

**FRASER RIVER
ACTION PLAN**



**Best
Management
Practices
(BMPs) for
Ship and Boat
Building and
Repair
Industry in
British
Columbia**



Canada

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Environment
Canada

Environnement
Canada

**Best Management Practices (BMPs)
for Ship and Boat Building and Repair
Industry in British Columbia**

to

Environment Canada

North Vancouver, British Columbia

August 30, 1995

by

PCA Consultants Ltd.

Richmond, B.C.

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The project team wishes to thank the many organizations and individuals who provided the background information for this project as well as those who participated in the various workshops and commented on the draft versions of the relevant documents. In particular, we would like to thank Rob Reuter and Debbie North, both of Washington State Department of Ecology, and the many shipyards and boatyards, which kindly allowed the project team to visit their facilities.

PROJECT TEAM

The first draft of this document was prepared by DF Dickins Associates Ltd. in March 1994. The draft was edited, updated, expanded and produced in this final version by Ann Godon and Peter S. Wong of PCA Consultants Ltd.

The Scientific Authority on the project was Stanley Liu of Environment Canada. He was assisted by a steering committee consisting of Dr. John Jordan (Burrard Inlet Environmental Action Program and Vancouver Port Corporation), Chris Robins (formerly of Greater Vancouver Regional District), Wayne Knapp (Fisheries and Oceans Canada), Bob Ferguson (BC Environment), Lisa Walls (Environment Canada), and Sandra Lum (formerly of Environment Canada).

RELATED DOCUMENTS

The following documents are related to the best management practices for the ship and boat building and repair industry in British Columbia:

- ***Best Management Practices (BMPs) for Ship and Boat Building and Repair Industry in British Columbia***
- ***Best Management Practices (BMPs) for Marinas and Small Boatyards in British Columbia***
- ***Best Management Practices (BMPs) for Ship and Boat Building and Repair Industry in British Columbia ----- Background Document***
- ***Best Management Practices (BMPs) for Boat Building and Repair (pamphlet).***

FOREWORD

Following the development, in 1989, of an initial draft of a ***Recommended Environmental Management Practice document for major British Columbia shipbuilding and repair facilities***, Environment Canada has conducted a survey of existing practices at all shipbuilding facilities in B.C. (Peter Hatfield, 1993). These survey results and subsequent consultation with industry representatives indicate that any future recommendations for improved practices need to be applied not only to the large shipyards, but also to government facilities, smaller commercial construction and repair yards, and any other facility offering repair facilities and services (including marinas, yacht clubs, and small craft harbours). Consequently, the Best Management Practices (BMPs) outlined in this document are intended for implementation by all facilities in B.C. where ship or boat building and repair activities are conducted in close proximity to the aquatic environment. This includes building and repair of pleasure boats as well as commercial vessels.

This BMP document was developed through the work of a Project Team including representatives from Environment Canada, B.C. Ministry of Environment, Lands and Parks, Greater Vancouver Regional District (GVRD), the Burrard Inlet Environmental Action Program (BIEAP), and Fisheries and Oceans Canada (DFO). This document is the final report in the development of the BMPs. (The first draft, prepared by DF Dickins Associates Ltd., was issued in March 1994.)

The BMPs outlined in this report include activities and remedial measures which are not completely specific to the shipbuilding and repair industry. Many of the recommended practices are equally applicable to many other industries as well. Waste minimization and the 3R's (recovery, recycle and reuse) are emphasized wherever possible in the individual BMPs.

Environment Canada will work cooperatively to find practical and cost effective solutions to the environmental issues addressed in this document. Facilities are encouraged to individualize the BMPs to their operations and site locations and to develop their own solutions for pollution control. It is expected that new facilities will adopt the BMPs in their construction and operation. Existing facilities could start by implementing the least-cost BMPs first. Site-specific circumstances will influence the applicability and timing of implementation of certain practices at both new and existing facilities.

The extent to which industry is able to follow the practices recommended in the final BMP document will be determined by audits. This BMP document does not preclude the government from introducing or taking regulatory steps in the future to ensure that the environment is adequately protected.

Enquiries and comments on the document are welcome and may be mailed to:

Fraser Pollution Abatement Program
Environment Canada
224 West Esplanade
North Vancouver, B.C.
V7M 3H7

For information regarding contaminant effects and the legislative background to the BMPs, as well as a review of current practices in Canada, the United States and overseas countries, the

reader should consult the ***Best Management Practices for the Ship and Boat Building and Repair Industry in British Columbia --- Background Document*** (available from Environment Canada at the address above).

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INTRODUCTION

Definition of Best Management Practices (BMPs)

Best Management Practices (BMPs) refer to industrial techniques and good housekeeping principles for reducing and preventing pollution. Best Management Practices are commonly referred to as BMPs. The overall philosophy behind BMPs is to conduct everyday activities in a more ecologically-sound manner: keeping pollutants out of surface waters and ground waters, recognizing that total containment and recovery is not always practical. BMPs fall into two general groups: source-control (e.g., vessel shrouding, sweeping, covering waste piles, and bermed storage for oils and paints) and treatment (e.g., hull washwater settling tanks and filters).

Objectives of Best Management Practices

Best Management Practices are needed to reduce and prevent contamination of the aquatic environment and to improve air quality. Ship and boat building and repair activities can cause pollution in a number of ways:

- pressure washing of hulls produces water contaminated with anti-fouling paints; paints containing copper, tin, lead, zinc and other heavy metals that are toxic to aquatic organisms
- stormwater runoff carries various kinds of pollutants generated or resulted from painting, sanding and hull repair into fish habitat
- improper handling of chemicals and petroleum products used in ship and boat building and repair can cause spills which pollute fish-bearing waters
- drips and spills pollute public waters when vessels are painted afloat or over inter-tidal areas
- dust and grit from abrasive blasting fouls fish habitat, and stormwater leaches out heavy metals from improperly stored abrasive blasting grit

Best Management Practices will help shipyards, boatyards and marinas comply with federal and provincial laws and municipal bylaws, including the Canadian Environmental Protection Act, Fisheries Act, Workers' Compensation Act, B.C. Waste Management Act, B.C. Contaminated Sites Legislation, and municipal air quality, noise, sewer and fire safety bylaws.

The BMPs for the ship and boat building and repair industry were derived from the following sources:

- review of practices recommended in other provinces and states (refer to accompanying Background Document),
- observations of a variety of repair activities in representative ship and boatyards in B.C. and Washington State (refer to accompanying Background Document), and
- common sense interpretations of the intent of existing legislation as it applies to a variety of contaminants and waste streams generated by ship and boatyard activities.

Implementation of BMPs

The Best Management Practices apply to new construction or repair of commercial vessels or pleasure boats of any size at any location. Shipyards, boatyards, marinas, yacht clubs and small craft harbours, (private, public or government) will be implementing the BMPs. The BMPs are voluntary at present but may become a regulatory requirement in the future, depending on industry cooperation. The extent to which industry follows the practices outlined here will be determined by facility audits.

Most of the BMPs proposed here are based on common sense and can be implemented quickly and at low cost, through simple changes to general housekeeping procedures or economical in-house fabrication. More costly measures may need to be examined on a case-by-case basis, taking into account the conditions, operations, and natural limitations of the facility. American experience has shown that the adoption of more stringent environmental standards has not imposed an intolerable financial burden on well-managed competitive operations.

Scope of This Report

The BMPs outlined here include those processes or operations necessary to clean, prepare, and coat boat hulls (including the storage and disposal of paints, solvents, oils, and cleaners). Some routine disposal activities are not covered specifically (e.g., grey water hookup to the municipal sewer system or disposal of general garbage).

The BMPs are divided into eight categories, each covering a specific operation or management task. In each case, the general intent behind the BMPs associated with each activity is stated and various options for achieving an improvement to existing practices are listed, with differences noted where necessary to accommodate particular facilities (i.e., marine railways, synchrolifts, etc.).

Practices which are currently regulated by federal or provincial legislation or municipal bylaws are flagged with a □. Practices which can be implemented with a short lead time and minimal financial outlay and/or modification to existing facilities are denoted with a ▲. Illustrations from existing BMPs (Metro Seattle, 1992) are included to clarify a number of the recommendations. Examples of different BMPs being practiced at boatyards and shipyards are shown in photographs attached at the end of the report.

Normal dredging activities to maintain the proper draft available in shipyards, dry-docks and larger boatyards are beyond the scope of this study. To minimize the potential environmental

impacts from activities involving dredging and the disposal of the dredged spoil, the owners and operators of the facilities must contact the local regulatory authorities (such as Environment Canada, Ocean Disposal Program) for assistance and approval.

For information regarding contaminant effects and the legislative background to the BMPs, as well as a review of current practices in Canada, United States and overseas countries, the reader should consult the ***Background Document to Best Management Practices for the Ship and Boat Building and Repair Industry in British Columbia*** (available from Environment Canada in North Vancouver).

Subsequent to the initial development of the above listed documents, the steering committee of the study identified that a **simplified** version of the **BMPs** should be developed for the smaller boatyards and marinas because these smaller facilities do not provide all of the servicing activities normally available at the larger operations. Based on the committee's intent, two additional documents have been developed for the smaller facilities and they are:

- ***Best Management Practices (BMPs) for Marinas and Small Boatyards in British Columbia***
- ***Best Management Practices (BMPs) for Boat Building and Repair (pamphlet)***

1

Surface Preparation

(washing, abrasive blasting, stripping, scraping)
- includes storage of spent grit, cleaning/recovery, and disposal

INTENT: To reduce the level of contaminants entering the aquatic environment from spent grit, airborne dust, paint flakes, and hull washwater; and to reduce air emissions from airborne dust.

