ALASKA CLEAN SEAS TECHNICAL MANUAL

2012 FIELD GUIDE

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ALASKA CLEAN SEAS TECHNICAL MANUAL
VOLUME 1
TACTICS DESCRIPTIONS

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DISCLAIMER

In producing this manual, Alaska Clean Seas has endeavored to provide the best available information based on the latest technological and engineering advancements. ACS believes that the information and procedures contained herein are well founded, and utilize information obtained from actual experiences in the environments where these procedures are intended to apply. Nonetheless, ACS and its members expressly disclaim that the procedures provided in this manual, even if followed correctly and competently, will necessarily produce any specific results. Implementation of the recommendations and procedures contained herein is at the sole risk of the user.

The *Alaska Clean Seas Technical Manual* provides a detailed source of information pertaining to spill response variables on the North Slope of Alaska. This information includes:

- Spill response tactics in a variety of conditions and seasonal variations.
- Maps of resources at risk from a spill.

The *Technical Manual* is generally applicable to all operators on the North Slope. Facility-specific information is provided in operator oil discharge prevention and contingency plans. The information provided in this manual, in conjunction with the individual operator contingency plans, is intended to meet the requirements of Alaska Department of Environmental Conservation spill planning regulations (18 AAC 75).

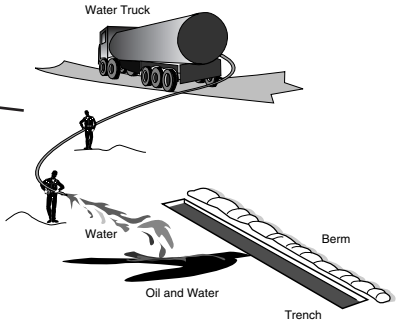
There are always variables beyond the control of any response organization that affect response performance. These variables include personnel safety considerations, weather, visibility, sea conditions, location of spill, type of oil spilled, rate of discharge, condition of the equipment or facility causing the spill, and for a vessel, position of discharging vessel and condition of remaining cargo. In addition, site-specific conditions such as the amount and type of wildlife and sea mammals in or around the site, or the amount and nature of debris present, could interfere with response performance. Accordingly, it is not possible to guarantee response performance in exact accordance with the estimates, strategies or scenarios presented in this *Technical Manual* for planning purposes. For example, the safety of employees, contractor personnel, government representatives, and the public is of paramount importance and will override all other considerations in response operations.

NOTE: This Field Guide is intended as reference material for field use. Although the tactics descriptions contained in this field guide are based on tactics descriptions in the *Alaska Clean Seas Technical Manual*, differences may exist. Refer to the current edition of the *Alaska Clean Seas Technical Manual, Volume 1, Tactics Descriptions*, for approved tactics descriptions.

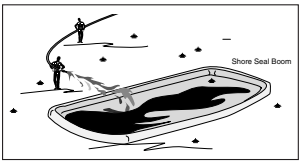
Tactics are numbered in series designated by a letter. This is the fourth tactic in the Recovery/Storage section.

TACTIC R-4 Flushing of Oil on Tundra Surface (Page 1 of 2)

The illustration depicts a typical deployment configuration for the tactic. Sometimes, more than one option is provided.



FLOATING OIL WITHIN SHORE SEAL BOOM



A concise description of how the tactic is deployed is provided to explain the illustration.

In spring or fall, flushing is used to concentrate oil into pits or trenches, where it is collected with direct suction using a Manta Ray skimmer head, sorbents, or a portable skimming system. The pits or trenches are constructed by cutting slots in ice, utilizing natural depressions, digging into tundra or gravel with a backhoe or Bobcat, or by augmenting a depression or pit with sandbags and Shore Seal boom (see Tactic C-4). Shore Seal boom is particularly effective when frozen in place. Constructed pits or trenches are lined with Visqueen or similar plastic sheeting.

The water source for the flushing unit is either a water truck or an auger hole in the ice of a nearby lake. Flushing usually occurs after pooled areas and contaminated snow have been removed.

The flush should consist of high-volume, low-energy flushing with water less than 106°F. This is essentially a mop-up technique after the majority of oil and oiled snow has been removed.

See Tactic R-7 for recovery of concentrated oil.

 NOTE: All values given on these pages are for planning purposes only.

The 11" x 17" format is designed so that the page can be copied as two 8.5" x 11" pages.

"Base Location" is storage location (may change seasonally); "Mobe Time" is time to get it out of storage, prepare it for operation, and make it ready to travel (concurrent for all equipment); "Deploy Time" is time to make it operational for its intended use at the spill site. These times do not include travel time from base to spill site, which may have multiple components (see Tactic L-3).

Flushing of Oil on Tundra Surface (Page 2 of 2) **TACTIC R-4**

NOTE: *"Base Location" is storage location (may change seasonally); "Mobe Time" is time to get it out of storage, prepare it for operation, and make it ready to travel (concurrent for all equipment); "Deploy Time" is time to make it operational for its intended use at the spill site. These times do not include travel time from base to spill site, which may have multiple components (see Tactic L-3).*

The equipment and support tables can be used to determine equipment needs and to develop response times for individual facilities.

EQUIPMENT AND PERSONNEL

- The number of staff to deploy sandbags depends on the size of the constructed concentration area.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Water Truck	All	Water source	1	2	2 hr	0.5 hr
or Upright Tank (400 bbl)	KRU, Alpine	Water source	1		2 hr	1 hr
Ice Auger	All	Water source	1	2	1hr	0
Trash Pump (2-inch)	All	Flushing of oil	1		1 hr	1 hr
Suction Hose (2-inch)	All	Flushing of oil	≥20 ft	—	2 hr	1 hr
Discharge Hose (3-inch)	All	Flushing of oil	>50 ft	—	1 hr	1 hr
			TOTAL STAFF	**2**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Heater	All	Support heavy equipment	≥1	1 initial setup	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Light Plant	All	Illumination	>1	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr

The "Capacities for Planning" section provides the values that can be used to calculate the volume recovered by various pieces of equipment. The values presented are derated according to agency guidelines.

CAPACITIES FOR PLANNING

- Recovery capacity depends on the nature of the spill, the size of the concentration area, and terrain features.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Flushing is a viable option only when air temperatures permit. Warm water (no more than 106°F) is preferred for flushing.
- Flushing works on oil contained on and in the surface of tundra, gravel, and ice, and is particularly effective on ice. The tundra can be damaged if it thaws; don't flush the same area more than 2 or 3 times or suck the tundra dry. Also, stay off the tundra that's being flushed.
- Personnel or small equipment should traverse the tundra on plywood sheets.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.

NOTE: All values given on these pages are for planning purposes only. ACS Tech. Manual Vol. 1, 03/12

Various operational and environmental considerations are presented here.

	Tactic	Rev. Date
SAFETY		
S-1	Site Entry Procedures	Revised 03/12
S-2	Site Safety Plan Form	Revised 03/12
S-3	Identifying Required Personal Protection	Revised 03/12
S-4	Site Layout	Revised 03/12
S-5	Air Monitoring for Personal Protection	Revised 03/12
S-6	Decontamination	Revised 03/12
S-7	Gross Decontamination of Vessels	Revised 03/12
S-8	Safety During Operations in Overflood Conditions	Revised 03/12
CONTAINMENT		
C-1	Containment Using Snow Berm	Revised 03/12
C-2	Deflection Booming at a Culvert	Revised 03/12
C-3	Culvert Blocking	Revised 03/12
C-4	Barriers on Land	Revised 03/12
C-5	Deflection or Exclusion Booming on Lake or Tundra	Revised 03/12
C-6	Underflow Dam	Revised 03/12
C-7	Deadarm Trench on River Bank	Revised 03/12
C-8	Deflection Booming in Stream	Revised 03/12
C-9	Exclusion Booming on River	Revised 03/12
C-10	Containment Using Ice-Road Ring	Revised 03/12
C-11	Containment on Ice with Trenches and Sumps	Revised 03/12
C-12	Trenching Ice to Direct Flow to a Containment Point	Revised 03/12
C-13	Deflection Booming in Open Water	Revised 03/12
C-14	Exclusion Booming in Open Water	Revised 03/12
C-15	Intertidal Booming	Revised 03/12
C-16	Anchored W Deflection Boom	Revised 03/12
C-17	Containment Using U-Boom	Revised 03/12
C-18	Containing Light Layer of Oil on Snow Using Water Spray	Revised 03/12
C-19	Containing Oiled Snow Using Snow Fence	Revised 03/12
RECOVERY AND STORAGE		
R-1	Mechanical Recovery of Lightly Oiled Snow	Revised 03/12
R-1A	Use of Snow Blower to Remove Lightly Misted Snow	Revised 03/12
R-2	Manual Recovery of Lightly Oiled Snow	Revised 03/12
R-3	Recovery of Oil-Saturated Snow	Revised 03/12
R-4	Flushing of Oil on Tundra Surface	Revised 03/12
R-5	Recovery of Embedded Oil	Revised 03/12
R-6	Recovery by Direct Suction	Revised 03/12
R-7	Recovery from Pit or Trench	Revised 03/12
R-8	Use of Portable Skimmers with Pumps (River and Lake)	Revised 03/12
R-9	Use of Sorbents	Revised 03/12
R-10	Fairchild Gate Weir Collection System	Revised 03/12
R-11	Decanting Separated Water in River	Revised 03/12
R-12	Aggressive Breakup in River	Revised 03/12

