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**CLEAN-UP STANDARD FOR
DISPOSAL AT SEA OF VESSELS,
AIRCRAFT, PLATFORMS & OTHER STRUCTURES**

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DISPOSAL AT SEA OF VESSELS,
AIRCRAFT, PLATFORMS & OTHER STRUCTURES**

Revision 3

December 2007

Environment Canada

Pacific and Yukon Region

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The Clean-Up Standard for Ocean Disposal of Vessels, Aircraft, Platforms & Other Structures, Environment Canada, Environmental Protection Branch, Pacific and Yukon Region was prepared under a contract by Mr. Darryl J. Hansen of the Pacific Lighthouse Environmental Management Services Incorporated, Steveston, B.C. www.plems.com

CLEAN-UP STANDARD FOR OCEAN DISPOSAL OF VESSELS, AIRCRAFT, PLATFORMS & OTHER STRUCTURES

1. BACKGROUND

1.1 Background: Development of this Standard

This Standard approaches each clean-up criterion from the viewpoint of reasonableness, with the proviso that environmental effects or potential environmental effects are the priority. Research has indicated that there may be several potential concerns that are not reflected in the site monitoring data or existing environmental guidelines. Until more research has been completed, a stricter criterion than that indicated solely by the site monitoring data has been employed in these instances.

This Standard was developed primarily from the clean-up criteria applied to the vessels sunk after 1995 on the Pacific coast of Canada. This revision takes account of further available information, including the experience of other jurisdictions. As more quantitative data are generated there will be further adjustments to this Standard. It is the intention of Environment Canada to continue to amend and develop this Standard as scientific evidence concerning environmental impacts is made available. Previous editions of this Standard included Revision 0, dated February 1998 and Revision 1, dated July 2001.

Prospective permit applicants should also consult the publications entitled “Applying for a Disposal at Sea Permit Under the *Canadian Environmental Protection Act, 1999*” and “Clean-up Guideline for Ocean Disposal of Vessels, Aircraft, Platforms & Other Structures – Revision 2”. Both documents are available from Environment Canada; current editions are posted on their website.

1.2 Interpretation and Definitions

In this Standard and its associated publications noted above, the following interpretation and definitions will apply:

- “asset” means the manmade structure that is proposed for ocean disposal and includes aircraft, ships, platforms and other structures. “Aircraft” and “ship” have the meaning described in the *Canada Environmental Protection Act, 1999* Section 122;
- “asset debris” means material that was once part of the asset that has been removed or disconnected from its original location in the asset.

- “clean-up debris” means any material that was not a part of the asset. If asset debris and clean-up debris are mixed, then the mixture is considered to be clean-up debris;
- “Designated Inspector” means the qualified person who inspects the asset in accordance with this Standard. The Designated Inspector may be an Environment Canada employee or other person acceptable to Environment Canada officials, subject to Part 8.1 Designated Inspector Qualifications;
- “emulsified oil” means a mixture of oil that is finely dispersed in water and does not readily separate due to gravity;
- “fitted equipment” means machinery or components that were bolted, welded, or otherwise fastened in an manner to indicate that removal while in service would not be a casual act, and that they were part of the outfit of the asset during its last period of service;
- “grease” means a lubricant or corrosion protective substance which was applied as a solid, and does not apply to any compounds that were not designed to be a lubricating or protective compound, nor does it apply to sludge or to heavy oils that may have thickened or solidified;
- “halocarbon” has the meaning under the *Federal Halocarbon Regulations, 2003* (Schedule 1) pursuant to the *Canadian Environmental Protection Act, 1999*.
- “machinery spaces” has the meaning under the *Marine Machinery Regulations* of the *Canada Shipping Act*;
- “PCBs” Polychlorinated biphenyls (PCBs) means any products that contain chlorobiphenyls congeners or any chlorinated organic compounds in concentrations that would be regulated under the *Chlorobiphenyls Regulations*, i.e., greater than 50 parts per million (ppm);
- “oil absorbent material” means any substance which is sold or marketed primarily as a material to absorb oils or fuels for spill cleanup;
- “Regulations” mean the *Disposal at Sea Regulations 2001* under the *Canadian Environmental Protection Act, 1999*;
- “responsible Environment Canada official” means the Environment Canada official who has been assigned primary responsibility for verifying that the condition of the asset is satisfactory for issuing a permit under the Regulations;
- “structure” means components that are an integral part of the strength members of the asset (decks, bulkheads, webs, etc.), which were not designed for removal except in

the most unusual circumstances. In most cases, structure components are welded in position;

- “suitably qualified Explosive Technician” means an individual that: possesses a current provincial blaster's licence issued by the Workers' Compensation Board or other governing provincial authority; and meets the Commercial Diving Competency Standards of the Canadian Standards Association; and has prior experience in sinking assets at sea that is satisfactory to the responsible Environment Canada official.
- “tall tanks” means structural tanks that are at least 2.5 meters in height and have access from the top and whose length/ height ratio and width/ height ratio do not exceed 2.0 as measured at the tank top.
- “Workers' Compensation Board or WCB” means the WCB in British Columbia, Manitoba, Nova Scotia, Prince Edward Island, Northwest Territories and Nunavut, the Workplace Health, Safety and Compensation Commission (WHSCC) in New Brunswick, the Workers' Compensation Commission in Newfoundland, the Workplace Safety and Insurance Board in Ontario, le Commission de la santé et de la sécurité du travail (CSST) in Quebec, and the Workers' Compensation, Health and Safety Board in the Yukon.
- “visible” means readily visible to the naked eye. With respect to electrical cable, it means cable that is visible from the deck of the compartment once false ceilings have been removed.