Note: Practices regulated by federal or provincial legislation or municipal bylaws.
 Practices which can be implemented with a short lead time and minimal financial outlay and/or modification to existing facilities.

Depending on the pressure used, washing activities can range from removal of loose paint, slime, and marine growth (using 1,500 psi to 5,000 psi or 10,000 kPa to 35,000 kPa) to a complete coating removal down to the original profiled metal (using ultra-high pressure systems operating up to 35,000 psi or 240,000 kPa).

BMPs

Hull Washwater

- 1.1 Collect **hull washwater** and remove all visible solids before discharging to a sewer or receiving waters. Inspect and clean all sumps, filters and/or screens regularly (see BMP 7.1- yard checklist).

Avoid any high pressure washing of hull unless prior clean-up of the dock floor, lift platform, or yard surface is completed. Attempt to reduce or eliminate interaction between water runoff and other debris which may be transported to the aquatic environment (see BMP 5.1).

Avoid high pressure washing of on tide grids, docks, planked and grated surfaces, or other areas where the washwater cannot be contained.

Various treatment systems are available to remove the contaminants from hull washwater. The diagram following shows a generic system with three (3) process options for treating the hull washwater. Depending on the site-specific conditions and the size of the operation, a ship and boat building and repair facility may utilize one or a combination of the three options in handling its wastewater.

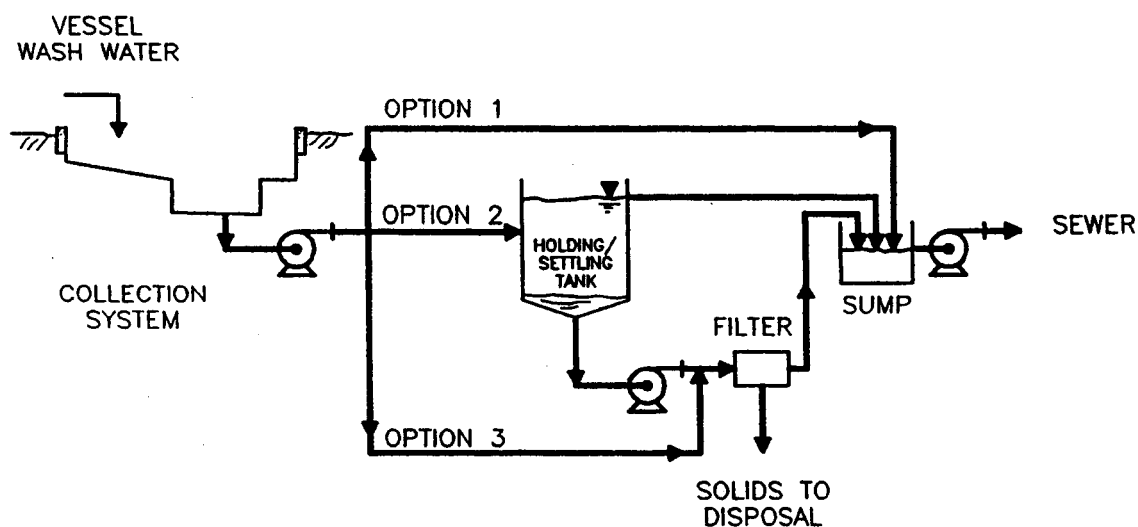
Surface Preparation:

Hull Washwater
continued

Option 1 - If the collected wastewater contains low concentrations of suspended solids and/or organics (e.g. storm water), the collected wastewater can be pumped and disposed of directly into the sanitary sewer system.

Option 2 - This option is usually applicable to ship and boat building and repair facilities with large volumes of wastewater containing high concentrations of solids. An engineered holding/settling tank system is an important component of the treatment system. The settling tank is designed to remove most of the solids. After treatment, the clarified effluent or overflow from the holding/settling tank can be discharged into the sewer system. The settled sludge can be further processed by dewatering through a mechanical filter and then disposed of at an approved facility. To minimize the capital cost of the sludge filtering system, it is a general practice to oversize the holding/settling tank system for the projected volume of wastewater. In addition to mechanical filtering, other options in sludge removal, handling and disposal are available, including removal of the settled solids by pumper trucks.

Option 3 - If the volume of wastewater is relatively small and contains a high concentration of solids, the wastewater can be directly processed by a mechanical filter system. The filtrate can be discharged into the sewer system, while the dewatered sludge from the filter can be disposed of in an approved facility.



Surface Preparation:

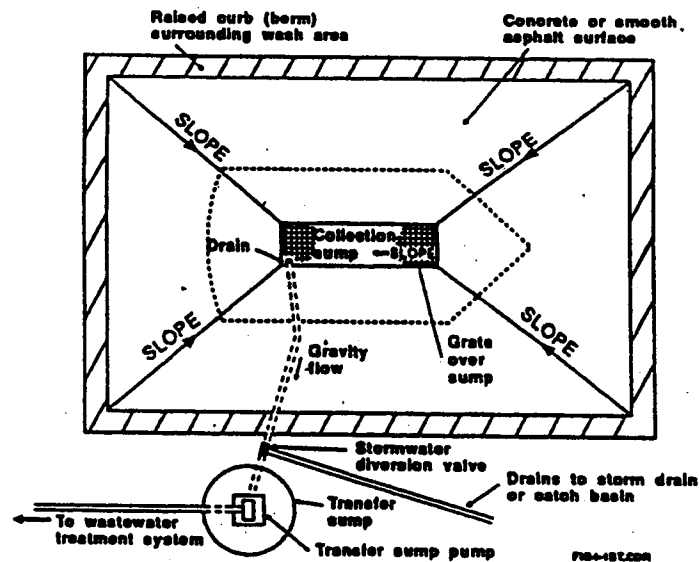
Hull Washwater
continued

Appropriate variations for collecting and channeling the washwater beneath travelifts, marine railways, and other types of lifts, and in drydocks and graving docks are shown in the diagram below.

Sludge or debris from wash water may qualify as special waste and require disposal at an approved special waste facility. Consult B.C.'s Special Waste Regulation or have the material tested to determine if this is the case.

Monitor the quality of water discharged to sewers or receiving environments (this may already be required by some local authorities). Discharges to the sanitary sewer must meet the requirements of the local sewer authority.

Travelifts: Build-up existing paved or cement area such that washwater naturally flows into a collection sump (refer to diagram below and photographs at the end of report for possible layouts).

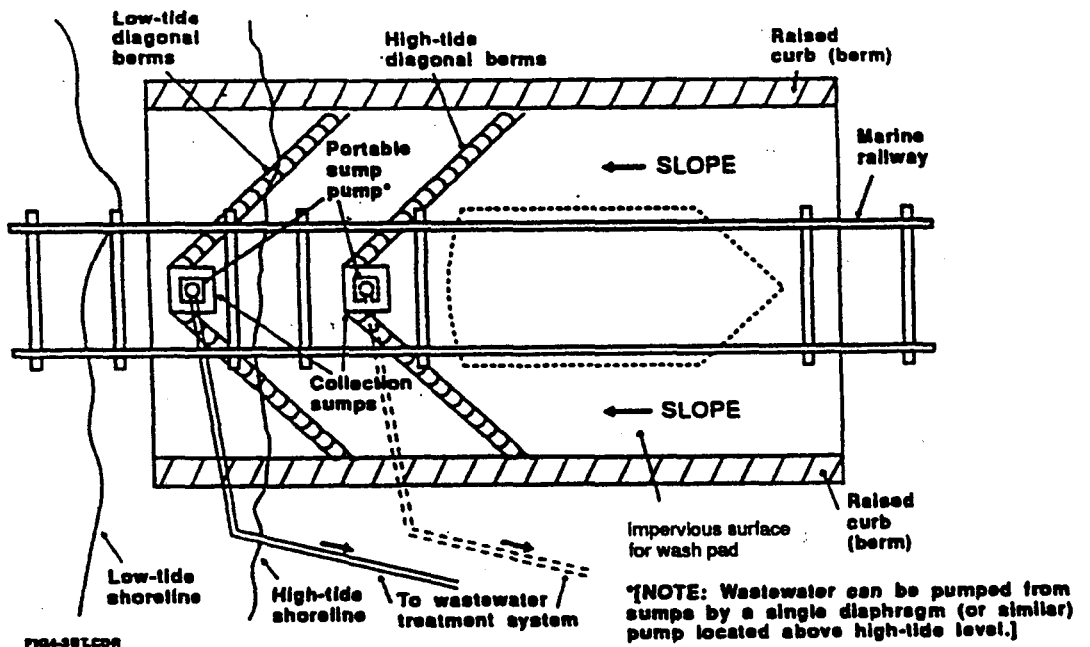


Fixed-pad Collection System

Surface Preparation:

**Hull Washwater
continued**

Marine Railways: Provide an impervious surface on the platform, and build-up the sill on both sides and the seaward end to allow washwater to flow into a sump and settling tank at the downslope end for collection and treatment before discharge. As an alternative, with sufficient clearway from the mean low tide level, install diagonal trenches and sumps within the railbed downslope of the carriage. The diagram below suggests two berms and sumps to allow for safe operation throughout the normal tide cycle. Limit washing to times in the tidal cycle when the sump is above tide, and clean the sump prior to the next tide.