Tactic		Rev. Date
RECOVERY AND STORAGE (CONT'D)		
R-13	Cutting Ice Slots for Recovery	Revised 03/12
R-14	Recovery of Oil under Ice	Revised 03/12
R-15	Anchored V-Boom to Skimmer	Revised 03/12
R-16	Hook Boom to Skimmer and Storage	Revised 03/12
R-17	J-Boom to Skimmer and Mini-Barge	Revised 03/12
R-18	U-Boom to Skimmer and Mini-Barge	Revised 03/12
R-19	J-Boom to Large Barge or OSRV	Revised 03/12
R-19A	Use of J-Booms in Broken Ice	Revised 03/12
R-20	U-Boom with Open Apex to Skimming System	Revised 03/12
R-21	Hot-Water, High-Pressure Washing of Solid Surfaces	Revised 03/12
R-22	Temporary Storage Options	Revised 03/12
R-23	Tank on Trailer (Fuel Tanker)	Revised 03/12
R-24	Hoses and Pumps in Series	Revised 03/12
R-25	Freighter Boat with Tank	Revised 03/12
R-26	Excavation and Storage of Oiled Gravel	Revised 03/12
R-27	Damaged Tank Transfer Procedures	Revised 03/12
R-28	Lightering/Offloading	Revised 03/12
R-29	Ice Mining	Revised 03/12
R-30	Recovery Using Diamond Boom for Subsea Pipeline Break	Revised 03/12
R-31	Free Skimming	Revised 03/12
R-32A	Single Boom-Arm Skimming	Revised 03/12
R-32B	Double Boom-Arm Skimming	Revised 03/12
R-33	Swift Water Recovery – Harbour Buster	Revised 03/12
TRACKING AND SURVEILLANCE		
T-1	Delineation of Oiled Snow or Tundra	Revised 03/12
T-2	Mapping and Surveillance of Spill on Land	Revised 03/12
T-3	Detection and Delineation of Under-Ice Oil	Revised 03/12
T-4	Discharge Tracking in Open Water	Revised 03/12
T-4A	Discharge Tracking in Ice	Revised 03/12
T-5	Trajectory Calculations	Revised 03/12
T-6*	Blowout Modeling	Revised 03/12
T-7	Spill Volume Estimation	Revised 03/12
BURNING		
B-1*	In-Situ Burning Plan	Revised 03/12
B-1A*	In-Situ Burn Plan and Application Form	Revised 03/12
B-2	Burning Oily Vegetation	Revised 03/12
B-3	In-Situ Burning with Heli-torch and Other Igniters	Revised 03/12
B-4	Deployment and Use of Fire Containment Boom	Revised 03/12
B-5	Burning Oil Pools on Any Solid Surface	Revised 03/12
B-6	Burn Residue Recovery	Revised 03/12
B-7	Burn Extinguishment on Water	Revised 03/12

* This tactic is not included in this Field Guide. Refer to the full-size ACS Technical Manual.

Tactic		Rev. Date
DISPERSANTS		
DT-1	Dispersant Application Via Vessel	Revised 03/12
DT-2	Dispersant Application Via Aircraft	Revised 03/12
DT-3	Dispersant Application Via Helicopter	Revised 03/12
SHORELINE CLEANUP		
SH-1	Shoreline Assessment	Revised 03/12
SH-2	Natural Recovery of an Oiled Shoreline	Revised 03/12
SH-3	Shoreline Cleanup Using Flooding and Flushing	Revised 03/12
SH-4	Shoreline Cleanup Using Steam Cleaning or Sand Blasting	Revised 03/12
SH-5	Shoreline Cleanup Using Manual Removal and Vacuum Methods	Revised 03/12
SH-6	Shoreline Cleanup Using Mechanical Removal	Revised 03/12
SH-7	Shoreline Cleanup Using Sorbents and Vegetation Cutting	Revised 03/12
SH-8	Shoreline Cleanup Using Mechanical Tilling/Aeration	Revised 03/12
SH-9	Shoreline Cleanup Using Sediment Reworking and Surf Washing	Revised 03/12
SH-10	Shoreline Cleanup Using Burning	Revised 03/12
SH-11	Biological/Chemical Shoreline Response Tactics	Revised 03/12
SH-12	Summary of Potential Impact of Shoreline Cleanup Techniques	Revised 03/12
WILDLIFE AND SENSITIVE AREAS		
W-1*	Wildlife Protection Strategy and Permits	Revised 03/12
W-1A*	RRT Hazing Checklist	Revised 03/12
W-1B*	RRT Capture/Transportation/Stabilization/Treatment Checklist	Revised 03/12
W-1C*	RRT Contact Information for Wildlife Resource Agencies	Revised 03/12
W-2*	Wildlife Hazing Equipment	Revised 03/12
W-2A	Mammal Hazing	Revised 03/12
W-2B	Bird Hazing	Revised 03/12
W-3	Wildlife Capture and Rehabilitation	Revised 03/12
W-4	Salvage of Dead Wildlife	Revised 03/12
W-5	Deployment of ACS Mobile Wildlife Stabilization Center	Revised 03/12
W-6*	Identifying and Protecting Sensitive Areas	Revised 03/12
DISPOSAL		
D-1*	Processing Recovered Liquids	Revised 03/12
D-2*	Storage and Disposal of Non-Liquid Oily Wastes	Revised 03/12
D-3*	Disposal of Non-Oily Wastes	Revised 03/12
D-4*	Stockpiling Oiled Gravel	Revised 03/12
D-5*	Processing of Contaminated Snow/Ice	Revised 03/12

* This tactic is not included in this Field Guide. Refer to the full-size ACS Technical Manual.

	Tactic	Rev. Date
LOGISTICS AND EQUIPMENT		
L-1	Ice Road Construction for Access to Winter Tundra Spill	Revised 03/12
L-2	Staging Areas	Revised 03/12
L-3*	Deployment Strategies	Revised 03/12
L-4*	Logistical Support	Revised 03/12
L-5[1]	Communications	Revised 03/12
L-6*	ACS Response Equipment Specifications	Revised 03/12
L-6A*	Shell Response Equipment Specifications	Revised 03/12
L-7[2]	Realistic Maximum Operating Limitations	Revised 03/12
L-8*	North Slope Mutual Aid	Revised 03/12
L-9*	Accessing Contract Resources	Revised 03/12
L-10*	Accessing Non-Obligated Resources	Revised 03/12
L-11*	Best Available Technology Analysis	Revised 03/12
L-11A*	BAT Analysis: ACS Communications	Revised 03/12
L-11B*	BAT Analysis: Trajectory Analyses	Revised 03/12
L-11C*	BAT Analysis: Wildlife Protection	Revised 03/12
L-12*	Logistical Support for On-Water Operations	Revised 03/12
ADMINISTRATION		
A-1	Emergency Action Checklist	Revised 03/12
A-2*	Spill Reporting Procedures	Revised 03/12
A-3*	ACS Pre-Approved Permits	Revised 03/12
A-4*	Training Requirements for Response Personnel	Revised 03/12
A-5*	ACS Certifications	Revised 03/12

* Not included -- refer to the full-size ACS Technical Manual.
[1] Pages 1-6 not included -- refer to the full-size ACS Technical Manual.
[2] Pages 1-3 and 10 not included -- refer to the full-size ACS Technical Manual.

TABLE OF CONTENTS

SAFETY TACTICS

SAFETY IS THE FIRST PRIORITY IN THE RESPONSE TO ANY TYPE OF SPILL

Remember, it's not worth risking injury to anyone to clean up a spill. Safety protocols and procedures must be followed for any spill. ***Proper hazard identification, hazard assessment, selection of appropriate personal protective equipment (PPE), personnel decontamination, and determination of appropriate safety and health practices take priority over all other spill response activities.***

LIMITS TO ENTRY

- ***No entry is authorized if the percentage of LEL exceeds 10% on a calibrated direct-reading explosive gas meter.***
- ***No entry is authorized if the oxygen percentage exceeds 23.5%.***
- ***In all cases, physical hazards of entry must be considered along with health hazards***

Key safety issues to consider in mobilizing a response effort are:

- Fire and explosion risk
- Chemical exposure potential
- Temperature extremes
- Safety of on-water or on-ice operations
- Other physical hazards

Not all hazards at an oil spill site are immediately apparent. A number of factors can be dangerous in the presence of an oil spill. Beware of the following:

- Potential ignition ("hot") sources for fire/explosion
- Smoking in the area
- Static electricity
- Escaping gas
- Unauthorized visitors (e.g., media)
- Undetected mechanical failures
- Spontaneous combustion
- Physical hazards (e.g., structural damage to pipeline or facilities)
- Chemical hazards (e.g., components in the oil, either naturally occurring or added, that are toxic to humans)

Effective spill response depends upon correct identification of the materials released. The Safety Officer will use his/her professional judgment to determine the following:

- Type of product or material released
- Physical state of material released (liquid, spray, solid, emulsified, mist, vapor, gas)
- Air concentration of material as compared to: 1) flammability range, 2) whether immediately dangerous to life or health (IDLH), 3) permissible exposure limit (PEL)*
- Hazards associated with material (e.g., flammability, toxicity, reactivity, corrosivity, health hazards)
- Weather conditions (e.g., prevailing winds, ambient temperatures, wind chill, relative humidity)
- Threat to human health and environmentally sensitive areas

In cases of release of an unknown material, the Safety Officer will assist with identification:

- Use available information such as labels, transport placards, NFPA, DOT Emergency Response Handbook, or bill of lading.
- Take sample, using accepted EPA protocol.
- If identified, consult material safety data sheet (MSDS) or operator's safety department.
- If no MSDS available, call CHEMTREC (1-800-424-9300 or 1-703-527-3887).