2. SCOPE

Type of Structures Addressed. This Standard was originally developed for ships. However, it may also be used for aircraft, platforms, other structures or other machinery that is scheduled for ocean disposal under the Regulations; consult Environment Canada for applicability.

Scope of Activity. The preparation activity for an asset sinking consists of several related activities. The two primary activities are asset clean-up, and salvage or recycling efforts. If the asset will be sunk in an area accessible to divers then diving safety preparations should be part of the preparation activities.

Requirements of Other Jurisdictions. This Standard is primarily intended to address environmental clean-up requirements mandated by federal authorities. Applicants are cautioned that provinces and municipalities may have further requirements that must be addressed, especially with respect to work-site safety and disposition of materials that are removed from the asset. It is not within the scope of this Standard to discuss provincial or municipal regulations, although the responsible Environment Canada official may require that those requirements directly applicable to the asset be met prior to permit approval.

Site Safety. Experience has shown that job-site safety during clean-up and salvage operations is frequently a problem. Falls, fire, and air quality issues are especially important in vessels. This Standard does not address job-site safety requirements for permit applicants, except as they relate to the formal inspection process. Permit applicants must refer to Worker's Compensation Board (WCB) regulations and the Canada Labour Code for requirements related to maintenance of a safe and legally compliant work-site. **Permit applicants are strongly cautioned that assets - especially ships - at the end of their life are inherently dangerous work sites; failure to implement and enforce an adequate safety program could lead to injury or fatality.**

Environmental Assessment. Under the *Canadian Environmental Assessment Act*, all federal departments and agencies are required to conduct or participate in federal environmental assessments if a federal authority exercises or performs certain powers, duties or functions in relation to a project. With respect to asset disposal at sea, Environment Canada is the lead responsible authority but other federal departments or agencies involved in this activity will be required to conduct their own environmental assessments or input into the environmental assessment conducted by Environment Canada. Permit applicants may be required to supply information to support this activity.

Diver Safety. Although diver safety is a significant issue in the case of **assets** sunk as diving attractions it is not among the environmental concerns required by the CEPA to be taken into account by the Minister of the Environment in granting an Ocean Disposal Permit. Consequently, a permit applicant planning to sink an **asset** as a diver attraction should seek legal advice regarding such issues as diver safety, the preparation of the **asset** from a diver safety perspective and liability before applying for a Disposal **at Sea** Permit under CEPA.

3. OIL AND GREASE

The aim of the hydrocarbon clean-up is to remove liquid hydrocarbons (fuels, oils) that could escape into the environment. It is acknowledged that it is impossible to remove all hydrocarbon contaminants; however experience has indicated that a very thorough clean-up is achievable. In general terms all liquid hydrocarbons are to be removed and semi-solids (greases) either removed where practical or contained. Permit applicants are advised that the Designated Inspector will require access to every space, tank, compartment, pipe and component in the asset.

3.1 Structural Tanks

All structural tanks are assumed to be contaminated by hydrocarbons until proven otherwise by inspection. Structural tanks encompass, *inter alia*: fuel storage/ settling/ service/ day tanks, cargo tanks, oil tanks, structural hydraulic tanks, fresh water tanks, ballast tanks, stabilizer tanks, black and gray water tanks, voids, and cofferdams.

Tank covers are to be removed, or tanks are to be opened for human access by some other method. Tank interiors including deckheads are to be cleaned of all hydrocarbons.

For inspection purposes, structural tanks are divided into three categories:

- **Double bottom tanks.** Each bay in a double bottom tank must be inspected. Safe access for Designated Inspectors is an absolute requirement. Permit applicants are strongly cautioned that double bottom tanks typically have difficult access, and that safety of workers and inspection staff must be actively addressed.
- **Tall tanks.** For inspection purposes the tank may either be opened and certified gas free for Designated Inspector access, or tanks may be flooded to a height approximately 20 cm below the bottom of the deepest structural member on the tank top, and a manhole size inspection cover provided on the tank top. Note that any piping in the tank must be inspected in accordance with Part 3.4.
- **Other structural tanks.** Any tank that is not a double bottom tank or does not meet the restrictive definition of “tall” tank is in this category. Other structural tanks will be entered and inspected, unless the cleanliness condition of the tank is readily viewed from outside the tank. Tanks must be dry for inspection unless other specific arrangements are made in advance with the Designated Inspector.

No visible hydrocarbons are allowed on the tank surfaces and interior fittings. Piping inside tanks must be removed from the tank or otherwise proven free of hydrocarbons as noted in part 3.4.

If flooding is used for tall structural tanks, then no visual evidence of oil on the water surface is allowed. If tall structural tanks are flooded, oil absorbent pads and excess loose oil absorbent material must be removed. Any piping in tall structural tanks must be inspected or removed before flooding or otherwise proven clear of hydrocarbons to the satisfaction of the Designated Inspector.

3.2 Non-structural Tanks

All non-structural tanks are assumed to be contaminated by hydrocarbons until proven otherwise by inspection. For inspection purposes non-structural tanks that are left in the asset must be opened for visual inspection. Note that non-structural tanks are frequently relatively small and access openings for on-going maintenance are typically not as large as for structural tanks. In most instances, larger openings will need to be cut to allow for

complete inspection.

No visible hydrocarbons are allowed. Debris and excess loose oil absorbent material must be removed.

3.3 Fuel and Oil Filling Points

All filling stations or deck fittings that were used for receiving fuels, oils or other hydrocarbons are to be opened and cleaned. The Designated Inspector will require access to ensure that the filling points and any associated fittings are completely drained and free of hydrocarbons. This will typically require access from the bottom and the top.

3.4 Fuel and Oil Piping

Fuel and oil piping is to be drained of all product. The requirement for cleaning and opening of pipes varies according to the type of product that was in the lines. In general, the more viscous the product the more opening and active cleaning activity will be required. For very viscous products (e.g. Bunker “C” fuel), the Designated Inspector will require that all piping be fully opened for visual inspection.