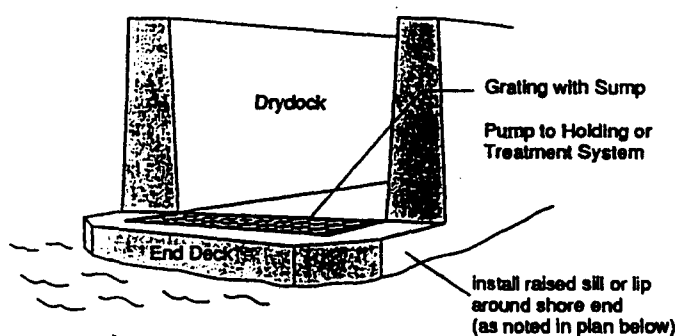


Diagonal Berm Collection System for Marine Railways

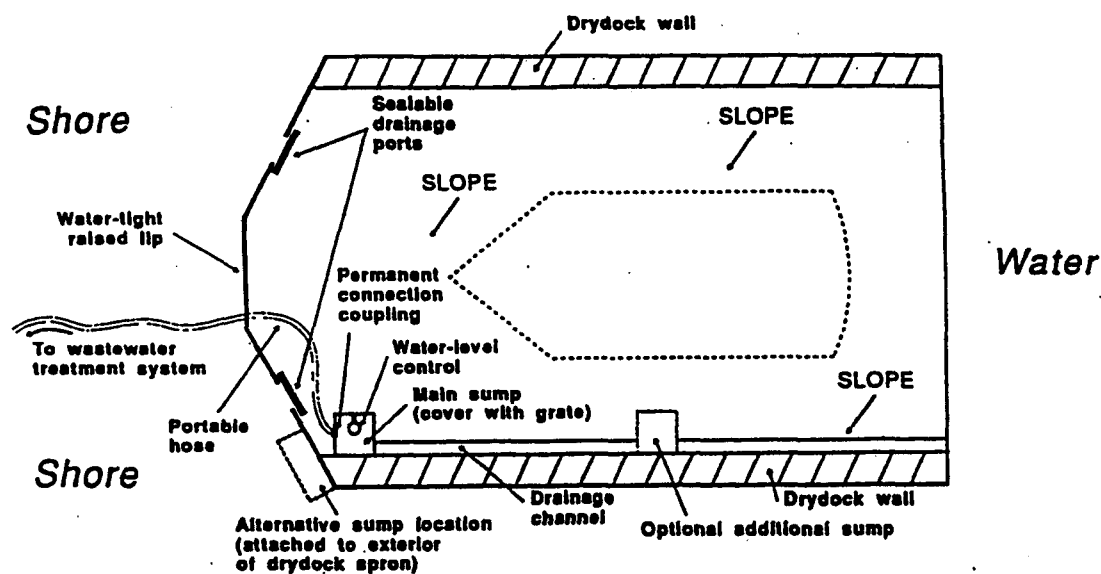
Surface Preparation:

Hull Washwater
continued

Drydocks: Provide raised sills at dock ends and install sumps to allow solids and paint sludge to separate before the washwater is allowed to go overboard (see photos at end of report and the diagrams below).



See photograph for example



Dry Dock Collection System

Surface Preparation:**Hull Washwater**
continued

Graving Docks: Maintain sumps to ensure collection of settled solids and paint particles and debris prior to flooding. Cover sumps during blasting operations. Attempt to limit or avoid direct water discharges splashing from outlets in the ship hull to the graving dock floor.

Synchrolift and Elevator Lifts: Avoid pressure washing while on any platform with grated or plank surface. For larger facilities, with upland work areas for multiple vessels, intercept solids and larger paint particles at sumps in yard storm drains. For facilities with elevator lift platforms over water, install solid decking and sills or gutters leading to a collection sump.

Tide Grids or Beaching: Avoid pressure washing of vessels on tide grids or when beached at low tide, unless the grid has a sump for collecting contaminants in the washwater. In this case clean the sump out before the grid floods and dispose of the collected contaminants properly (they may qualify as a special waste).

Surface Preparation:

Spent Grit Containment

- 1.2 Attempt to contain and recover as much spent grit from abrasive blasting as possible. Prevent spent grit and fugitive dust from reaching the water.
- Enclose the blasting operations if uncontained grit and dust could enter the water. Use weighted shrouding and support frames wherever possible to enclose blasting activities on complete vessels (refer to photos at end of report). Experience shows that about 24 person-hours are needed to fully enclose a medium sized (30 m to 40 m) vessel in a drydock, or about 8 person hours to fully shroud a smaller vessel in the 12 m to 15 m size range.
 - Use permanent or portable shelters (preferably with exhaust ventilation and dust collection) for blasting components and parts.
 - Avoid blasting the hulls and superstructures of floating vessels moored or alongside.
 - Do not sandblast components or vessels on unpaved yards.
 - ▲ Do not blast parts or components on the wharf itself unless the surface is sealed such that all of the spent grit can be recovered.
 - Provide covers for hull washwater sumps to prevent entry of spent grit or inadvertent flushing of grit into the sump system.
 - ▲ Filter or provide collectors around yard drains to prevent flushing of spent grit into the storm water runoff or sewer system (refer to photos at end of report). This BMP is also repeated as 5.7 under *General Yard Maintenance*.
 - Clean all deck surfaces of spent grit (by sweeping, brushing, shoveling and vacuuming) prior to submersion.
 - ▲ Clean and collect spent grit from yard areas at the end of the work shift (as per WCB proposed regulations)

Marine Railways: Provide a sealed deck surface on the platform to avoid spent grit accumulating underneath the carriage. Utilize existing side-wall scaffolds or erect masts to support shrouding hung along the sides and across the ends. Shroud superstructure to deck level for topsides work. A porous inner tarp and a solid outer tarp has proven to be an effective combination (see also "Drydocks" below).

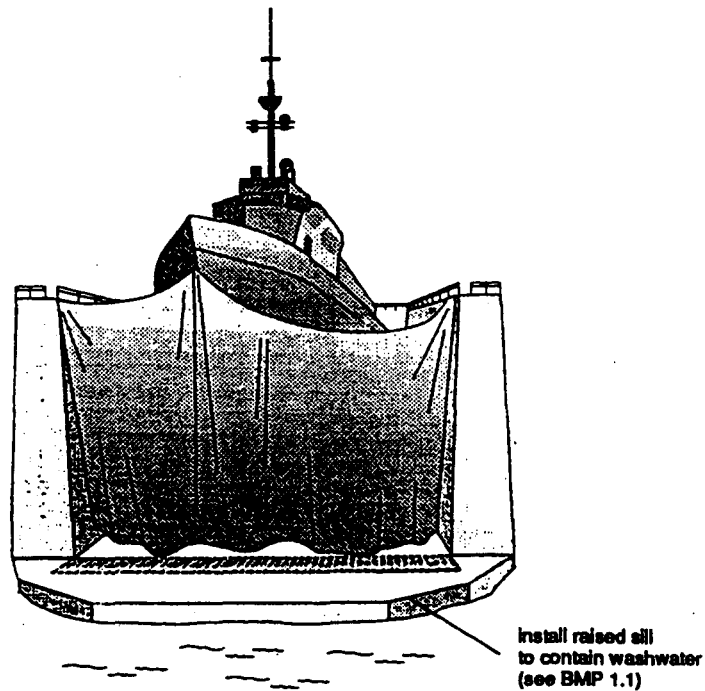
Surface Preparation:

Spent Grit Containment
continued

Elevator Lifts: Treat as marine railway, except apply even more stringent standards as an over-water operation. There is a need to provide additional shrouding from lift sides to connect with the deck level. A preferred alternative would be to avoid all abrasive blasting on an over-water lift.

Drydocks: Install shrouds hung from cables strung between wing walls at each end (see photographs at end of report and sketch below). Minimize contact between shipboard cooling and process water, and spent grit or paint (applies also to graving docks). Sweep, brush, or shovel the drydock floor clean, as much as possible, before each launch. Clean remaining areas after refloating to changing position of keel and bilge blocks.

See photographs for example



Surface Preparation:**Spent Grit Containment**
continued

Travelifts (boatyards and marinas with repair yards) and Synchronlifts: Shroud superstructure and/or hull, or cover vessel with portable shelter, before blasting in the yard. Exceptions apply where the yard area is sufficiently large that contamination of adjacent properties is unlikely and transport of spent grit into surface storm drains can be prevented. In that case, some shrouding is still preferred to control airborne dust. See also recommendations regarding frequent yard sweeping and cleanup. Examples of shrouding being used in a boatyard are shown in the photographs at the end of this report.

Graving Docks: Minimize washing the dock, or entry of any cooling water streams to the dock floor, while spent grit is present. Cover floor drains to prevent entry of spent grit into the sumps. Maintain gates and seals in good repair to minimize water contact with spent grit.

Tide Grids or Beaching: Avoid any sand blasting of vessels on a tide grid or when beached at low tide.

Surface Preparation:**Spent Grit Storage and Disposal**

- 1.3 ▲ Store spent grit in a dedicated area as far removed from surface waters and storm drains as possible. An impervious floor or pad with cement block side and back walls, and a rain-cover, is recommended to minimize leaching of metals and paint contaminants during storage (see example installation in the photographs at the end of the report). Consider simple screening of large particles and other debris to make the spent grit more acceptable to alternative disposal sources (see BMP 1.4)
- 1.4 ▲ Work together with other shipyards and abrasive suppliers to develop and implement an abrasive recycling program for the ship/boat yard industry. One recycling option currently practiced in the U.S. is to use spent abrasives as raw material for cement manufacturing.

Insist that abrasive suppliers work together to develop an environmental policy that includes the life cycle management of their products. This approach recognizes that all life cycle stages (raw material acquisition, manufacturing, transportation, distribution, use, recycling, and disposal) have associated environmental and economic impacts.