**The PEL is 5 mg/m³ for particulate oil in air (e.g., from a high-pressure release of oil), and the PEL is 0.6 ppm for benzene in oil. In addition, oil may contain methanol and xylene from injection at the wellbore.*

PRE-ENTRY SAFETY

The decision as to whether of not any given entry shall be attempted is ultimately the responsibility of the On Scene Commander with advice and guidance from:

- The Site Safety Officer (safety professional or experienced responder)
- The Emergency Response Leader
- The Environmental Team Leader

Steps to follow during the pre-entry phase to provide maximum safety to workers, the environment, and facilities:

- Before any site activity, all known facts about the incident are discussed in a pre-entry briefing.
- Known site hazards are identified.
- A Site Safety Officer makes a preliminary evaluation of a site's characteristics (hazards) before site entry.

The Site Safety Officer performing the initial assessment will:

- Determine if people are injured or trapped. If so, contact help as soon as possible.
- Delineate affected area (Hot and Warm Zones).
- Designate site as "Dangerous - No Smoking."
- Stay upwind from spill.
- Restrict access to spill area to those involved in initial containment.
- Note any geographic hazards (cliffs, fast-moving water, ditches, etc.).
- Consider the need for the following: protective gear, decontamination, site control, and safety equipment.
- Gather any and all pertinent data (begin evaluation).

SITE ENTRY

Immediately after the initial site entry, a more detailed evaluation of the site's specific characteristics is completed in order to further identify existing hazards and aid in the selection of appropriate PPE.

Below are three levels of protection for entry into varying conditions listed in descending order of protection. It is required to consult with a "competent person" for job specific PPE requirements. (Note: The recommended levels below reflect a 12-hour shift. All employees must have had the necessary training pertaining to their tasks prior to entering any site. In addition, these guidelines are for crude oil and petroleum spills; other criteria apply to hazmat spills).

1. Entry by one or more workers with SCBA and a single backup observer also equipped with SCBA is allowed under the following conditions:
   - Oxygen atmospheric concentration is less than 23.5%.
   - LEL percentage is less than 10% as measured by a calibrated direct-reading hand-held instrument.
2. Entry with full-face air purifying respirator and organic vapor cartridges is allowed by any number of workers without backup observers under all of the following conditions:
   - Oxygen atmospheric concentration is between 19.5% and 23.5%.
   - LEL percentage is less than 3%.
   - Total hydrocarbon concentration is less than 500 ppm.
   - H_2S air concentration is less than 10 ppm.
   - Benzene air concentration is less than 10 ppm.
   - Normal natural or mechanical ventilation is available.
   - No visible mist or fog of oil present.

S-1: Site Entry Procedures (Pg 3 of 4)

3. Entry with half-face air purifying respirator and organic vapor cartridges is allowed by any number of workers without backup observers under all of the following conditions:

   - Oxygen atmospheric concentration is between 19.5% and 23.5%.
   - LEL percentage is less than 3%.
   - Total hydrocarbon concentration is less than 500 ppm.
   - H_2S air concentration is less than 10 ppm.
   - Benzene air concentration is less than 3 ppm.
   - Normal natural or mechanical ventilation is available.
   - No visible mist or fog of oil present.

4. Entry without respiratory protection is allowed for any work required under all of the following conditions:

   - Oxygen atmospheric concentration is between 19.5% and 23.5%.
   - LEL percentage is less than 3%.
   - Total hydrocarbon concentration is less than 50 ppm.
   - H_2S air concentration is less 10 ppm.
   - Benzene air concentration is less than 0.3 ppm.
   - Normal natural or mechanical ventilation is available.
   - No visible mist or fog of oil is present.

Note: In environments with excess dust and debris, an organic vapor / particulate filter is recommended (OV/HEPA)

DOCUMENTATION

Careful and complete documentation of planning, procedures, and implementation of spill response activities is critical for two main reasons. Federal OSHA and State of Alaska DOSH regulations require certain record-keeping. Also, knowing what's been done in the past can help prevent problems and increase cleanup and safety effectiveness in the future. The following records should be available either on site or in personnel files:

- Initial site assessment information
- Site safety plan
- Personnel training records
- Site safety briefings
- Paperwork for exposure badges and air monitoring logs
- Accident reports
- Medical monitoring records

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

CONSIDER ALL SPILLS TO BE HAZARDOUS:

- Always approach a spill from an upwind direction.
- Avoid direct or indirect body contact with the spilled material.
- Remove all potential ignition sources from immediate area.
- Shut down all powered equipment until Safety Officer approves operation.
- Restrict access to spill area to those involved in initial containment and cleanup activity.
- Do not approach materials producing gases or vapors until identification is possible and hazards are known.
- Maintain constant observation of personnel for indications of hypothermia and/or frostbite.
- Follow procedures to avoid slips, trips, and falls, especially in ice and snow conditions.

IF A PROFESSIONAL OPINION IS NEEDED CALL THE IH OR SAFETY REPRESENTATIVE

- A trained person using properly calibrated equipment must conduct air monitoring.
- If permissible entry conditions change outside of allowable criteria during entry, the entry must be terminated.
- If a worker is splashed with crude oil, remove clothing and wash affected skin area.
- If eyes are splashed rinse for at least 15 minutes and get medical attention.

PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIRED FOR RESPONDERS TO A CRUDE OIL RELEASE:

- Appropriate respiratory equipment (see above)
- Appropriate gloves (nitrile, butyl rubber, or Viton), boots, and full-body-covering suits (Level A, B, C)
- Safety glasses or goggles
- Hard hat
- Appropriate dress for cold weather, as necessary
- Steel-toed footwear or arctic boots in cold weather; ice cleats as necessary
- Fire-retardant clothing if within 50 feet of a process area
- Personal flotation devices, as necessary

S-2: Site Safety Plan (Pg 1 of 2)

NORTH SLOPE SITE HEALTH & SAFETY PLAN

Incident Name:	Date Prepared:
Incident Location:	Time Prepared:
Site Safety Officer:	On-Scene Commander:

(1) TYPE OF INCIDENT

- ☐ Personal Injury/Medical
- ☐ Explosion
- ☐ Spill
- ☐ Collision
- ☐ Other
- ☐ Fire
- ☐ Gas Release
- ☐ Well Control
- ☐ Terrorism
- ☐ Planned Event

(2) ENTRY OBJECTIVES (Refer To ICS-201, 202)

- ☐ Isolate and Control Entry
- ☐ Rescue Victims/Evacuation or Shelter in Place
- ☐ Spill Cleanup
- ☐ Account for Personnel
- ☐ Source Control
- ☐ Reconnaissance
- ☐ Fire Suppression
- ☐ Special Procedures
- ☐ _____
- ☐ _____

(3) HAZARD IDENTIFICATION/EVALUATION (Refer to ICS-204S)

Chemical Properties

Name:

Est. Amount:

State (Liquid, Gas, Solid)

Spec. Gravity/Vapor/Density

Water Soluble?

MSDS on Hand?

Hazards

- ☐ Flammable? FP: ___ LEL Range: _____ %
- ☐ Explosive?
- ☐ Toxic? IDLH: PEL:
- ☐ Corrosive? DOT/UN#
- ☐ Reactive? DOT Hazard Guide #
- ☐ Carcinogen? Threat To: _____
- ☐ Human Health at Risk?
- ☐ Environmental Sensitive Areas at Risk?

Physical (Energy Sources Involved)

- ☐ Electrical
- ☐ Pressure
- ☐ Momentum/Gravity
- ☐ Residual/Stored Energy
- ☐ Special
- ☐ High Temperature
- ☐ Energy Isolation and Control Verified? YES/NO
- ☐ Vibration
- ☐ Noise
- ☐ Heat or Cold Stress

Biological

- ☐ Blood Borne Pathogen Prevention Plan Implemented?
- ☐ Wildlife Control Implemented?
- ☐ Special Health/Medical Issues?

Special

- ☐ Confined Space Entry
- ☐ Elevated Area
- ☐ Limited Access
- ☐ Below Grade (pit, trench)
- ☐ Offshore Structure
- ☐ Land Structure

(4) SITE INFORMATION (Refer to ICS-201-5)

Safe Access Route to the Site:

Command Post Location:

Medical Located:

Site Control:

Site Org. Level: (ICS-204) YES/NO

Site Control Zones Established on ICS-201 Site Map.