If piping in the asset is not already marked with contents from its service life, permit applicants must trace systems and clearly mark piping. Designated Inspectors will assume that unmarked piping contains liquid hydrocarbons, unless the pipe is clearly part of another known system. Designated Inspectors will audit the in service and/ or permit applicants marking scheme through sampling to verify that it is correct. If errors of importance are found, the Designated Inspector may require further openings or other work.

Small-bore hydrocarbon-carrying lines ($\frac{1}{2}$ inch nominal or smaller) must be removed from the asset.

In vertical piping runs, all valves shall be completely opened and any blanking flanges or spectacle plates removed. Horizontal piping runs larger than $\frac{1}{2}$ inch nominal require one full opening that allows visual inspection of the internal pipe bore on each major horizontal run. This opening will be used to assess sludge formation, and may lead to further cleaning requirements depending on findings. Note that this includes piping in tanks; some coordination will be required if the “flooding” method of inspection is used (see Part 3.1). **In addition:**

- For light products, piping shall be opened at low spots and a minimum of every three metres. Opening means flanges separated, couplings unbolted and piping separated, or the pipe is to be cut completely through at the bottom.
- For heavy products, piping shall be opened at low spots and a minimum of every three metres. Opening means that the pipe is completely open for visual examination.

Opening locations are to be clearly marked for the Designated Inspector by means of tagging, spray paint, etc. By the time of the inspection all draining of piping systems is to be completed; no visual evidence of hydrocarbon weeping may exist at openings.

3.5 Fuel and Oil Pipe Fittings Including Manifolds

Fittings consist of valves, manifolds, coolers, site glasses, siphon breakers, filters, etc. All fittings must be opened and cleaned or removed from the asset. Fittings in light oil systems may have a cut through the lowest point of the fitting in lieu of complete opening. By the time of the inspection all draining of fittings is to be completed; no visual evidence of hydrocarbon weeping may exist at openings.

Where the construction of a fitting is complex or unusual, the Designated Inspector will require a visual examination of internals in order to determine location of any residual fuel or oil product. Fittings that have more than one oil-tight compartment (as in manifolds and coolers) require special attention. The Designated Inspector will require access to all sub-compartments or components to determine the internal flow path and to confirm that internal passageways are clean.

3.6 Bilge Piping

All piping that runs through the bilge areas of machinery spaces is assumed to be contaminated by hydrocarbons until proven otherwise. Piping in bilge spaces is to be treated as for fuel and oil piping.

3.7 Gauges and Gauge Lines

Pressure gauges and gauge lines are assumed to be contaminated with the product that they were intended to measure. Pressure gauges and gauge lines for hazardous material systems (including hydrocarbon systems), and other systems that may have been contaminated with hazardous materials, are to be removed from the asset.

Note that every effort must be made to remove copper gauge lines (regardless of contents) to meet the requirements of Part 4.10 of this Standard.

All fluid filled gauges are to be removed from the asset. Temperature gauges may be left in position provided that they do not contain any hazardous material. Other measuring instruments are to be removed from the asset or opened for cleaning and examination.

3.8 Combustion Engines

Combustion engines include any reciprocating engine in which fuel is consumed (diesel, gasoline, gases), Stirling cycle engines and gas turbines. Permit applicants may either

remove combustion engines and associated components from the asset or clean them in accordance with this part.

- **Structure.** All access panels, explosion doors, handhold doors, maintenance panels, gear covers, bearing covers/ retaining plates, etc. are to be removed. Visible oil is to be removed from all internal components. The surrounding and support structure is to be made accessible for inspection, especially the area under the engine. At least one main bearing is to be opened to determine if their design allows oil to be trapped and all are to be opened and cleaned if required. Heads on reciprocating engines are to be removed for inspection.
- **Fuel System.** All fuel system components are to be stripped from the engine. These include injectors, carburetors, supply, distribution and return lines, filters, pumps, relief valves, pressure regulating mechanisms, governors and heat exchangers. If the permit applicant wishes to sink these items with the asset they are to be opened, cleaned, and readied for inspection.
- **Lubricating Oil System.** Lubricating oil sumps are to be drained and opened for cleaning and visual inspection. This will typically require that additional access openings be made. All lubricating oil piping, both internal and external to the engine, is to be removed or opened and drained. Lubricating oil system components are to be opened and cleaned or removed from the asset. Internal oil gallery plugs are to be removed. Bearing covers on external pedestal and thrust bearings are to be removed, and drains opened. Permit applicants are advised that engine structure may need to be removed or cut away to allow access to oil galleries and internal supply lines. Engine driven oil pumps are to be pulled and cleaned or removed from the asset. Engine oil filling and dirty oil drainage arrangements shall be removed or opened and proven clean.
- **Other Systems.** Other components and systems susceptible to contamination with hydrocarbons (superchargers, turbochargers, air filters, exhaust trunks, etc.) are to be opened for inspection.

3.9 Boilers

Boiler fireboxes are to be opened for inspection. A section of the bottom firebrick is to be removed through to the underlying structure. The removed section must be of adequate size to allow visual inspection (approximately 200 mm x 200 mm), and must be located at the lowest accessible part of the firebox, or if the floor is at an even keel, below the oil sprayers.

Any bricking or firewall material showing evidence of hydrocarbon contamination is to be removed from the asset. All boiler mounted fuel components (burners, valves, fuel control components, etc.) are to be removed from the asset, or opened for inspection.

Blind bilges (if fitted) associated with boilers are to be opened for inspection. Tanks associated with boilers are to be treated as per the requirements for non-structural tanks.