- 1.5 ▲ If metal or coal slags are used and disposal at a local landfill is planned, ensure that the spent grit meets local municipal, provincial and federal criteria for contaminated soils. Many municipalities use the Level C criteria from B.C. Environment's guidelines for managing contaminated sites as the requirement for accepting waste material into landfills.
- 1.6 Continue to evaluate alternatives to traditional dry abrasive blasting in an effort to reduce or eliminate the spent grit problem. One example includes recent developments with the use of very high pressure blasting systems (hydroblasting) operating up to 35,000 psi which completely strip the hardest coatings from a vessel and use inhibitors to control rust bloom. In the event that hydroblasting is introduced in a facility, some form of collection and treatment of the resulting effluent would be needed prior to discharge into the environment. Some commercial systems incorporate the effluent treatment as part of the overall system.

Surface Preparation:**Sanding, Scraping, and Stripping**

- 1.7 In construction of any new facilities or modification of existing facilities (i.e., drydocks, decking, etc.), attempt to maintain a flat surface free from pipes and other obstructions which can hinder clean up of deck surfaces.
- 1.8 ▲ Tarp under a vessel blocked on a gravel or dirt yard before sanding, scraping or stripping paint. Tarp or install rigid sheeting under a vessel blocked on a planked or grated surface. Dispose of collected paint chips and scrapings at an approved facility.

- 1.9 Avoid sanding, scraping and stripping of paint if vessels are blocked on tide grids. Only if other options are not available and unless the grids are well-removed from sensitive fish habitat, shellfish harvesting areas, fish farms, or shallow estuary areas, the above surface preparation activities should not be conducted on tide grids.

If surface preparation is unavoidable, tarp under vessels and collect paint chips, scrapings and other waste before the grid floods. Dispose of collected paint chips and scrapings at an approved facility (the collected debris may qualify as a special waste).

2

Coatings

(paint storage, application, disposal)

INTENT: To reduce the potential for paint products from entering the aquatic environment either through fire, spills in mixing, overspray, or improper disposal.

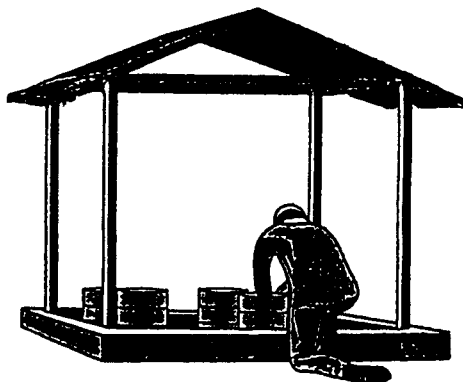
Note: Practices regulated by federal or provincial legislation or municipal bylaws.
 Practices which can be implemented with a short lead time and minimal financial outlay and/or modification to existing facilities.

BMPs

- 2.1 Position vessels in a suitable location before applying antifouling coatings. This should be at an approved site, well-removed from sensitive fish habitat, shellfish harvesting areas, fish farms, shallow estuary areas, or surface storm drains. Avoid any spraying of antifouling paint or other coatings while the vessel is on a tide grid or beached at low tide. Use rollers or brushes only, with suitable drip trays for mixing. Apply antifouling paints in accordance with manufacturer's label instructions and in compliance with appropriate federal and provincial regulations.
- 2.2 To prevent paint drips from entering public waters, use tarps or drop sheets under vessels blocked on tide grids or planked or grated docks. Remove tarps before the grid floods.
- 2.3 Store unopened paints, primers, epoxies, varnishes, etc., in a fire-resistant enclosure or fenced secure area with impervious floor and bermed area to contain at least 110% of the largest container or 10% of the total volume of the containers, whichever is greater (given the small size of most paint containers, the latter criterion is most relevant). If there is no roof over the bermed area, any accumulated storm water should be drained via a siphon to avoid any direct drainage route through the berm walls. Storage areas should comply with the local fire code and the National Building Code. Avoid any storage of coating materials directly at dockside or on the wharf.

Coatings:

- 2.4 ▲ Use mixing shelters with containment pans and raincover to reduce general spillage. Avoid paint mixing on docks or floats (refer to photo of typical portable unit at the end of this report and diagram below).



- 2.5 □ Use airless or high volume low pressure (HVLP) spray guns to reduce overspray. Monitor overspray at selected points around the yard perimeter. Establish and adhere to "safe" wind directions and speeds for particular facilities.
- 2.6 ▲ Use rollers or brushes for all painting alongside, except where topsides are fully shrouded.
- 2.7 Shroud painting activities as much as possible to reduce overspray or runoff of paint from the yard into the aquatic environment. Refer to discussion of shrouding options under BMP #1 for blasting. Photos at end of report show typical shrouding for painting in a small boatyard.
- 2.8 Use a still to recover and recycle different solvent products. Stills are a cost-effective alternative to contract disposal of spent solvents. Obtain authorization from BC Environment for the operation of the still (as stills handle Special Waste). Maintain used solvents in a secure and covered area with adequate containment prior to processing.
- 2.9 ▲ Allow **empty** paint cans to air dry before disposal.
- 2.10 ▲ Attempt to send partial cans of paints away with the vessel as much as possible or combine leftover paints and use them as needed around the yard in order to reduce the volume of waste entering landfills and ensure the maximum utilization of the paint at a later date.

3

Waste Fluids

(tank cleaning, hydraulic systems, bilge cleaning)
- includes storage, separation, off-site disposal, on-site processing

INTENT: To facilitate the safe disposal of waste fluids and reduce the chance of accidental spillage.
--

Note: Practices regulated by federal or provincial legislation or municipal bylaws.
 Practices which can be implemented with a short lead time and minimal financial outlay and/or modification to existing facilities.

BMPs

- 3.1 Segregate different waste fluids in colour coded containers or by tank design to reduce the chances for cross-contamination. Clearly mark tank contents.
- 3.2 Maintain waste tanks, drums or receptacles in a secure, covered area with containment equivalent to 10% of the total volume or 110% of the largest container, whichever is greater. Refer to photos at the end of the report.
- 3.3 Empty and clean drip pans and open containers promptly.
- 3.4 If on-site separators are used, do not discharge water to sewer or property unless it is demonstrated to contain <15 ppm oil. Unless separation to these levels can be assured, it is preferred to arrange for disposal by a licensed contractor.
- 3.5 Recycle used oil filters at an approved facility. Drain all oil filters before recycling.
- 3.6 Do not pour any liquid waste products down floor, sink, or outdoor storm drains. To ensure that drains are not misused, install signage with symbols such as fish on all drains.
- 3.7 Discharge sanitary wastes and grey water to the municipal sewer or haul away in tank trucks for disposal.

Waste Fluids:

- 3.8 Steam clean oily parts over a grate and sump to enable collection of oily water.
- 3.9 Waste oil is a special waste as defined in the B.C. Special Waste Regulation. Oil handling practices need to be in compliance with this legislation (refer to section 16 and 48(3) of the Regulation for containment and handling practices).

4 ||| Chemical and Petroleum Products Storage

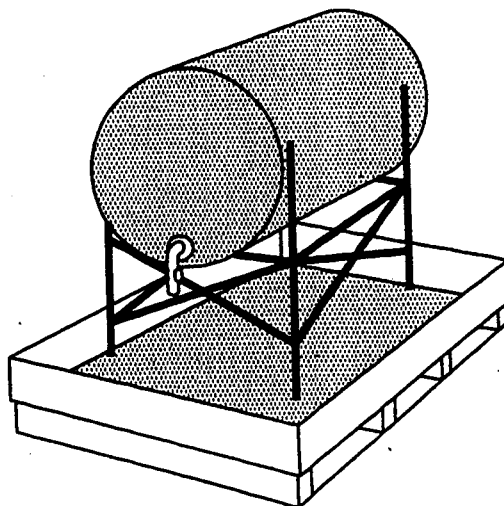
INTENT: To reduce the potential for an uncontained spill.

Note: Practices regulated by federal or provincial legislation or municipal bylaws.
 Practices which can be implemented with a short lead time and minimal financial outlay and/or modification to existing facilities.

This BMP applies to chemical and petroleum products used in repair or new construction and is not intended for fueling operations (for fueling, see B.C. Coastal Marina Facility and Operating Standards or other applicable guidelines).

BMPs

- 4.1 Use a drip tray for drums in use (see diagram below). A cover is preferred to prevent rainwater accumulation.
- 4.2 Provide a secure, fenced and covered area for oil, gasoline, and chemical drum or pail storage. The area should have an impervious floor and be surrounded by a berm capable of holding 10% of the total volume of fluids stored or 110% of the largest single container, whichever is larger. In cases where bermed area is not covered, arrange for drainage of storm water through siphons rather than any drainpipes penetrating the berm wall. Individual drums can be stored on portable spill pallets. See photos at the end of the report.
- 4.3 Provide above-ground storage tanks with suitable containment and overfill protection systems.



5

General Yard Maintenance and Housekeeping

INTENT: To minimize opportunities for cross-contamination between different activities, to minimize storm water runoff of contaminants directly to receiving waters, and to foster a sense of general cleanliness which will lead to more organized and consistent handling of waste products.

Note: Practices regulated by federal or provincial legislation or municipal bylaws.
 Practices which can be implemented with a short lead time and minimal financial outlay and/or modification to existing facilities.