Exclusion Zone Line:

Contamination Reduction Zone Line:

Support Zone Line:

Traffic Pattern Established? YES/NO

(5) WEATHER/ENVIRONMENTAL

Current

Air Temp: Wind Speed: /mph Humidity:

Precipitation: Wind Direction:

Forecast Time: Date:

Air Temp: Wind Speed: /mph Humidity:

Precipitation: Wind Direction:

Sea/Water Conditions

Sea State 1-2-3-4-5-6 Feet. Maximum Average Wave Height: Feet.

Currents: Y - N Current Speed: knots Current Direction:

Forecast:

(6) SAFETY PROCEDURES

SPECIAL ENTRY PROCEDURES (Refer to ICS-206)

Pre-Entry Vitals Taken by Medical

Post-Entry Vitals Taken by Medical

Comments:

(7) ROUTE OF EXPOSURE

- ☐ Inhalation _____
- ☐ Ingestion _____
- ☐ Eye Contact _____
- ☐ Dermal _____

(8) MONITORING

Area

	Frequency
Oxygen	Y/N _____
Flam. Gas	Y/N _____
H2S	Y/N _____
Benzene	Y/N _____
CO2	Y/N _____
Hydrocarbon	Y/N _____
_____	Y/N _____

Safety or Industrial Hygienist:

Sign:

(9) TRAINING

☐ Response Training Requirements Have Been Identified?

Comments:

_____

_____

_____

(10) PERSONAL PROTECTIVE EQUIPMENT (PPE)

Exclusion Zone (Hot)

	Head/Eye	Respiratory	Body	Gloves	Foot	PFD
☐ A						
☐ B						
☐ C						
☐ D						

☐ Contamination Reduction Zone (WARM) (See Section 19, Decon)

Prepared By: _____ _____ **Approved By:** _____ _____

Site Safety Officer Date/Time On-Scene Commander Date/Time

S-2: Site Safety Plan (Pg 2 of 2)

(11) COMMUNICATIONS RADIO

- ☐ Radio Communication Plan Implemented?

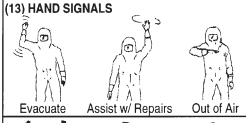
  Command Channel: _____
  Tactical Channel(s): ____/____/_____

- ☐ Emergency Call: (Band Aid - Band Aid - Band Aid)
- ☐ Bull Horns
- ☐ SCBA Communication
- ☐ In-Suit Communication

(12) VISUAL/SIGNS

- ☐ Entry Team Briefing Conducted
- ☐ Buddy System
- ☐ Leader/Team Site Rules Established
- ☐ Emergency Signals Verified with All Team Members
- ☐ Other:

(13) HAND SIGNALS



(14) SITE EMERGENCY EQUIPMENT

List special equipment required

	Equipment	Location
☐		
☐		
☐		
☐		
☐		
☐		
☐		

(15) RESCUE/MEDICAL

List Special Rescue or Medical

	Equipment/Unit	Location
☐		
☐		
☐		
☐		
☐		
☐		
☐		

(16) ESCAPE/EVACUATION

- ☐ Safe Refuge Area Established for Exclusion Zone & for Location:
- ☐ Escape/ Evacuation Alarm/Signal:
- ☐ Entry Team Escape Route:
- ☐ Criteria for Required Evacuation Established? (wind change, IDLH conditions, etc.)

(17) DECONTAMINATION (CORRIDOR)

- ☐ Decontamination Plan Established?
- ☐ Decon Solution _____
- ☐ Decontamination Control Marked on ICS-201 Site Map?
- Standard Decontamination Layout? **Y/N**
- ☐ Emergency Decon Procedure (Gross Flushing)

(18) DECON WORKER PPE LEVEL

	Head/Eye	Respiratory	Body	Gloves	Foot	PFD
☐ A						
☐ B						
☐ C						
☐ D						

NOTE: Decon personnel to be protected at the same level or one level below Exclusion Zone entry personnel.

(19) ORGANIZATIONAL PLAN & INITIAL BRIEFING

- ☐ Organizational Plan/Position Designations Complete? (Refer to ICS-201, 203, 204)
- ☐ Incident Action Plan Established? (Refer to ICS-Forms, I.A.P.)
- ☐ All Positions Track and Record Actions (Refer to ICS-214) Unit Log

(20) ATTACHMENTS (ICS Forms, Maps, Photos, etc.)

(21) DEMOBILIZATION

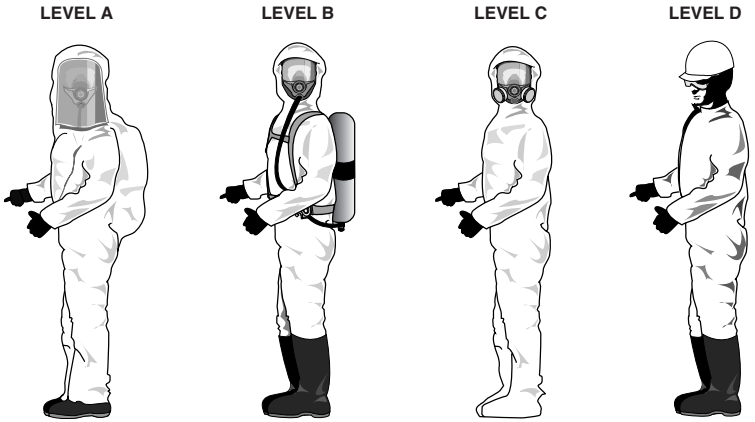
- ☐ Demobilization Safety Procedures Established?

(22) ADDITIONAL COMMENTS:

Prepared By: _____ _____ **Approved By:** _____ _____
Site Safety Officer Date/Time On-Scene Commander Date/Time

NOTE: All values given on these pages are for planning purposes only.

S-3: Identifying Required Personal Protection (Pg 1 of 4)



Personal protective equipment (PPE) is designed to protect workers from safety and health hazards and prevent injury resulting from incorrect use and/or malfunction of equipment. In general, the greater the level of risk, the greater the level of PPE required. PPE includes:

- Respirators: SCBA, air-purifying respirator
- Full body covering including nitrile, butyl rubber, or Viton gloves and boots
- Safety glasses or goggles
- Hard hat
- Cold weather gear, including steel-toed footwear or arctic boots
- Hearing protection

PPE is divided into four categories based on the level of personal protection afforded.

- **Level A** provides the greatest level of skin, respiratory and eye protection.
- **Level B** offers the highest level of respiratory protection but lesser level of skin protection (e.g., skin protection is required for exposure to liquids but not vapor).
- **Level C** is used when concentrations and types of airborne substances are known and the criteria for using air-purifying respirators are met.
- **Level D** consists of work clothing affording minimal protection, used for nuisance contamination only.

Most spill-site workers will use Levels C and D.

EQUIPMENT

LEVEL A

- SCBA, or positive-pressure supplied-air respirator with escape SCBA
- Totally encapsulating chemical-protective suit with vapor barrier
- Coveralls*
- Long underwear*
- Gloves, outer, chemical resistant
- Gloves, inner, chemical resistant
- Boots, chemical resistant, steel toe and shank
- Hard hat (under suit)*
- Disposable protective suit, gloves and boots (may be worn over or under encapsulating suit depending on suit design)

LEVEL B

- SCBA, or positive-pressure supplied-air respirator with escape SCBA
- Hooded chemical-resistant clothing (overalls and long-sleeved jacket coveralls; one- or two-piece chemical splash suit; disposable chemical-resistant overalls). May also be encapsulating.
- Coveralls*
- Gloves, outer, chemical resistant
- Gloves, inner, chemical resistant
- Boots, chemical resistant, steel toe and shank
- Boot covers, outer, chemical resistant, disposable*
- Hard hat*
- Face shield*

LEVEL C

- Full-face or half-mask air-purifying respirators with appropriate cartridges
- Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls.)
- Coveralls*
- Gloves, outer, chemical resistant
- Gloves, inner, chemical resistant
- Boots, chemical resistant, steel toe and shank
- Boot covers, outer, chemical resistant, disposable*
- Hard hat*
- Escape mask*
- Face shield*

LEVEL D

- Coveralls
- Gloves*
- Boots/shoes, chemical resistant, steel toe and shank
- Boots, outer, chemical resistant, disposable*
- Safety glasses or chemical splash goggles
- Hard hat
- Escape mask*
- Face shield*

* Optional

S-3: Identifying Required Personal Protection (Pg 3 of 4)

GUIDELINES FOR PPE

RESPIRATORY:

A NIOSH approved air purifying respirator with an organic vapor cartridge may be used under conditions where airborne concentrations are expected to exceed permissible exposure limits. All employees need to be fit tested for the particular brand and model they will be expected to use.

A Respiratory Protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

SKIN:

The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation, absorption, and skin damage.

Recommended Use: Depending on conditions the use of aprons and or arm covers may be necessary.