Any mud drums, water drums or steam drums must be opened for visual inspection. Entry is not required unless contamination is visible. If there is any evidence of hydrocarbon contamination in drums, the Designated Inspector may require opening of selected headers or other components to assess the extent of contamination and cleaning requirements.

3.10 Non-combustion Engines, Shafting, Gearing and Stern Glands/Tubes

Main gearboxes and associated clutches are to be drained of all lubricating oils. All access panels, explosion doors, handhold doors, maintenance panels, bearing cover retaining plates, etc. are to be removed. Further access openings are to be made as required for cleaning and inspection access. Internal gear sprayers, lubricating lines and other components are to be removed, or opened and drained. Bearing covers on external pedestal and thrust bearings are to be removed and drains opened. Any bearings with sumps (typically plummer bearings) are to have sumps fully opened for inspection.

Stern tubes and seals, if of the oil bath type, are to be drained of oil. Note that this may require extraordinary measures to preserve the watertight integrity of the vessel during the clean up and salvage operation. The Designated Inspector will require that evidence be presented to confirm the absence of oil in the stern tubes.

The outside surfaces of propulsion shafts must be clean free of oil and grease. A light internal coating of water resistant grease is acceptable if shafts are watertight and of heavy wall construction. Large internal accumulations of grease must be removed; it is recognized that this may require a docking. Oil and hydraulic lines inside shafts must be removed or otherwise proven clean. Oil and grease transfer blocks must be opened and cleaned or removed.

Vessels that are equipped with thrusters, Z-drives, or other methods of unconventional drive will be addressed on a case-by-case basis. The criterion is that no hydrocarbons remain in the drive system. Permit applicants must recognize that this may require that the vessel be dry-docked.

Where a dry-docking is required, the responsible Environment Canada official may allow special inspections to confirm part-progress on those particular items associated with the dry-docking activity.

3.11 Steering Gear

Hydraulic pumps and associated piping and fittings are to be removed, or opened and drained. Hydraulic telemotor systems are to be treated similarly. Main steering rams must have the ram cylinders opened to allow visual inspection. Grease lines and reservoirs for rudder heads are to be removed from the ship. Grease in rudder stocks may remain *in situ* if required to preserve watertight integrity of the vessel during cleanup,

otherwise it must be removed.

Vessels with combined drive and steering systems will be addressed as per Part 3.10.

3.12 Auxiliary Machinery

Auxiliary machinery refers to machinery and components that are not an integral part of the main propulsion system of the asset. The term can include, *inter alia*: pumps, motors, compressors, galley equipment, capstans, elevators, cargo handling machinery, etc. Many pieces of auxiliary machinery have a lubricating oil system or are in direct contact with liquid hydrocarbons.

Auxiliary machinery that had a liquid hydrocarbon as its working fluid must be completely opened and cleaned.

For other auxiliary machinery, all lubricating oil system components shall either be stripped from auxiliary machinery and removed from the asset, or opened and cleaned. Lubricating oil sumps shall be opened, drained and wiped clean; an adequate opening to allow a complete visual inspection of the oil sump is required. This may require that structure be removed or cut away. Bearings, except as allowed in Part 3.14, shall be opened and cleaned.

3.13 Hydraulics

Unless there is acceptable proof to the contrary, all hydraulic systems will be assumed to have employed a hydrocarbon based fluid. Hydraulic lines are to be removed from the asset, or opened at every fitting and blown through with air until clear. Small bore lines (less than ½ inch nominal) are to be removed from the asset. Hydraulic fittings (valves and valve blocks of all types, cylinders, pumps, accumulators, filters, coolers, etc.) are to be removed from the asset or stripped to component level and cleaned. Hydraulic sumps are to be drained, and opened for cleaning and visual inspection. This will typically require that additional access openings be made.

3.14 Grease

All grease reservoirs are to be removed from the asset, or opened and cleaned. Grease lines shall be removed. All visible grease accumulations must be removed. Machinery that employs grease-packed gearboxes (common on deck machinery) must be opened and cleaned of grease. Grease on chains and sprockets shall be removed. Greased cables are to be removed from the asset. Waste cooking or other grease in galley equipment and sink traps shall be removed.

Site monitoring has not shown adverse effects from small amounts of grease contained within housings and bearings. Sealed rolling element bearings that contain grease may

be left *in situ*. Grease in other fittings such as stuffing boxes, glands, etc. may be left *in situ* if the seals are intact and the quantities are small. Small is a relative term but will be interpreted to mean less than 100 milliliters evenly distributed throughout the component.

3.15 Bilge Areas

Bilge areas include the interior skin in machinery compartments, cargo holds, storerooms, etc. The bilge area includes all areas that would be subject to contact with oily water, or may be a catch area for spills from cargo or stores, and interior skin areas which may have been subject to hydrocarbon contamination through sprays, spills, disposal, etc. Bilge areas include the plating and all surfaces of attached stiffeners (including undersides) and fittings. Bilge areas shall be free of visible oils, greases and sludge. Oil or grease films evident to the touch must be removed.

Any debris contaminated with hydrocarbons is to be removed. Any cleaning fluids used to clean the bilge are to be removed from the vessel. Accumulations of loose oil absorbent material are to be limited to those amounts which cannot reasonably be picked up with brooms and vacuums. See Part 5.2.

Machinery and other components must be moved/ removed as necessary to allow access to bilges for inspection. Ballast bars or other material located in bilges must be moved to allow inspection of underlying surfaces.

3.16 Decks and Floor Coverings

Decks and floor coverings include ceramic tile, linoleum and linoleum tile, carpet and continuous floor coverings. False floors must be opened for inspection.