BMPs

- 5.1 ▲ Recover all solid wastes prior to drydock, lift, tide grid, or railway submergence or graving dock flooding.
- 5.2 Pave or concrete as much of the active part of the workyard as possible to encourage good maintenance and recovery of contaminants.
- 5.3 ▲ Maintain hose connections and valves to avoid unintentionally running water over yard debris.
- 5.4 ▲ Store hydraulic hoses with coupled end fittings in leakproof containers (see photo at the end of the report).
- 5.5 ▲ Sweep and/or clean the active working area of the yard on a regular basis (daily when blasting - see proposed WCB Regulations, May, 1994).
- 5.6 ▲ Pump out waste oil recycling tanks on a regular basis to ensure that vessel owners and employees are not forced to leave oil containers in a vulnerable or exposed location. Waste oil tanks should conform with ULC/ORD-C-142-23 "Above-Ground Waste Oil Tanks".
- 5.7 ▲ Filter or provide collectors around yard drains to prevent flushing of spent grit into the stormwater runoff or sewer system (refer to photos at end of report).
- 5.8 ▲ Provide appropriate garbage collection facilities to collect wastes for recycling or disposal to prevent littering.

6 Spill Prevention, Control and Countermeasures

INTENT: Provide for an organized, prompt and effective response to fuel and chemical spills in the yard, docks, floats and surrounding waters.

Note: Practices regulated by federal or provincial legislation or municipal bylaws.
 Practices which can be implemented with a short lead time and minimal financial outlay and/or modification to existing facilities.

BMPs

- 6.1 ▲ Establish a site-specific spill contingency plan which takes into account the particular layout of the facility and maximum spill volumes likely to be encountered for both oil and chemicals. A summary of contingency planning guidelines is provided below. Additional information is available through Environment Canada.
- 6.2 ▲ Report spill incidents directly to the Provincial Emergency Program, Environment Canada and Canadian Coast Guard. Refer to emergency numbers in Appendix A of this document.
- 6.3 Maintain a countermeasures equipment inventory (e.g., sorbent pads, containment booms, etc.) that is chemically compatible and sized in accordance with the volume of hazardous materials stored on-site. Marked spill kits should be situated around the yard in covered containers. Replace used spill response materials immediately.
- 6.4 ▲ Train employees in the use of the contingency plan, spill containment and recovery equipment, and correct spill reporting procedures.
- 6.5 Contaminated clean-up materials (rags, sorbents, etc.) should be disposed in accordance with the B.C. Special Waste Regulation.
- 6.4 ▲ Register hazardous materials with local fire department.

Spill Prevention, Control and Countermeasures:***CONTINGENCY PLANNING***
(as provided by Environment Canada)

A contingency plan is one of the most valuable tools available during response to an accidental discharge. A contingency plan stipulates your response strategy. Pre-planned courses of action are essential to achieve efficient and effective response to accidental discharges. Efficient and effective response safeguards human life and health, the environment, and property, in that order.

During an emergency, the facility employees do not have time to plan strategy, locate equipment, identify contacts and their phone numbers, etc. These must be pre-determined and contained in the contingency plan. The plan must be updated annually to reflect changes at the facility and in local conditions (contact phone numbers, equipment stockpiles, cleanup contractors, etc.)

The value of a contingency plan is limited by its practical applicability. Even the best contingency plan will be of little value during an emergency if the facility employees are not familiar with its contents or are unable to locate it directly. The three key factors of contingency planning are:

- the contents of the plan must be accurate and specific;
- all facility personnel must be fully conversant with the contents; and
- it must be located as to allow for immediate reference by facility personnel.

It is incumbent upon the operator/manager of each facility to ensure that a contingency plan is developed, maintained and tested. Actual testing of the plan via a spill exercise is the only way to identify defects therein. The discovery that planned response actions are impractical or impossible during real event can have disastrous consequences.

Spill Prevention, Control and Countermeasures:

In the aftermath of a discharge, regulatory authorities will focus not only on the cause of the spill but also on the reactions of the responsible party. A functional contingency plan will facilitate a good response, and this will help to establish that the responsible party has acted in a reasonable and diligent manner. If the responsible party can demonstrate due diligence, the likelihood of prosecution is decreased.

Although each contingency plan must be developed on a site specific basis, all plans prepared for facilities in British Columbia must include the Provincial and Federal "24 hour - Spill Reporting Hotline" numbers which are 1-800-663-3456 (1-800-645-7911) and 666-6100, respectively.

Contingency Plans for facilities located in proximity to the water must also include the phone number of the local Department of Fisheries and Oceans office.

Significant time and effort is required to develop a realistic and functional contingency plan, but the benefit it affords during an emergency may save considerable costs in cleanup and remediation work, and prevent untold environmental and property damage.

A number of excellent documents are available to guide and assist you in the development of your contingency plan. The Canadian Standards Association (CSA) has produced ***Emergency Planning for Industry - A National Standard of Canada (CAN/CSA-Z711-M91)***, May, 1991, which can be purchased from the CSA. The BC Ministry of Environment, Lands and Parks has produced ***Guidelines for Industry Emergency Response Contingency Plans***, March, 1992, available at no charge from their Environmental Emergency Coordination Office.

Environment Canada is available to review and comment on your contingency plan. Contact Emergency Section, Enforcement & Emergencies Division, Environment Canada, North Vancouver.

7

Record Keeping, Checklists, Written Company Standards

INTENT: To provide a self-regulating check on performance in carrying out BMP actions most appropriate for each facility; to maintain a record of improvements needed or deficiencies spotted by management, employees and users; and to ensure compliance with established environmental procedures as a condition of use (for marinas and "do it yourself" boatyards).

Note: Practices regulated by federal or provincial legislation or municipal bylaws.
 Practices which can be implemented with a short lead time and minimal financial outlay and/or modification to existing facilities.

BMPs

- 7.1 Establish a daily checklist of key yard areas to confirm cleanliness and appropriate storage and security procedures. Assign different inspection responsibilities to specific employees.
- 7.2 Post hazardous waste disposal charts in conspicuous locations detailing for each waste the HAZARD (poison, flammable, corrosive), PROHIBITED DISPOSAL (dumpster, drain, sewer), RECOMMENDED DISPOSAL (recycle, solvent still, contractor disposal, etc.).
- 7.3 Prepare a summary of the BMPs that apply to your operation and issue to all employees and yard users. Post BMP lists in conspicuous locations around the yard.
- 7.4 Ensure receipt of a signed checklist from each user detailing consumption and disposal of any hazardous products while in the yard. Make completion and compliance a condition of launching the vessel.
- 7.5 Establish an overall corporate environmental philosophy which reflects management's commitment to protecting the environment. Carry this philosophy through visual signs, written forms and verbal messages (see BMP #8, under "Training").

Record Keeping, Checklists, Written Company Standards:

- 7.6 Consider funding a site audit to establish soil and marine sediment contamination levels as a "before BMP" baseline. The results will demonstrate the effectiveness of BMPs on improving the quality of the local environment.
- 7.7 Keep a record of the water quality tests for washwater discharged to sewers and surface waters.
- 7.8 ▲ Maintain an overall mass balance of materials used vs. estimated volumes collected to provide an overview of potential losses (e.g., grit used vs. grit recovered).
- 7.9 ▲ Consider some form of employee suggestion box on BMPs with an award incentive. An example would be finding less labour intensive, safer and/or more cost-effective means of achieving a given BMP action item.
- 7.10 Work with manufacturers and regulators to establish joint-testing programs (with shared risks) for alternative products such as blasting agents and coatings.

8 Training

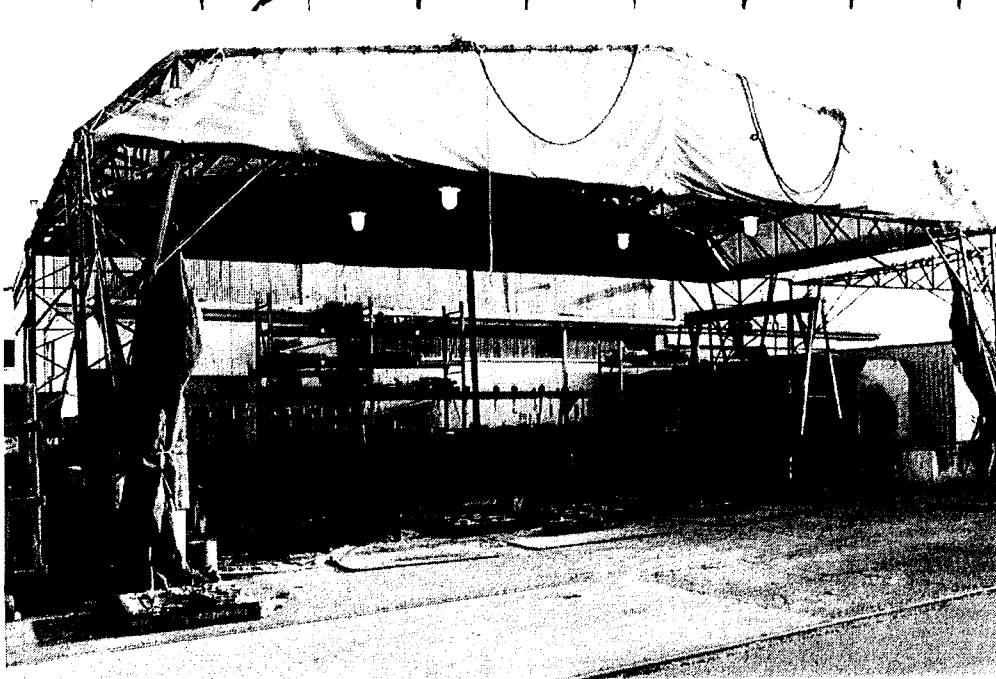
INTENT: To instill a sense of personal responsibility among all employees and yard users, and provide the necessary background to ensure that the BMPs are implemented properly and in a cost-effective manner.
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Note: Practices regulated by federal or provincial legislation or municipal bylaws.
 Practices which can be implemented with a short lead time and minimal financial outlay and/or modification to existing facilities.