Note: *These are just recommendations; each company may purchase and use their PPE of choice. Below is a simple guideline for petroleum PPE selection. It is still necessary for a "competent person" to determine PPE usage for each specific response incident. Surgical grade gloves are not a recommended substitution for industrial use chemical protective gloves. Read the manufacturers recommended application before using any product.*

GLOVE MATERIAL	GENERAL USES
Butyl	Offers the highest resistance to permeation by most gases and water vapor. Especially suitable for use with esters and ketones. Poor for aliphatic, aromatic hydrocarbons, halogenated hydrocarbons, and gasoline.
Neoprene	Good for acids and bases, peroxides, fuels, hydrocarbons, alcohols, phenols. Poor for halogenated and aromatic hydrocarbons
Nitrile	Excellent general duty glove. Provides protection from a wide variety of solvents, oils, petroleum products, and some corrosives. Excellent resistance to cuts, snags, punctures, and abrasions
PVC	Provides excellent abrasion resistance and protection from most fats, acids, and petroleum hydrocarbons. Poor for most organics (consult a competent person prior to use).
PVA	Highly impermeable to gases. Excellent protection from aromatic and chlorinated solvents. Cannot be used in water or water-based solutions.
Viton	Exceptional resistance to chlorinated and aromatic solvents. Good resistance to cuts and abrasions.
Silver Shield	Resists a wide variety of toxic and hazardous chemicals. Provides the highest level of overall chemical resistance.
4H	Same as Silver Shield, but offers better dexterity.
Natural (Latex) rubber	Good for very dilute acids and bases. Poor for organics (consult a competent person prior to use).

EYE/FACE:

Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions the use of a face shield over safety glasses or goggles may be necessary.

OTHER PROTECTIVE EQUIPMENT:

It is recommended that protective clothing be worn when skin contact is possible such as:

- Tyvek (light duty clean up)
- Saranex
- Dupont level "B"

It is required to consult with a "competent person" for job specific PPE requirements. Eye wash and quick drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

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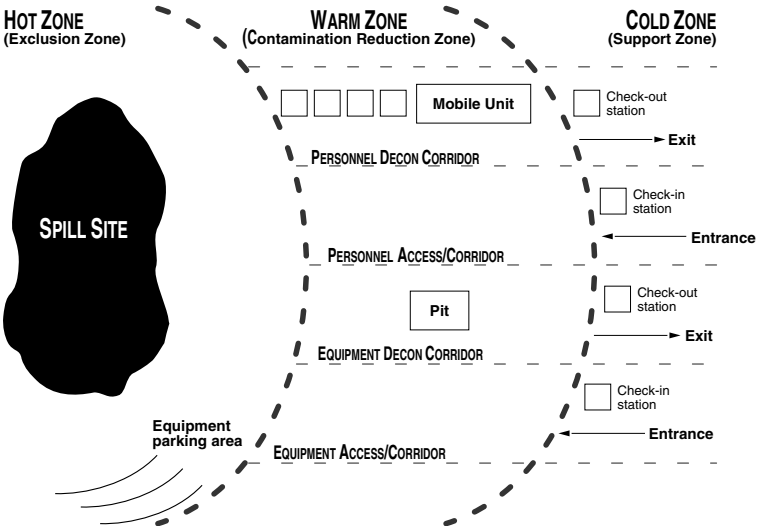
S-4: Site Layout (Pg 1 of 2)



Control boundaries must be established for any spill site to ensure that people are not exposed to the spilled substance:

- **Exclusion or Hot Zone** — Control zone perimeter established by the Safety Officer where pre-site entry and site entry procedures are applied (see Tactics S-1 and S-2)
- **Contamination Reduction or Warm Zone** — Workers shed contaminated clothing; allows for equipment and personnel decontamination.
- **Support or Cold Zone** — No contamination. Zone has support facilities, staging area, warm-up trailer, and mobile command post.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Dry Decon Unit	All	Decontamination	1	4	1 hr	1 hr
Wet Decon Unit	GPB, KRU, Alpine	Decontamination	1	4	1 hr	1 hr
Decon Pits	ACS, KRU	Decontamination	2	3 initial	1 hr	1 hr
Portable Decon Berms	All	Decontamination	≤10	—	1 hr	0.5 hr
Manual Decon Equipment (e.g., scrub brushes, sorbents, sprayers, etc.)	All	Decontamination	—	—	1 hr	0.5 hr

TOTAL STAFF FOR SETUP **7**

TOTAL STAFF TO SUSTAIN OPERATIONS **4**

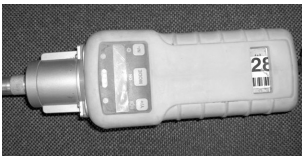
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Water Truck	All	Water	1	2	2 hr	0.5 hr
Vacuum Truck	All	Wastewater removal	1	2	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	0.5 hr

See Tactic L-2 for additional support equipment.

S-5: Air Monitoring for Personal Protection (Pg 1 of 2)

PHOTOIONIZATION DETECTOR (PID)

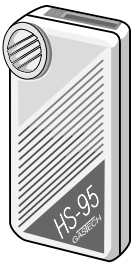


CHIP MEASUREMENT SYSTEM (CMS) METER

PERSONAL MONITOR BADGE

MULTI-GAS INSTRUMENT

SINGLE-GAS INSTRUMENT



COLORIMETRIC TUBE

It is critical that workers know what substances comprise a spill so they can take appropriate precautions. While the initial assessment and entry are done by a trained Safety Officer, it is important for all workers to be familiar with the process and equipment used to assess and monitor the hazardous materials at a spill site.

When the potential for both known and unknown hazards exists, air monitoring procedures must be followed.

1. Monitor with direct-reading test equipment (i.e., combustible gas meters, flame ionization and photoionization detectors) for IDLH conditions, oxygen deficiency, explosive atmosphere, and toxic substances.
2. Implement on-going air monitoring. Continuous monitoring is important since conditions can change due to spill progression, weather and other factors.

Gas instruments: Safety Officer uses these to determine site entry and PPE needed:

1. Multi-gas instrument: "four gas" — Monitors oxygen, LEL, H_2S and carbon monoxide
2. Single gas instrument — e.g., H_2S
3. Chip measurement system (CMS) meter

Photoionization Detector (PID): Used to detect total hydrocarbons and in some cases, specific chemicals such as benzene. Accuracy ± 5%.

Colorimetric Tubes: Used to detect specific chemicals and levels of toxicity. Portable. No power needed. Accuracy ± 30%.

Personal Monitor Badge: Worn by the individual to check exposure to certain chemicals; record required.

ACS has a calibration, inspection, and maintenance program for the above equipment.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Single-Gas Instrument	All	Testing	1	1	0.5 hr	0.5 hr
Multi-Gas Instrument	All	Testing	1	1	0.5 hr	0.5 hr
Draeger Tubes	All	Testing	1	1	0.5 hr	0.5 hr
Personal Monitor Badge	All	Testing	1	1	0.5 hr	0.5 hr
PID	All	Testing	1	1	0.5 hr	0.5 hr
Portable GC	All	Testing	1	1	1 hr	1 hr
			TOTAL STAFF	**≥1, increasing incrementally with the size of the incident**		

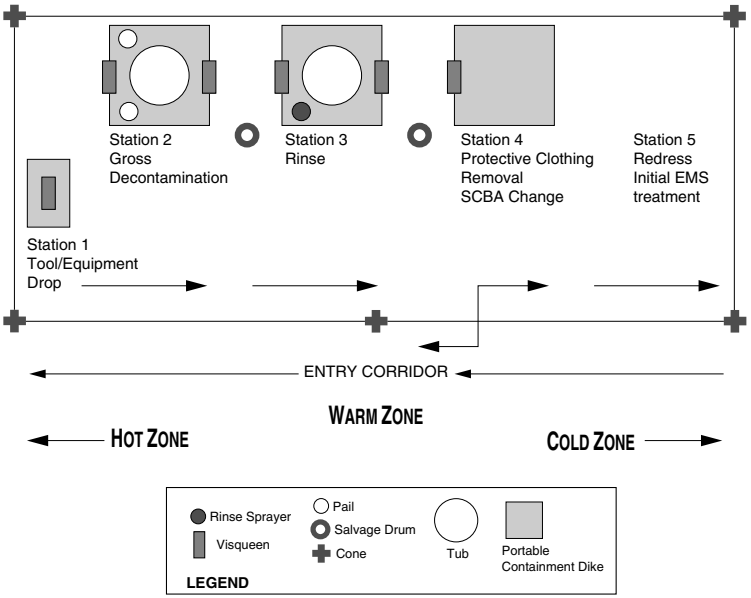
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

MONITORING EQUIPMENT	HAZARD	LEVEL	ACTION
Oxygen Meter	No O_2 or too much O_2	<19.5%	Monitor wearing SCBA with escape bottle. NOTE: combustible gas readings not valid in atmospheres <19.5% oxygen.
		19.5-23.5%	Continue monitoring with caution. SCBA not needed based only on oxygen content.
		>23.5%	STOP monitoring. Fire potential! Consult specialist.
Combustible Gas	Explosion	≥10% LEL	Withdraw immediately!!!!
H_2S Meter	Presence of H_2S	>10 ppm	Use SCBA and have emergency escape breathing apparatus (5 min. minimum).
PID	Total Hydrocarbons	≥500 ppm	SCBA required.
		≥50 to <500ppm	Air-purifying respirator with organic vapor cartridges.
PID	Benzene	≥10 ppm	SCBA required.
		<10 ppm	Full-face air-purifying respirator with organic vapor cartridges.
		<3 ppm	Half-face air-purifying respirator with organic vapor cartridges.
		<0.3 ppm	Continue monitoring with caution.
PID or Colorimetric Tubes	Xylene	>100 ppm	Full-face air-purifying respirator with organic vapor cartridges.
		<100 ppm	Continue monitoring with caution.
Colorimetric Tubes	Methanol	>200 ppm	SCBA required.
		<200 ppm	Continue monitoring with caution.
Colorimetric Tubes or CMS Meter	Organic, inorganic gases, vapors	Depends on chemical	Consult reference manuals for air concentration vs. toxicity data

- During monitoring operations, if the instrument operator is uncertain of the significance of a reading, especially if conditions could be unsafe, a technical specialist should be consulted immediately. Consideration should be given to withdrawing personnel from the area until the Safety Officer's approval is given to continue operations.
- Methanol is present in most oil field chemicals. Examples include scale inhibitor and corrosion inhibitor.