Oil and grease films on deck coverings are to be removed. In compartments subject to hydrocarbon spills during the asset's life (e.g. workshops, compartments with fuel or oil tank overflows or tank covers), a section of the floor covering (if fitted) is to be removed through to the underlying structure. The removed section must be of adequate size to allow visual inspection down to the structural deck (approximately 200 mm x 200 mm), and must be located at the lowest accessible part of the compartment, or where there is no low spot, adjacent to the likely contamination source.

Sections of wood planking on upper decks are to be removed through to the underlying structure in areas of visual staining. The removed section must be smoothly sawn to allow examination of the end grain cross section, and be of adequate size to allow visual inspection of both the planking and the underlying structural deck (approximately 200 mm x 200 mm). Planking that has oil penetration deeper than 2 mm from the surface is considered saturated.

Deck coverings or underlays that have been saturated with hydrocarbons are to be

removed from the asset.

3.17 Bulkheads and Deckheads

Bulkheads and deckheads are to be free of oil and grease films. Where it is evident that a spill or accumulation has occurred, coverings are to be removed to reveal the full extent of the spill or accumulation.

Access for visual inspection is required behind false bulkheads and ceilings. Where false bulkheads or false ceilings impair inspection, they shall be removed or opened to the extent necessary to allow full and unimpaired visual inspection. Further openings shall be made as necessary to progress clean-up as noted in this Standard.

3.18 Other Components and Structure

Other components that may contain oils or grease are to be removed from the asset, or fully opened for inspection.

Concrete fill or ballast poured into bilges and equipment foundations may remain in situ subject to the following conditions:

- The low edges of any containment system are opened to allow trapped oil to drain; and,
- The surface of the concrete is cleaned of visible hydrocarbons; and
- The concrete fill is tight against the structure.

4. HAZARDOUS MATERIALS

4.1 Removal of Hazardous Material

All hazardous materials are to be removed from the asset, except as allowed by the Regulations or by this Standard. Permit applicants are advised that removal from the asset must be undertaken in a careful and measured manner. Hazardous material handling, storage and disposal are the subject of provincial and municipal regulations.

4.2 Residues in Cargo Areas

Residues in cargo areas will be considered to be hazardous material until proven otherwise by the permit applicant.

4.3 Unknown Wastes

Any waste product which is of unknown origin or content will be assumed by the Designated Inspector to be hazardous material until proven otherwise by the permit

applicant.

4.4 Antifreeze and Coolants

Antifreeze and coolant mediums, other than untreated water, are to be drained and removed from the asset. Piping associated with these systems shall be treated as per fuel and oil piping (See Part 3).

4.5 Batteries

All batteries are to be removed from the asset. This includes batteries that are part of fitted equipment.

4.6 Fire Extinguishing Systems

Fire extinguishing systems are to be fully decommissioned. Except for fire fighting systems that employ untreated sea water or fresh water, all fire fighting compounds are to be removed from the asset. Storage containers, if left *in situ*, are to be opened for inspection. Any lines that have been charged with any fire fighting product other than untreated sea water or fresh water are to be treated as for fuel and oil piping (see Part 3). See also Part 4.7 Halocarbon systems.

4.7 Halocarbons

All halocarbons in refrigerating, air conditioning, fire-fighting and other systems shall be removed from the asset. The permit applicant is reminded of the requirements contained in the Federal Halocarbon Regulations (“Recovery” section) under the *Canadian Environmental Protection Act, 1999*. Notices concerning dismantling, disposing and decommissioning should be preserved for review by the Designated Inspector.

Permit applicants are advised that provinces may have additional requirements.

4.8 Mercury

Equipment or components using mercury (see listings below) are to be removed intact from the asset. Any other visible mercury is to be removed from the asset. **Permit applicants are reminded of the health hazard associated with airborne mercury.**

The following items typically contain mercury and shall be removed intact from the asset: mercury thermometers, “U” tube vacuum measuring devices, fluorescent tubes, “silent” light switches, float switches, “tip” switches on portable equipment, domestic style thermostats and cathode ray tubes.

The following items may contain mercury and shall be removed from the asset or

carefully opened to show that mercury is not present: gyroscopes, vacuum measurement gauges, some laboratory equipment, profile draft indicators, remote tank level measuring systems, and roll indicators.

Thermometer pockets and other receptacles for mercury instruments shall be fully accessible for inspection.

4.9 Zinc

Zinc anodes are to be removed from the exterior hull, sea bays, piping systems, coolers, bilges, tanks, etc.

For external anodes, the Designated Inspector may require a written statement from the permit applicant that anodes have been removed if the Designated Inspector cannot reasonably check the underwater hull.

4.10 Copper

It is required that the permit applicant make a significant effort to salvage copper from piping, electrical equipment and fittings. Uncoated elemental copper must be removed. Enclosed or coated copper need not be removed except where the coating is damaged or severely degraded relative to its in-service condition. Notwithstanding the exemption concerning coated and enclosed copper, Designated Inspectors may require removal of some of these items (notably motors and generators) where overall copper loading in the compartment would otherwise be excessive.

Electrical cable requirements are addressed in Part 4.14.

4.11 Lead

Lead ballast bars, fittings and sheet products used for shielding, flooring etc. shall be removed.

4.12 Cadmium

Cadmium plated items and elemental cadmium must be removed.

4.13 Other Metals

There are no restrictions at this time.

4.14 Polychlorinated Biphenyls (PCBs)

Liquid polychlorinated biphenyls must be removed from the asset. The following suspect components shall be removed:

- Fluid filled transformers; all transformers shall be made visible for inspection.
- Fluorescent light ballasts.
- Electronic components that may be fluid filled, based on their external appearance.