BMPs

- 8.1 Task one person with organizing training sessions on BMPs, and make him or her accountable to management. Ensure that all employees are trained in BMPs.
- 8.2 Initiate a regular routine of workshops and employee briefings on different environmental issues. Try to bring in speakers from the outside on different environmental topics to increase the level of interest and exposure to different solutions and techniques.
- 8.3 Involve different agencies (federal, provincial and municipal) in the training program to share perspectives on different environmental issues and force a continuous process of reassessment of priorities from the points of view of industry, the public, and government.

ILLUSTRATION



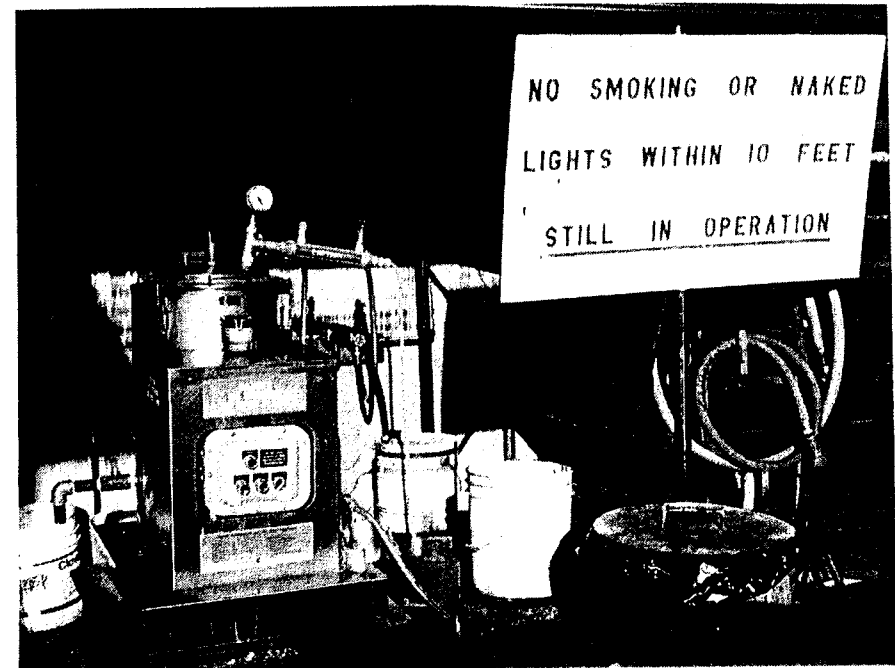
Shelter for control of overspray while painting parts and components



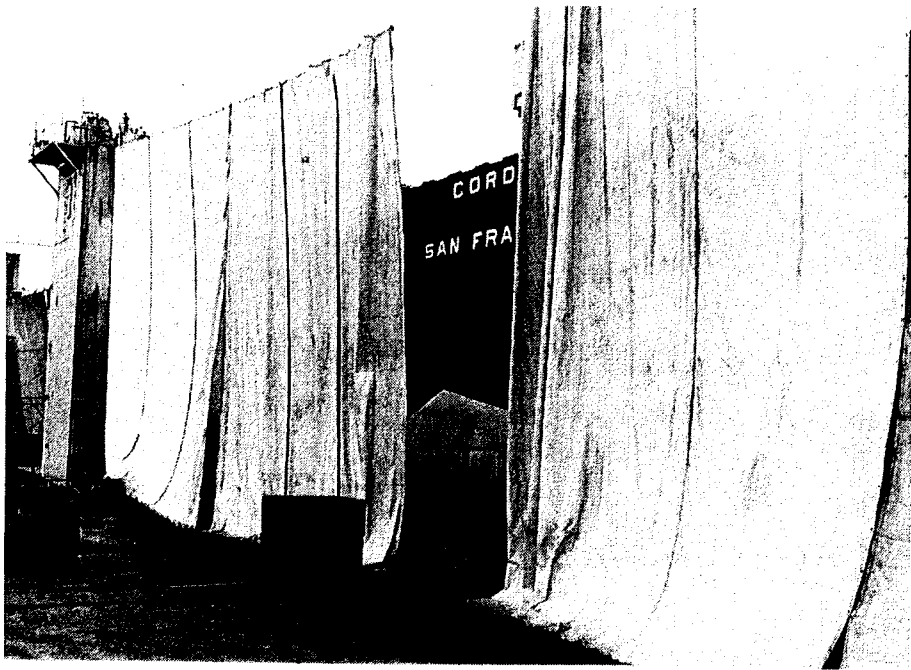
Portable shelter for paint mixing with rain cover and recessed metal floor for containment



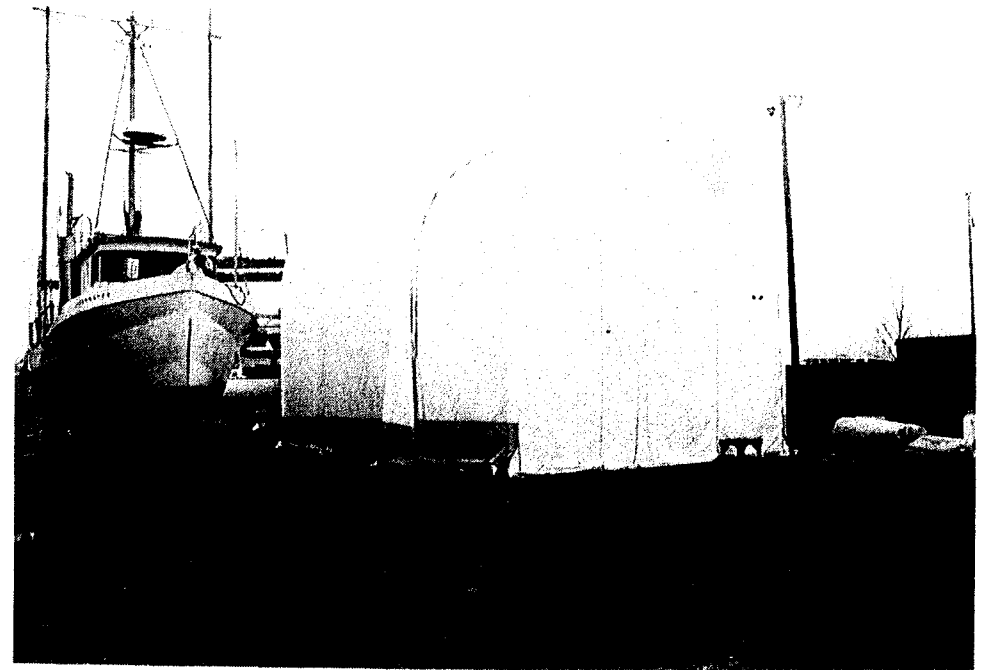
Sprinklered, fire resistant inside storage for paint and other flammable products



Solvent still



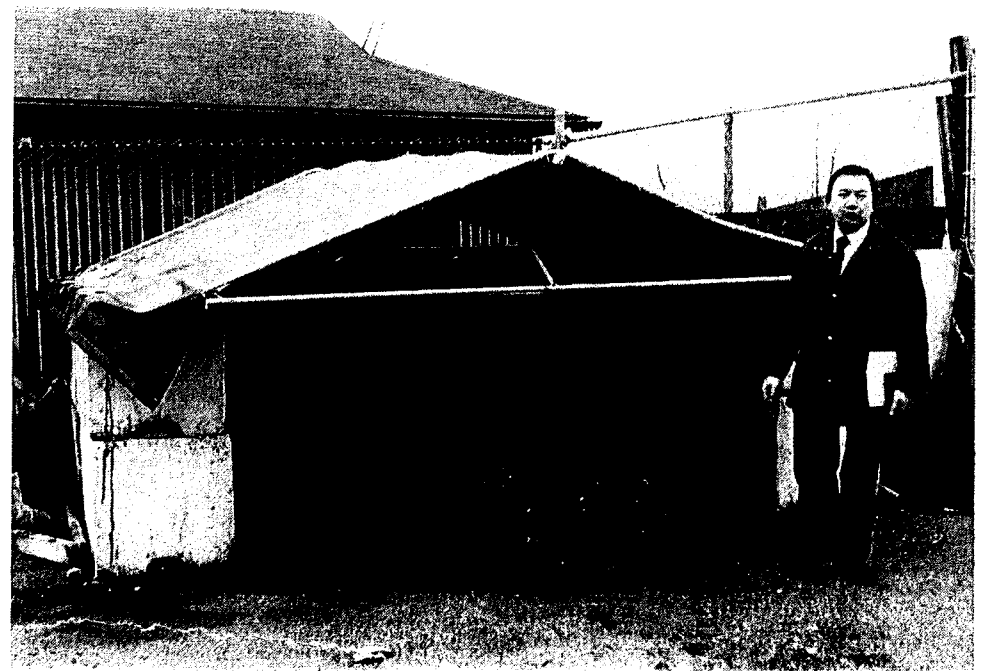
Shrouding between the drydock wing walls to contain blasting activities