S-6: Decontamination (Pg 1 of 10)

EXAMPLE DECONTAMINATION AREA



Decontamination involves the removal of oil or other contaminants from personnel or equipment after they leave the spill zone. The purposes of decontamination are to:

- Minimize worker contact with contaminants.
- Prevent spread of contaminants to clean areas and exposure to personnel there.
- Remove contaminants from equipment to allow its reuse.

Site classification zones (cold, warm, hot) must be established prior to setting up the decon area. A decon area must be established before response personnel enter the exclusion zone (hot zone). Decon methods should be determined according to the contaminant, PPE used, and environmental conditions at the time (temperature, location, etc.). An appropriate level of PPE should be worn by decon personal to avoid contaminating themselves. All decontamination areas will provide an effective method of decon such as:

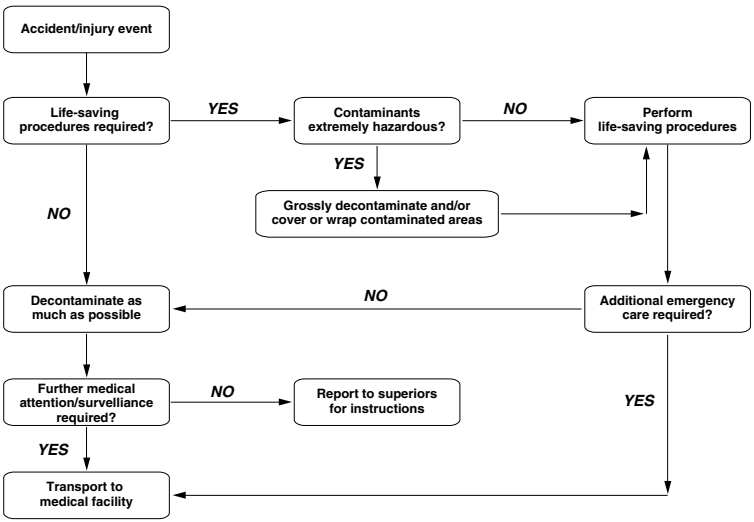
- Dilution
- Absorption
- Chemical degradation
- Isolation and disposal

The decontamination plan must be part of the site health and safety plan.

The decontamination zone is the control point for personnel entering and leaving the spill area. Important issues for decon setup include the following:

- Containment, collection, disposal of contaminated solutions and wastes generated from decon.
- Separate decon setups for heavy equipment and machinery to prevent cross-contamination of personnel.
- Separation of decon stations to prevent personnel cross-contamination.
- Distinct entry and exit points, and physically separated entry paths into contaminated area from clean area and vice versa.
- Procedures for minimum decon for restroom use and medical emergencies.
- Location of medical/first aid stations to avoid exposure to contaminants.

DECISION CHART FOR EMERGENCY DECONTAMINATION



S-6: Decontamination (Pg 3 of 10)

NOTE: *"Base Location" is storage location (may change seasonally); "Mobe Time" is time to get it out of storage, prepare it for operation, and make it ready to travel (concurrent for all equipment); "Deploy Time" is time to make it operational for its intended use at the spill site. These times do not include travel time from base to spill site, which may have multiple components (see Tactic L-3).*

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Wash Tubs	All	Decontamination	≥3	6	0.5 hr	0.5 hr
Portable Decon Berm	All	Decontamination	≥4	—	1 hr	0.5 hr
Galvanized Bucket	All	Decontamination	≥2	—	0.5 hr	0.5 hr
Sprayer	All	Decontamination	≥2	—	1 hr	0.5 hr
Salvage Drum	All	Decontamination	≥2	—	0.5 hr	0.5 hr
Traffic Cone	All	Designate decon area	≥4	—	0.5 hr	0.5 hr
Caution Tape	All	Designate decon area	>2 rolls	—	0.5 hr	0.5 hr
Visqueen	All	Decon area	>1 roll	—	1 hr	1 hr
			TOTAL STAFF	**6**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Oily Waste Dumpster	North Slope Borough	Waste receptacle	1	1 initial	1 hr	0.5 hr
Light Plant	All	Illumination	1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	1 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

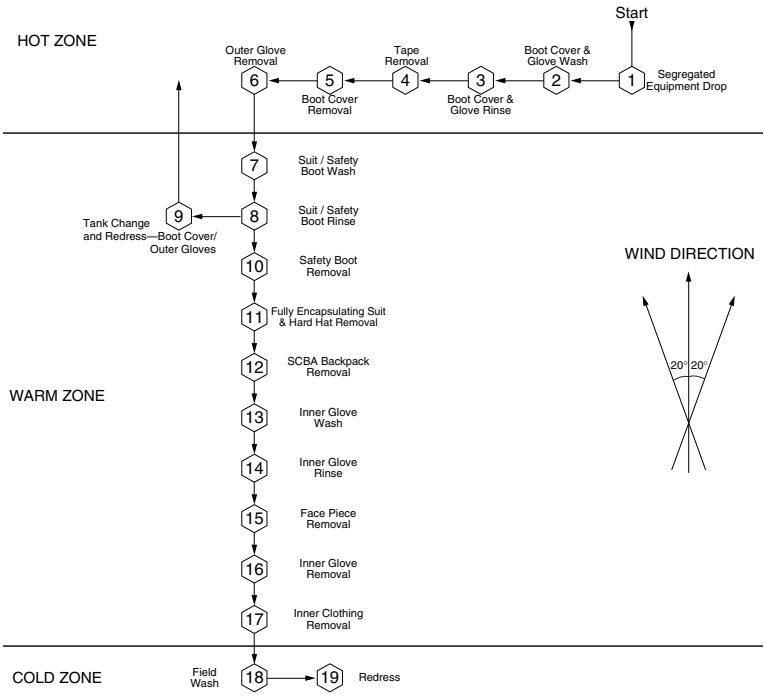
Establish decon work practices to minimize contact with hazardous materials:

- Stress extra steps to avoid contact with or handling of contaminants.
- Wrap sampling/monitoring equipment in disposable see-through plastic bags.
- Use disposable protective clothing and equipment [personal protective equipment (PPE), chemical-protective clothing (CPC)] where possible.
- Use strippable coatings for equipment where possible.
- Use double containerization of contaminated wastes and recovered materials (e.g., plastic liners in overpack drums).
- Inspect all CPC for cuts, tears, punctures, abrasions, and other signs of deterioration.
- Assure proper fastening and sealing of CPC and PPE.
- First-stage decon personnel must wear same, or one lower, level of PPE as cleanup workers.

Resources required for decon and decon setup will depend on the following:

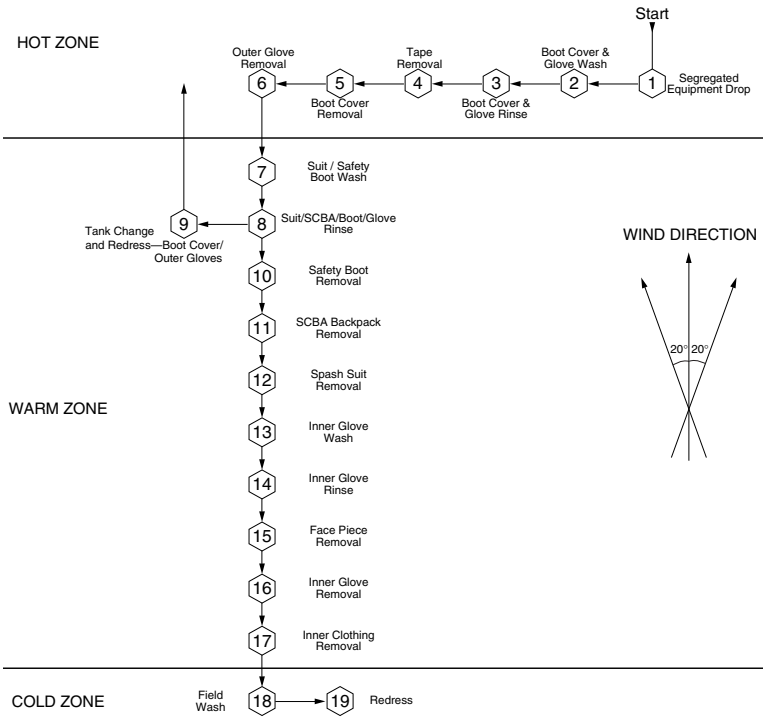
- Availability of potable water, electric power, and waste disposal.
- Mobilization time and duration of site activities.
- Level and type of cleanup and response activity expected at site, and site conditions.
- Available space for decon setup and location requirements for decon line.
- Health hazards presented by contaminants at cleanup/response site.
- Need for additional controls (e.g., vapor diffusion/dispersion, movement/transfer of gross waste).