PCBs held in solid matrix may be difficult to detect from visual appearance. For assets constructed before 1984, the following items must be removed:

- Oil impregnated felt or cloth gasket material.
- Other materials as specified by the Responsible Departmental Official. Permit applicants should check with Environment Canada for the list of required removals for their permit.
- Visible copper cabling must be removed.
- Open ends of electrical cables that show any evidence of fluid weeping (except for water) must be removed in their entirety.

Where there is reason to suspect that other equipment or components may contain PCBs, then the responsible Environment Canada official will require that the permit applicant either remove the equipment or component from the asset, or provide proof from a competent authority acceptable to the responsible Environment Canada official that the equipment or component does not contain PCBs.

4.15 Black and Gray Water

Black water (sewerage) and gray water (drains from sinks, showers, dishwashers, etc.) shall be removed from the asset. Black water lines are to be flushed to the satisfaction of the Designated Inspector.

Gray water lines shall be treated as per fuel and oil piping (see Part 3). Representative gray water lines shall be opened for full visual inspection; if lines are not clean and free of deposits, then the Designated Inspector will require further opening or removal of the lines.

Traps from sinks in workshops, laboratories and other compartments where oil or hazardous chemicals may have been employed are to be opened for inspection.

Deck scuppers or deck drain lines from workshops, storerooms, lockers, hangers, medical spaces, magazines, machinery rooms, galleys, laboratories, compartments with non-structural tanks and other compartments where oil or hazardous chemicals may have been stored shall be opened for full visual inspection, or removed from the asset. Deck

scuppers may be opened from above or below as convenient, provided that complete inspection is possible.

4.16 Radioactive Materials

A certificate of radiation compliance is required for ex-warships, research vessels, or other assets (as specifically required by the Environment Canada official) that may have carried radioactive material or equipment. The certificate of compliance is to state that material remaining on the asset meets the abandonment requirements of the *Nuclear Safety and Control Act*.

4.17 Plastics, Other Synthetic Materials and Soft Furnishings

Plastic, other synthetic materials and soft furnishings may be left *in situ* if they are part of the structure of the asset and are securely attached to the structure of the asset, subject to any tests that the responsible Environment Canada official may specify. Material that is not securely attached is asset debris (see Part 5).

Plastic foam insulation is addressed at Part 6.2.

4.18 Fitted Hazardous Materials and Products

Hazardous materials and products shall be removed in accordance with Part 4, except as specifically exempted by this section. Materials that are not specifically addressed in this section and that are an integral component of the structure of the asset may be left *in situ*.

Examples may serve to illustrate the distinction:

- liquid paint must be removed, but paint on the hull may be left *in situ*;
- structural glue may be left in place, although adhesives in tubes, cans, bottles, etc. must be removed from the asset.

If there is doubt as to what is acceptable, the responsible Environment Canada official will provide a ruling on the specific issue in question.

5. DEBRIS

5.1 Introduced Material

No material may be introduced into the asset, unless:

- It is of a permanent and commemorative nature (plaques, markers, etc.) and it does not otherwise contravene this Standard, or
- It is structural in nature, and is a requirement to allow the asset to be safely moved or handled, and it does not otherwise contravene this Standard, or

- It is required to make the asset safe for work, and is of small quantity and it does not otherwise contravene this Standard.

5.2 Debris

Clean-up debris must be removed from the asset. The standard of cleanliness required is broom clean.

Corrosion products associated with the asset may remain provided that they are not contaminated with hydrocarbons or hazardous material. Asset debris may remain in the asset subject to the following conditions:

- no asset debris contaminated with hydrocarbons or hazardous material may remain in the asset; and
- asset debris that is heavy and/ or bulky fitted equipment, and was disconnected or removed from the structure of the asset for cleaning or inspection purposes may remain in its original compartment. Otherwise, asset debris must be contained in a sealed compartment or structural tank that is below the waterline of the ship and underneath the largest section of the superstructure; and
- no asset debris may be placed in a compartment or structural tank that is to be sealed until both the compartment and the debris have been inspected; and
- asset debris must be negatively buoyant.

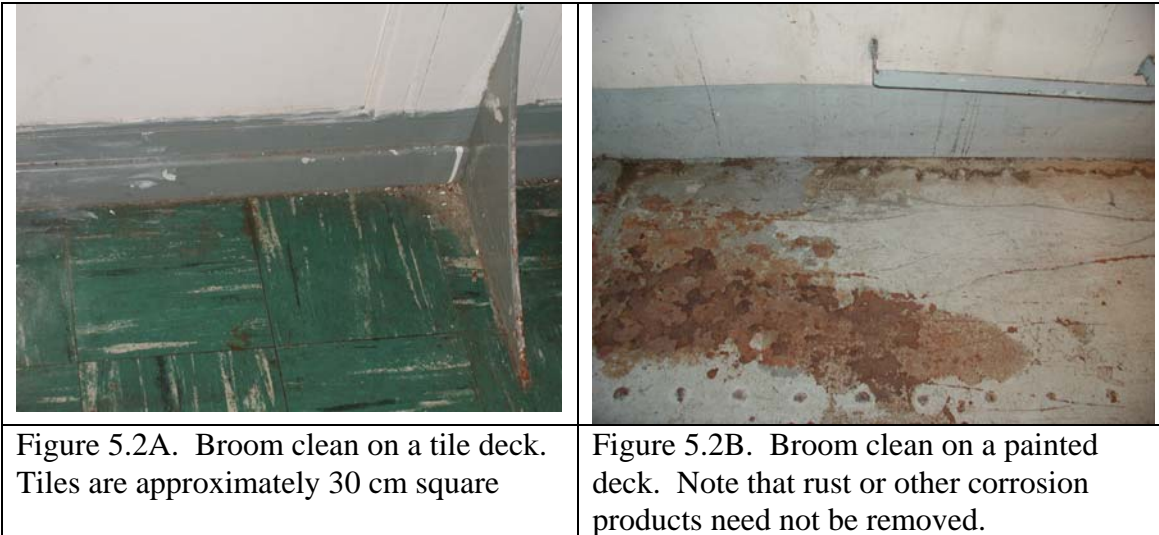




Figure 5.2C. Broom clean in way of stiffeners. Remaining material is loose oil absorbent material.