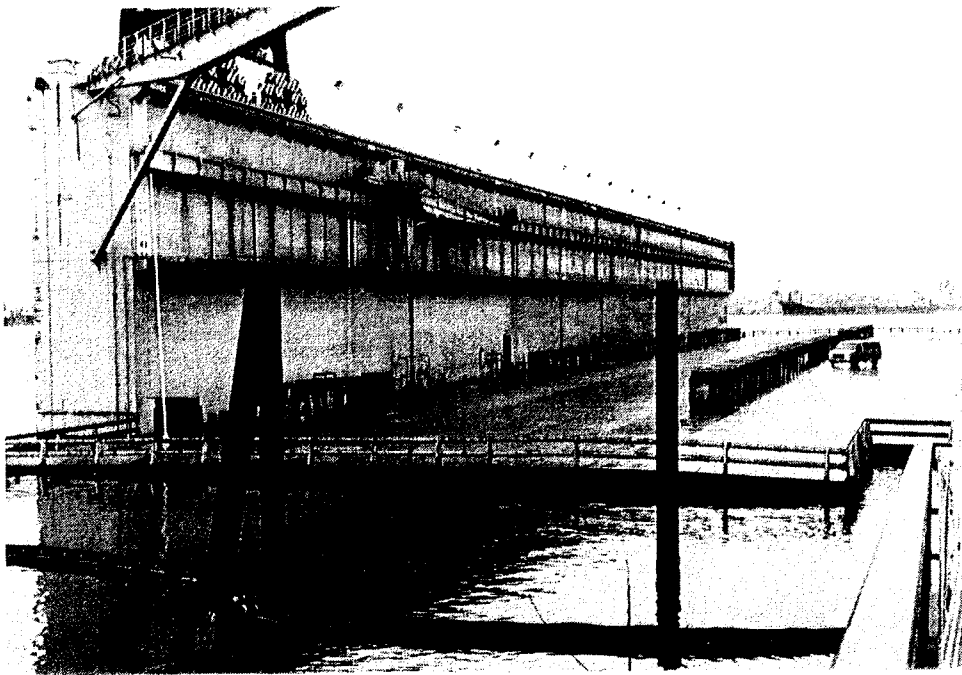
Telescoping portable shelter used to enclose blasting and painting at a boatyard



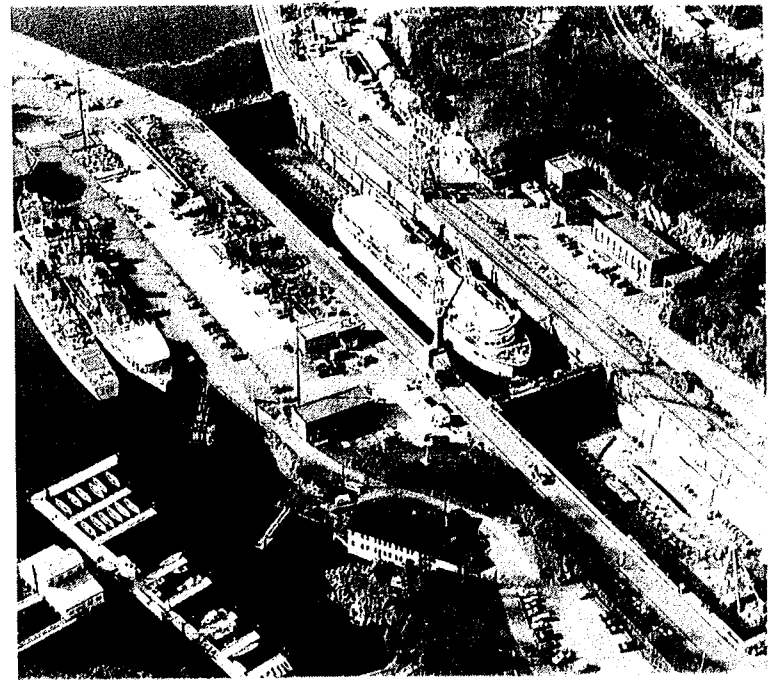
Yard sweeper ("Bobcat" attachment is a good alternative for small yards)



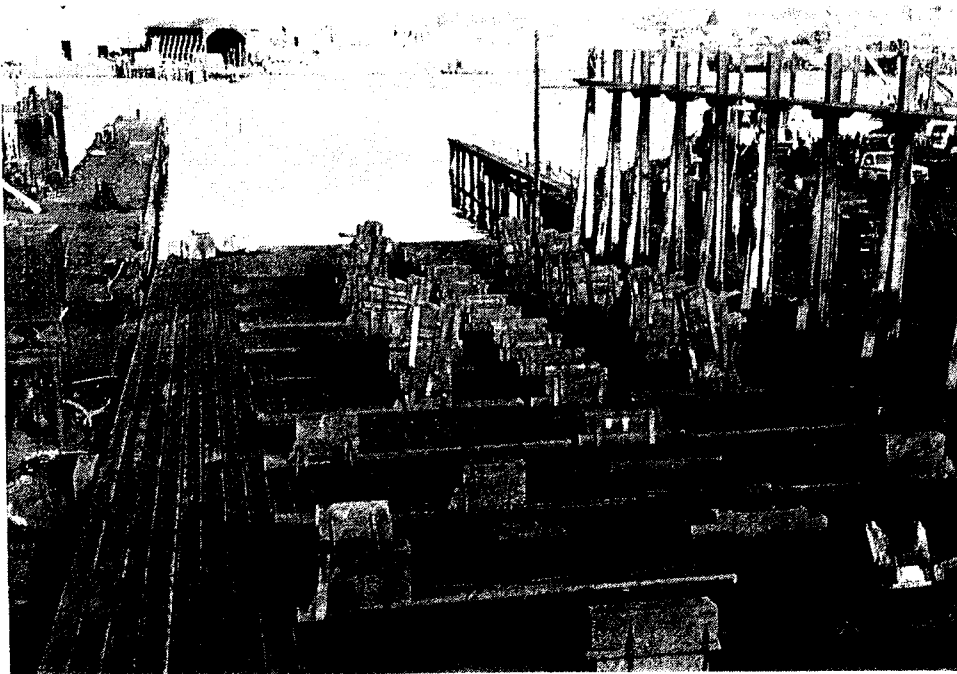
Spent grit storage area with paved floor, block walls and rain cover