LEVEL A DECON

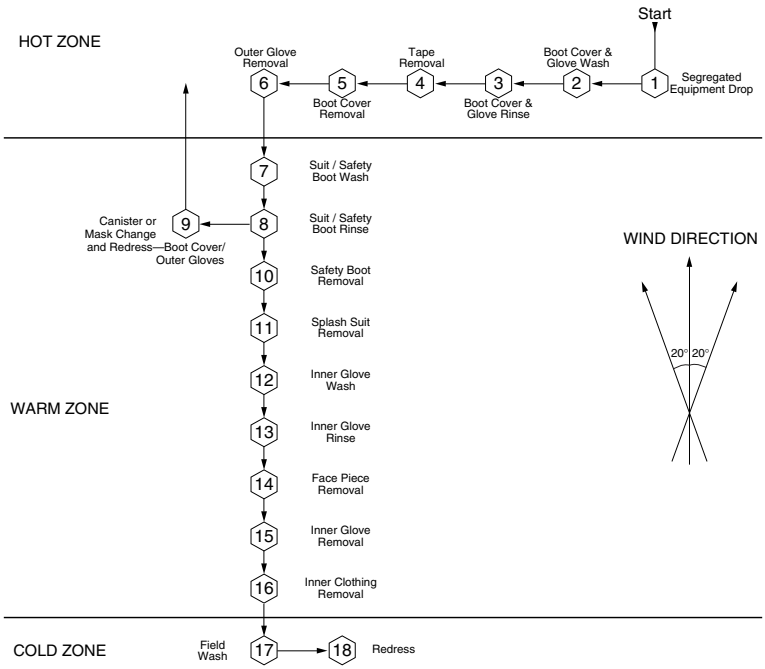


S-6: Decontamination (Pg 5 of 10)

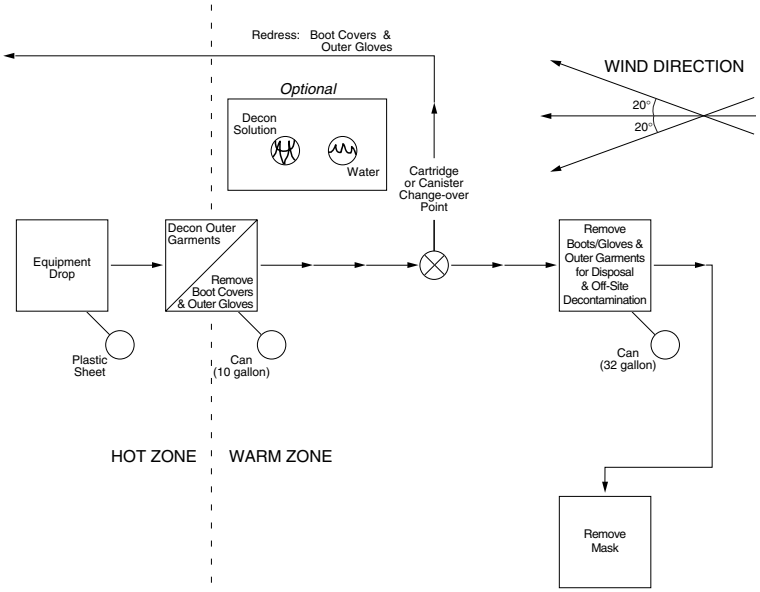
LEVEL B DECON



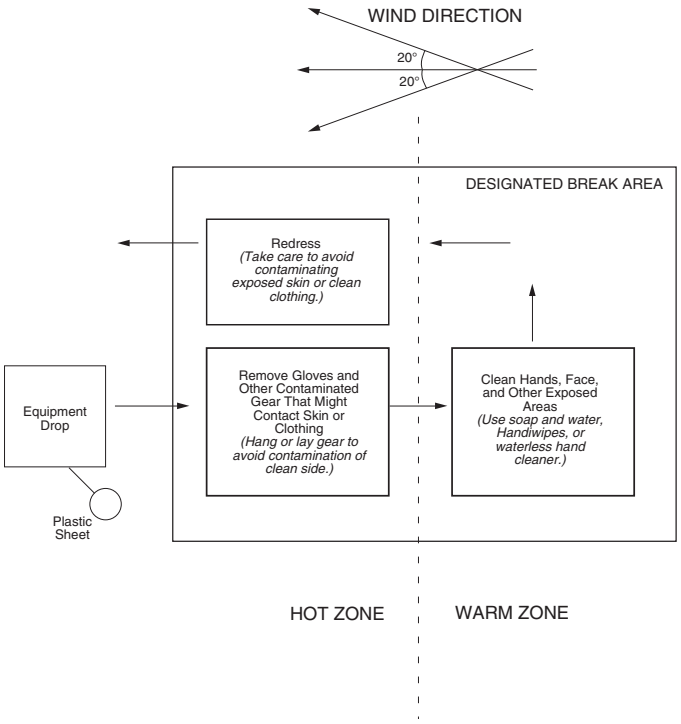
LEVEL C DECON



LEVEL C — MINIMUM DECON



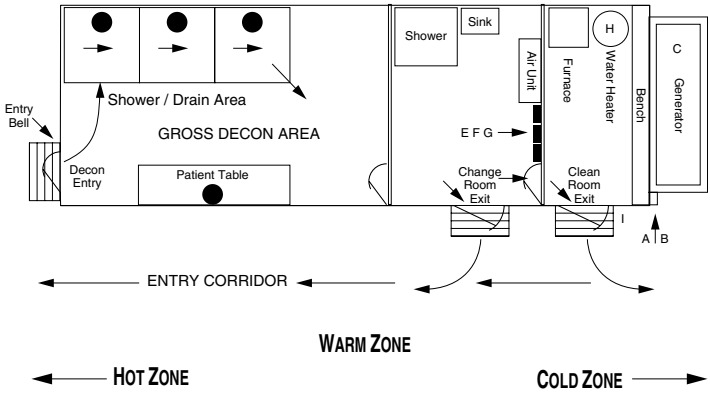
LEVEL C AND D — PARTIAL DECON



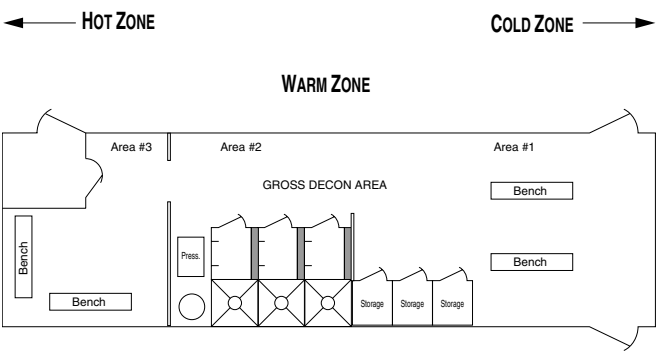
It is not feasible for workers to fully decontaminate each time they take a break from work activity. However, it is necessary that certain gear be removed so that contamination is not spread to clean areas. Hands and other exposed skin must be cleaned so the contamination is not ingested or spread to protected parts of the body or clothing.

Before eating, taking a break, or similar activities, workers should move to the designated break area and partially decontaminate. During the break, take extra care to prevent contamination of unprotected clothing and skin.

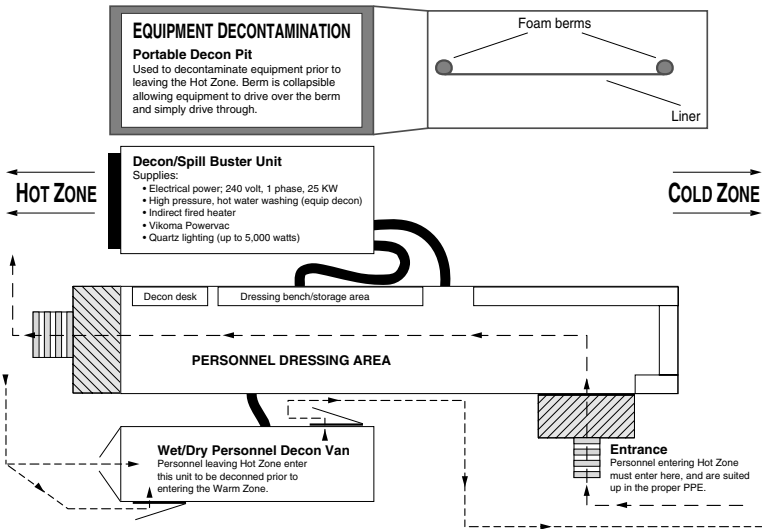
PRUDHOE BAY EOA DECON



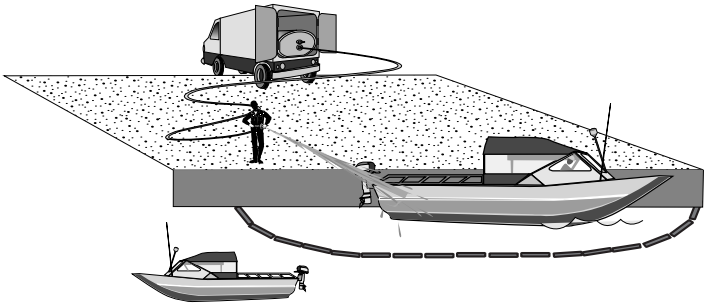
ACS DECON



KUPARUK DECON



S-7: Gross Decontamination of Vessels (Pg 1 of 2)



If required, vessels leaving a work site may be decontaminated. Vessel decontamination at remote sites may be performed adjacent to a floating platform. Sufficient length of boom to surround the vessel being decontaminated is deployed prior to the decontamination process. Boom and absorbent material are used to contain the oil. Decontaminating procedures may include vacuuming, pressure washing or hand-wiping the vessel's hull. Source water may be used to rinse the vessel's hull. As necessary, the decontamination procedures may be repeated to assure a clean hull and deck.