5.3 Recyclable Metals

Commercially recyclable metal (especially copper, lead, brass, bronze and aluminum) may not remain in the asset, except as follows:

- Small cuttings and minor amounts may remain in clean-up debris.
- Recyclable metal that is integral to the structural integrity or stability of the asset may remain. If the asset is to be sunk with significant quantities of commercially recyclable metal, permit applicants will be required to provide information and analysis to support the Environmental Assessment process (see Part 2).

6. INSULATION

6.1 Asbestos Containing Material

Asbestos-containing material (ACM) is the subject of workplace safety regulation. Permit applicants are required to adhere to local regulations concerning ACM during the asset preparation process. Permit applicants are strongly cautioned that air-borne asbestos is a known health hazard, and that failure to follow applicable workplace safety regulations could lead to serious long-term health effects.

Intact and undisturbed asbestos insulation need not be removed.

Loose or friable asbestos evident in compartments under inspection may cause the inspection to be terminated by the Designated Inspector, at the permit applicant's expense. If inspections are terminated, Designated Inspectors will notify the Workers Compensation Board of their concerns and action. Loose or friable ACM must be addressed. It may be removed from the asset and disposed of in accordance with local regulations. Alternatively, loose or friable ACM may be treated as "asset debris", subject to the following:

- It may not be mixed with other asset debris or introduced material;
- It must be sealed in a compartment located low in the asset (below the normal waterline if in a ship) and under the major portion of the superstructure. This compartment must be inspected and deemed clean by a Designated Inspector prior to placing any ACM in the compartment.

6.2 Plastic Foam Insulation

Plastic foam insulation is to be removed from the asset unless it meets the all of following requirements:

- The foam is securely fastened in place to the asset structure by waterproof glue, studs or other secure and permanent method; and,
- The foam is intact; and,
- The foam is covered with a structurally sound and solid surface; and,
- The composition of the foam is known, and is deemed acceptable for ocean disposal by the responsible Environment Canada official.

6.3 Painted & Blown Insulation

If the painted or blown insulating product is classified as ACM, then it must meet all the requirements of Part 6.1 as well as this part. Painted and blown insulation may remain in the asset subject to the following conditions:

- The insulation is not contaminated with hydrocarbons or other substances noted in Part 4, and
- The product is held with sufficient security that it could withstand the stress associated with the intended method of sinking the asset and,
- The product has a strong waterproof bond to the substrate or is otherwise securely held to the structure to preclude post sinking release.

Painted and blown insulation that does not meet all of the above requirements or that is damaged or loosened during the clean-up process must be removed from the asset.

6.4 Other Types of Insulation

There are no specific requirements for insulation that is not addressed in Parts 6.1 – 6.3. If disturbed, other types of insulation may be considered as asset debris.

7. PAINT

7.1 Anti-fouling Coatings

Anti-fouling coatings must be in a non-active state before a permit under the Regulations can be issued. Permit applicants may satisfy this requirement in one of several ways:

- The anti-fouling coating on the vessel or platform hull may be removed. It is recognized that this may require a docking.
- The permit applicant may produce documentation showing the dates when the vessel or platform was last removed from the water and detailing the underwater hull coatings applied. Coatings applied more than twelve years in the past will be considered non-active.
- The permit applicant may conduct such testing as determined necessary by the responsible Environment Canada official to ascertain the status of the anti-fouling coating. These tests will require at least six samples from various portions of the underwater hull and will be subject to leachate tests as specified by the responsible Environment Canada official. Information on the interpretation of the test results can be obtained from Environment Canada. Test results indicating that the coating is non-active will satisfy the requirement.
- Underwater hulls that are more than 80% covered with marine growth will be assumed to have non-active anti-fouling coatings. The Designated Inspector will require that evidence be presented to confirm the extent of marine growth if the Designated Inspector cannot reasonably check the underwater hull.

7.2 Above Waterline Exterior and Interior Paints

Loose and flaking paint must be removed from painted surfaces. “Loose and flaking” is defined as paint that may be removed with application of reasonable force using a wire brush. See figures for guidance on requirements.

Subject to any contamination issues, paint chips may be treated as asset debris.



Figure 7.2A. Large chips of loose and flaking paint. Black/ white dots are 4cm diameter.



Figure 7.2B. Loose and flaking paint – required degree of removal.



Figure 7.2C. Small chips of loose and flaking paint. Black/ white dots are 4cm diameter.



Figure 7.2D. Loose and flaking paint – required degree of removal.

8. ADMINISTRATIVE REQUIREMENTS

8.1 Designated Inspector Qualifications

Despite the detailed content of this Standard it is recognized that there is a degree of subjectivity in the inspection process. For this process to be successful and achievable, Designated Inspectors must be trained and experienced in asset construction **and** operation, and be completely familiar with the potential environmental issues. Designated Inspectors are to be retained by the Applicant and acceptable to Environment Canada officials. The Designated Inspector requirement for vessels, barges and other marine platforms is well understood and is laid out below. The Designated Inspector requirement for other asset types will depend on the asset in question; minimum mandatory requirements and guidelines for selection are provided.