Drydock



Graving dock



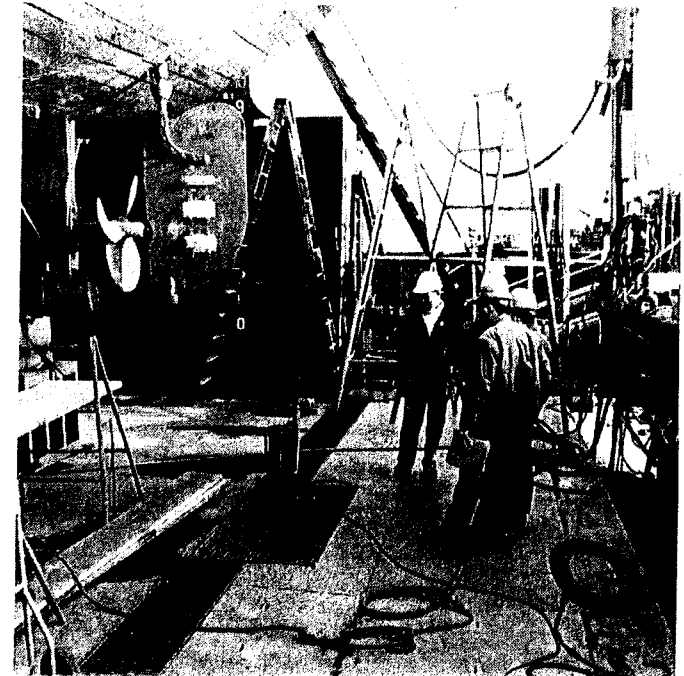
Marine railway with wood deck



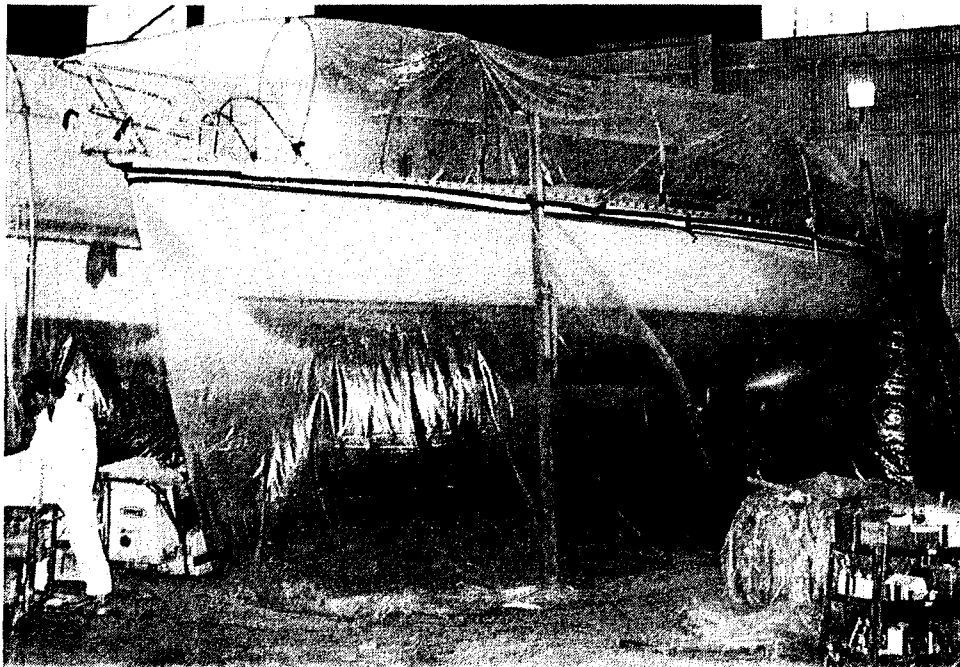
Travelift



Sloped bermed area to direct hull wash water to sump for sludge catchment



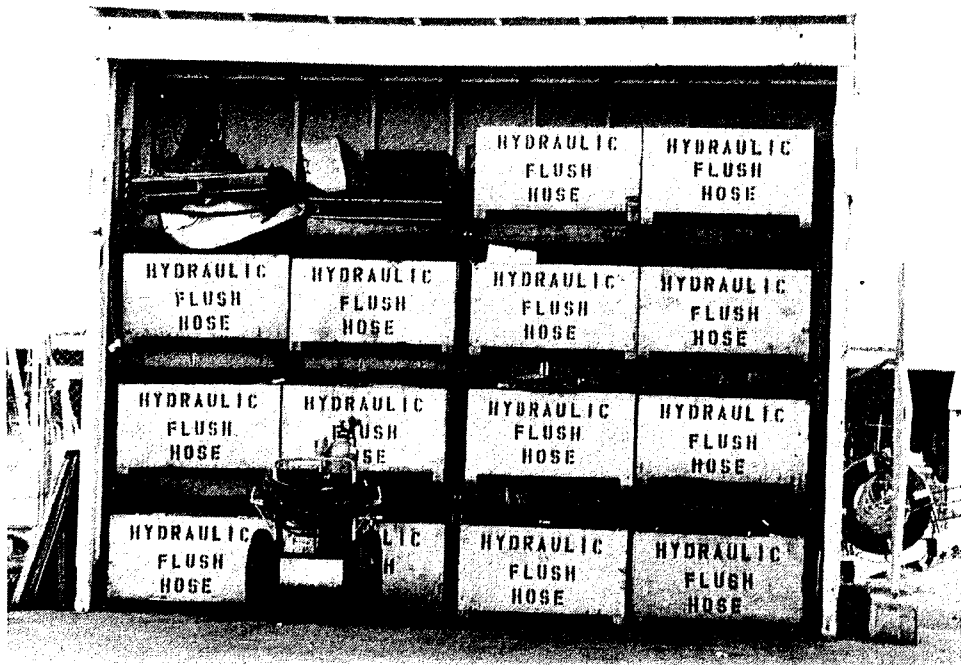
Sump retrofitted to existing drydock to collect hull wash water.



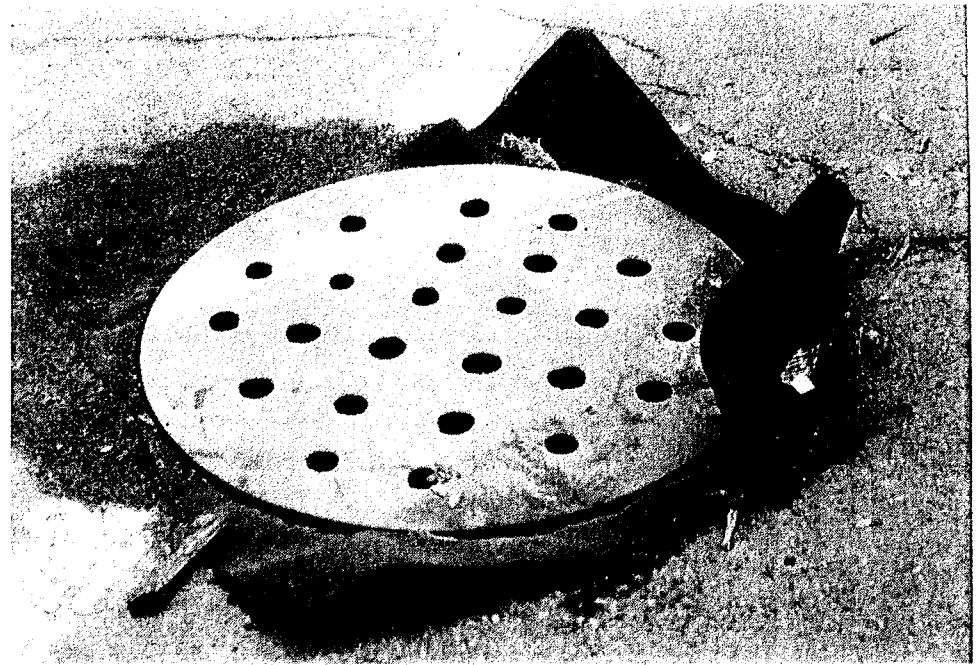
Fully shrouded boat prior to painting



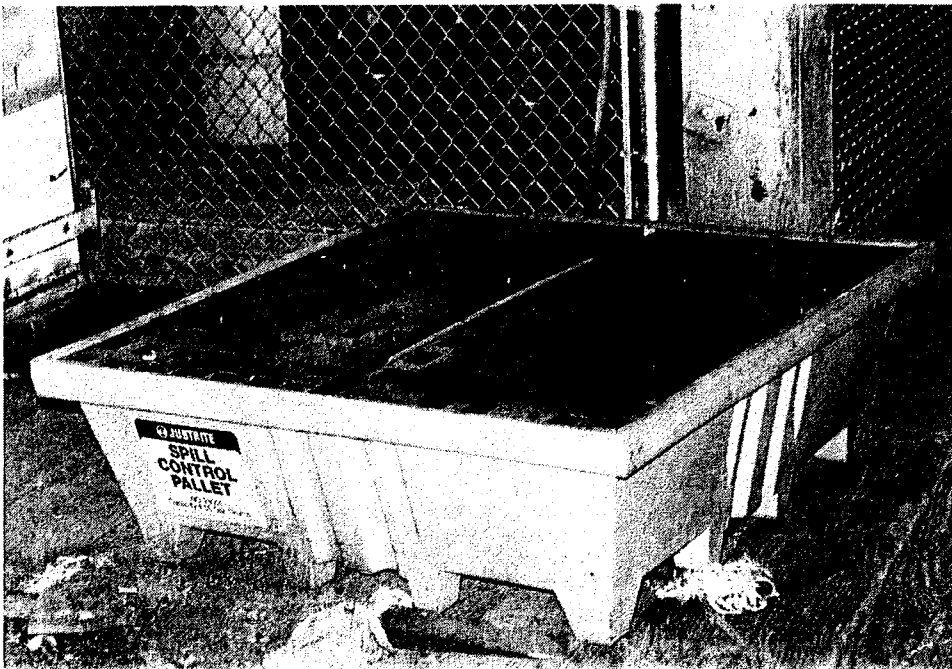
Aluminum arches used to support shrouding of vessel topsides in a drydock



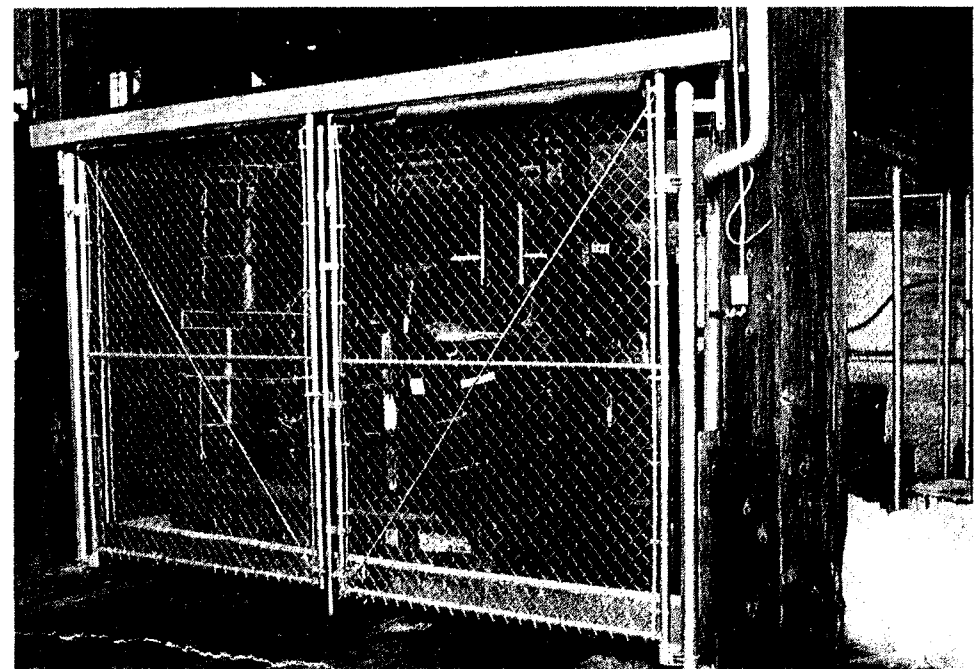
Storage system for hydraulic flush hoses



Poly filter under yard drain manhole covers to catch sludge, grit, oils and grease runoff from yard



Spill control pallet



Secure storage for non-hazardous chemicals

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Appendix A

Contact List:

Applicable Government Agencies

GOVERNMENT CONTACT LIST

<u>Legislation</u>	<u>Agency</u>	<u>Telephone No.</u>
Fisheries Act	Habitat Management Fisheries and Oceans Canada, Vancouver	666-6566
GVRD Air Quality Management Bylaw 725	Greater Vancouver Regional District, Burnaby	436-6700
Greater Vancouver Sewerage & Drainage District Sewer Use Bylaw 164	Greater Vancouver Sewerage & Drainage District, Burnaby	432-6450
Pest Control Products Act	Agriculture Canada, New Westminister	666-2153
Pesticide Act	B.C. Ministry of Environment, Lands and Parks Victoria	387-9411
Ocean Dumping Regulations	Environment Canada, North Vancouver	666-0724
Special Waste Regulation	B.C. Ministry of Environment, Lands and Parks Victoria	387-9992
Worker's Compensation Act	Worker's Compensation Board Richmond	276-3121 or 1-800-661-2112
Environmental Review (new projects)	Burrard Inlet Environmental Action Program Vancouver	775-5195
	Fraser River Estuary Management Program New Westminister	525-1047
Emergency Numbers		
Spill Reporting Regulation	Provincial Emergencies Program	1-800-663-3456 (1-800-645-7911)
	Environment Canada	666-6100
	Canadian Coast Guard	666-6011