface preparation processes that may be viable for the Fleets include abrasive blasting, vacuuming, adhesive paint removers, and manual multi-brush scraping.

A vacuum system has the advantage of removing loose paint and collecting it at the same time. A fully contained vacuum robot system, such as the Unibot Vac Robo System, has been used for metal surface preparation for comparable applications. According to Showa Rubber Company, Ltd., owners of Unibot, Unibot has been successfully used on vessel freeboard and topside surface preparation. The removed paint and metal residue is contained within the vacuum enclosure. Unibot reportedly creates no fugitive dust or contaminated water because it is attached to recycling and filtration units that separate and recycle water, abrasive grit (if used), and debris. The Unibot can work up to 600 vertical feet and 300 horizontal feet from the joy

stick controller, potentially reducing or eliminating the need for moving the Fleet anchored vessels farther apart. Similar robot systems are also available, such as the En-Vac Robotic Wall Scabbler, which works on concrete surfaces.

If polyurea-based spray-on materials are used to contain the exfoliating paint, a manual surface preparation that combines vacuuming, hand grinding, and priming to prepare the freeboard and topsides for overcoating could be used. Loose paint would be removed from the surface by hand grinding. High power vacuums would capture most of the exfoliating paint, although additional containment would be necessary. In order to prepare the surface for the polyurea application, approximately 10 percent of the surface would be manually abraded to create adhesion points for the polyurea (Performance Foam, Inc. 2007).

A paint remover could have effective and efficient qualities. Paint removers suitable for surface preparation include a variety of products, such as Peel Away Marine Safety Strip (Marine Strip) I and II, manufactured by Dumond Hazardous materials, Inc. Both products have been used successfully in smaller scale marine applications on fiberglass, wood, and metal (although Marine Strip II cannot be used on aluminum). Both products remove up to ten layers of paint in one application; however, Marine Strip II will leave intact any epoxy barrier coat. Although both products are less toxic than other commercial paint removers, they contain hazardous materials, and containment measures must be taken during application. Marine Strip products are applied by roller or sprayer, covered with cloth, allowed to remain in place for approximately 24 hours and stripped with a scraper. A second application may be necessary if some paint remains. Marine Strip products do not penetrate the hull fiberglass gel coat commonly found on private recreational boats. This method might be excessively time-consuming for large surface areas, such as those of 1,000 square feet or more.

Multibrush scraping has proven traditional competencies. Multibrush scraping is a manual process similar to vacuuming and hand grinding but with different equipment. The pneumatic or electric cleaning brushes are designed, configured, and operated to achieve the necessary level of surface preparation. Containment would be required to prevent the paint residue from entering the water.

Overcoating

Overcoating is the practice of coating the exposed vessel freeboard and topside surfaces with paint or a sealant product to prevent paint exfoliation. Overcoating processes that may be viable for the Fleets include penetrating primer, marine paint, and spray-on polyurea.

Polyurea refers to a polymer technology that has been used successfully to overcoat ship hulls, decks, and superstructures. Polyurea is a hazardous material that is generated when a polyurethane resin reacts with an epoxy curative (Polyurea.com 2005). The level of hazardous material formulation of polyurea depends on the application; a qualified chemist must be consulted to prepare an appropriate formulation for each job. Proper surface preparation is also very important to ensure the desired bond strength of polyurea. Polyurea cures quickly and is usually dry to the touch within seconds and often fully cured within 48 hours. Polyurea may be applied at a large range of ambient temperatures and humidity conditions. Polyurea does not contain volatile organic compounds or solvents (Performance Foam, Inc. 2007).

A certain minimum horizontal clearance would be required between vessels to provide access for a barge containing application equipment. Another way of applying the spray-on type coating is via a platform lowered over the side from above. The containment process includes attaching netting, tarp, and containment booms to contain any falling debris, vacuuming and priming the surface, and applying the polyurea overcoat. Surface preparation would be done at circular spots on a ten-foot grid where the polyurea would attach, so the material could span 100 square foot painted areas.

A variety of marine paints and primers are available commercially. Marine primers and paint are common methods of overcoating small and large boats. Primer and paint would be applied manually using sprayers or rollers.

Containment

Different containment methods may be applicable to the processes involved in surface preparation and overcoating. Containment refers to the practice of encapsulating the work area and surroundings during surface preparation to avoid releasing exfoliated paint and metal residue into the environment. While vacuum systems could be used to contain most emissions, surface preparation methods will require additional containment. The specific containment methods reviewed are freeboard netting/tarping and localized tenting/netting, and booms for containing floating materials.

Freeboard netting has a mesh material fine enough to contain paint, is attached to the vessel hull and is moved around the vessel as work progresses. Determining how to attach and reposition the netting effectively during the work should be tested. Care must be taken in securing the netting to the top and bottom of the freeboard area to avoid compromising the containment system during variable wind conditions.

Localized tenting/netting could be applied to confined work. It is possible that netting similar to that described above but confined closer to the work area could be installed. Testing would be necessary to determine how to attach the netting effectively and to move it efficiently.

A containment boom is similar to a curtain inserted into water that forms a gate around debris. Containment booms are typically used to contain oil but can also contain other floating debris. When operations are complete, the boom is reeled in and the debris is collected and disposed. A containment boom would not be effective on paint chips if they are not buoyant.