8.1.1 Vessels, Barges and Other Marine Platforms. Designated Inspectors for vessels, barges and other marine platforms must meet **all** of the following requirements:

- Designated Inspectors must be provincially licensed as:
 - Professional Engineers, actively practicing in the disciplines of marine engineering and naval architecture, or
 - Members of the Bar, actively practicing in Admiralty or environmental law.
- Designated Inspectors must have an operating license issued under the *Canada Shipping Act* or the *National Defence Act*. The licenses are to be the highest level licenses granted under the applicable legislation; and
- Designated Inspectors must have served at sea as the chief engineer of a ship that has a tonnage of at least 2000 tonnes or the tonnage of the vessel inspected, whichever is less, and
- Designated Inspectors must have satisfactory work experience related to environmental issues, and
- Designated Inspectors must not have any financial or other interest in the project.

8.1.2 Other Assets. For assets other than vessels, barges and marine platforms, the Applicant will engage Designated Inspectors who are the most qualified and knowledgeable individuals in their field and be acceptable to Environment Canada. The following criteria are established:

- Designated Inspectors must be provincially licensed as:
 - Professional Engineers, actively practicing in the discipline most directly related to the asset, or
 - Another technical professional that is **licensed** under legislation and whose professional qualification is directly related to the asset.
- Where operating licenses are required to operate or perform maintenance on the asset, Designated Inspectors must have a license issued under the applicable legislation.

The licenses are to be the highest level licenses granted under the legislation that are applicable to the asset; and

- Designated Inspectors must have direct hands-on experience operating and or maintaining the asset or a similar asset that is larger or more complex.
- Designated Inspectors must have satisfactory work experience related to environmental issues, and
- Designated Inspectors must not have any financial or other interest in the project.

8.2 Requesting Final Inspection by Environment Canada

An Environment Canada Disposal at Sea program representative must conduct a final inspection. A sketch or drawing of the compartment layout in the asset must accompany the permit application. Environment Canada may refuse to participate in a final inspection requests if the permit applicant fails to supply an accurate asset layout drawing or sketch and detailed report of the clean-up of the asset (see 8.5). As a minimum, the drawing must show:

- Each deck or floor in plan view. Compartment boundaries must be accurately indicated. Each compartment must be uniquely identified by name or other convention, and
- Frame numbers on each deck for assets that are longitudinally framed (e.g., aircraft, vessels and barges), and
- Design contents (e.g., fuel, fresh water, lubricating oil, etc) for tanks.

8.3 Final Inspection Requirements

The Environment Canada Disposal at Sea program representative will not enter any space that is not, in their opinion, safe to enter. Reasons for refusing to enter a compartment or space include inadequate access openings, flooding above the level of the deck-plates, unsafe ladders, noxious fumes, airborne dusts or particles that may contain asbestos, or concerns over adequate oxygen in tanks or closed compartments. Applicants should have suitable ventilation and test equipment or valid test reports available to address potential safety concerns. Failure to address safety concerns will cause the final inspection to be terminated by Environment Canada.

It is expected that the permit applicant and a representative from any key contractors employed will accompany the Environment Canada Disposal at Sea program representative during the final inspection. Environment Canada Disposal at Sea program representative will verbally debrief the permit applicant on completion of the inspection.

8.4 Sinking Requirements

If permit applicants intend to use explosives, pyrotechnics or liquid fuels for any aspect of the disposal operation, the following additional requirements are imposed:

- If permit applicants intend to use explosives or pyrotechnics, their intended use must be declared in the Disposal at Sea permit application, an explosive deployment plan must be developed, and an environmental assessment of their use must be undertaken. The explosive deployment plan and the environmental assessment must be submitted with the Disposal at Sea permit application.
 - The explosive deployment plan must be developed by a suitably qualified Explosive Technician and include, as a minimum:
 - For shallow water disposals (i.e., sites that could be accessible by divers), a plan to inspect the asset after sinking and remove any unexploded ordnance.
 - Explosives type, charge size, location, method of detonation and back-up.
 - Explosive safety arrangements.
 - The environmental assessment of explosive or pyrotechnic use must address, as a minimum:
 - Public safety.
 - Potential damage to marine organisms.
 - Mitigation measures.
- If permit applicants intend to use liquid fuels, a liquid fuels deployment plan must be developed and submitted with the Disposal at Sea permit application. The plan must include the following as a minimum:
 - Location, quantity and type of fuels intended for use.
 - Method of ignition and back-up plans.
 - Calculations on burn rate and sink rate to verify adequate time for all fuels to be expended prior to flooding. Calculations must be completed by a provincially licensed Professional Engineer or a suitably qualified Explosive Technician.
 - Spill response plan.

Permit applicants are advised that Disposal at Sea permits will require them to arrange for the presence of an Environment Canada Enforcement Officer (designated pursuant to subsection 217(1) of the *Canadian Environmental Protection Act, 1999*) at the disposal site at the time of the sinking. The Enforcement Officer will confirm that all conditions of the Disposal at Sea Permit are met and that sinking arrangements are as per the permit application.

8.5 Reports

Written reports are required, and shall contain the following information:

- A summary of the status of the asset as measured against the requirements of this Standard.
- A detailed listing of every structural compartment (room, space, tank, void, deck area, etc) in the asset. The listing shall identify each compartment uniquely.
- A general description of the compartment including equipment, fittings and fixtures remaining in the compartment. This must be adequate for site monitoring programs.
- Findings for issues described in parts 3 through 7 of this Standard.
- A description of corrective action required to meet Standard requirements.

The Designated Inspector shall render the written report within 10 working days of the final inspection with Environment Canada.

www.ec.gc.ca

Additional information can be obtained at:

Environment Canada

Inquiry Centre

10 Wellington Street, 23rd Floor

Gatineau QC K1A 0H3

Telephone: 1-800-668-6767 (in Canada only) or 819-997-2800

Fax: 819-994-1412

TTY: 819-994-0736

Email: enviroinfo@ec.gc.ca