Whenever possible, hand wiping should be conducted as the initial gross decontamination procedure. Efforts should be made to minimize impacts to the environment by limiting, where possible, the use of decontamination methods that result in the re-introduction of oil and/or introduction of rinsate into the water.

A citrus-based cleaning agent approved by ADEC may also be used. Prior to using a specific cleaning agent, for the gross decontamination of vessels on water, where there is potential for introduction of the agent into the water, a Material Safety Data Sheet (MSDS) for that product must be provided to ADEC for review and approval.

Remaining oily residues may be absorbed with sorbents or a recovery system. All recovered oil is stored in suitable containers.

All waste from the decontamination process is transported to a permitted disposal facility. The disposal facility is designated in the incident waste management plan.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Water Truck	All	Water source	2	2	2 hr	0.5 hr
or	Upright Tank	KRU, Alpine	Water Source	1	2	2 hr	1 hr
	Steam Cleaning Unit		Removing oil	1	2	1 hr	1 hr
	Sorbents, oily waste bags, cleaning agents, etc.	All	Removing oil	Variable	2	1 hr	0.5 hr
	Trash Pump (2-inch)	All	Flushing oil	1	2	1 hr	1 hr
	Suction Hose (2-inch)	All	Flushing oil	≥20 ft	—	2 hr	1 hr
	Discharge Hose (3-inch)	All	Flushing oil	>20 ft	—	2 hr	1 hr
	Workboat	All	Tend and deploy boom; serve as work platform	1	2	1 hr	1 hr
	Boom	All	Surround vessel being decontaminated	Variable	—	1 hr	1 hr
				TOTAL STAFF	**6**		

SUPPORT

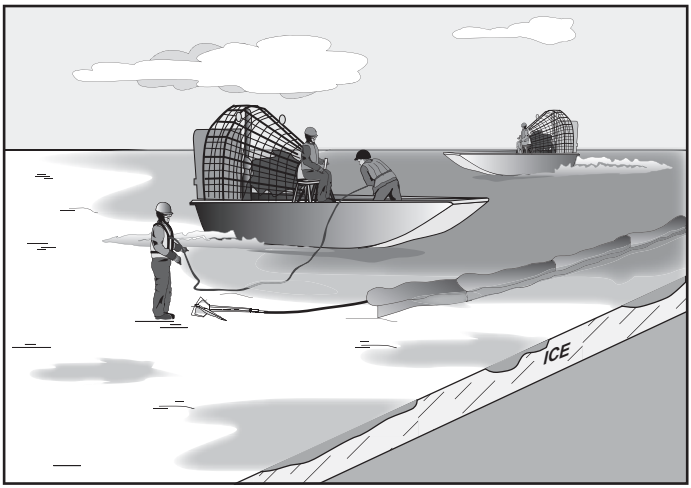
EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Oily Waste Dumpster	North Slope Borough	Waste receptacle	1	1 initial	1 hr	0.5 hr
Light Plant	All	Illumination	1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	1 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

Resources required for decon and decon setup depend on the following:

- Availability of potable water, electric power, and waste disposal.
- Mobilization time and duration of site activities.
- Level and type of cleanup and response activity expected at site, and site conditions.
- Available space for decon setup and location requirements for decon line.
- Health hazards presented by contaminants at cleanup/response site.
- Need for additional controls (e.g., vapor diffusion/dispersion, movement/transfer of gross waste).

S-8: Safety During Ops in Overflood Conditions (Pg 1 of 2)



Each spring, the nearshore Beaufort Sea in the area of ACS operations experiences a phenomenon called "overflood" at the mouths of the major streams. As the ice in the upper reaches of the streams thaws before the lower reaches, water from these streams flows out over the nearshore landfast ice This condition can be hazardous to personnel trying to conduct spill response operations from airboats. The ice under the overflood can be unstable under the weight of the water.

During overflood conditions, personnel should make every attempt to conduct spill response operations while staying onboard the vessels. If it is absolutely necessary for personnel to be on the ice, the following controls should be considered:

- Ice conditions evaluated by a *competent individual* approved by the On-Scene Commander (A *competent individual* is someone who through knowledge, training, and experience has the ability to identify existing and predictable hazards relating to deteriorating ice conditions.)
- Evaluation of weather conditions
- Experienced people only, as approved by the On-Scene Commander
- Lightweight dry suits
- Personal flotation devices
- Harness with tether (man in boat tending line)
- Appropriate footwear (as dictated by specific conditions)
- At least two vessels in the immediate vicinity
- Post-immersion care facility immediately available (warm area, blankets, etc.)
- Emergency medical assistance immediately available
- An immerse evacuation plan will be communicated to all personnel.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Lightweight Dry Suit	ACS	Body protection	≥6	—	1 hr	0.5 hr
Personal Flotation Device	All	Life saving	≥6	—	1 hr	0.5 hr
Harness with Tether	All	Life saving	≥6	—	1 hr	0.5 hr
Footwear	ACS	Traction and foot protection	>6 pair	—	1 hr	0.5 hr
Airboat	All	Transportation and safety	>2	2-3 per boat	1 hr	1 hr

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Shelter	ACS, GPB, Endicott, Alpine, Kuparuk	Warmup/break	2	2 initial*	1 hr*	1 hr
Heater	All	Heat	≥1	1 initial	1 hr	0.5 hr
Light Bank	All	Illumination	>1	1 initial	1 hr	0.5 hr
Fuel Truck	All	Fuel	1	Once per shift	1 hr	0.5 hr
Medical Equipment	All	Life saving	1	—	1 hr	0.5 hr

**Warmup trailers require 2 staff to set up and 0.5 hr to deploy; Weatherports required 3 staff to set up and 1 hour to deploy.*

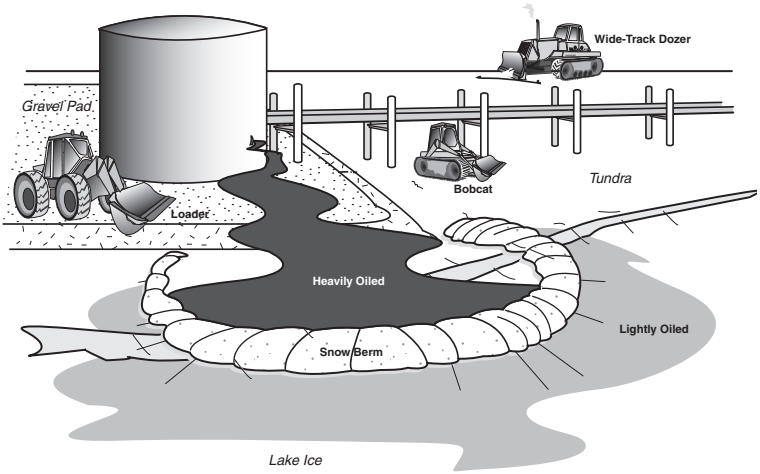
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- The use of cleated footwear. and dry work suits is recommended.

S

CONTAINMENT TACTICS

C-1: Containment Using Snow Berm (Pg 1 of 2)



A snow berm is built around the areas of heaviest oiling to contain oil or diesel spilled to tundra and/or ice in winter. A rubber tracked, wide-track dozer drives around the spill with its blade angled towards the spill, pushing snow into a berm. Once the perimeter has been covered with an initial berm, the dozer shores up areas, as necessary.

A front-end loader could also be used to build a berm, and a Bobcat can be used to access areas the large front-end loader or wide-track dozer cannot reach.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Wide-Track Dozer	All	Snow berm construction	1	1	1 hr	0.5 hr
or	Front-End Loader	All	Snow berm construction	1	1	1 hr	0.5 hr
or	Bobcat	ACS, EOA, KRU, Alpine	As needed	1	1	1 hr	0.5 hr
				TOTAL STAFF	**1**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Transport wide-track dozer	1	1 driver	1 hr	0
Heaters	All	Heat	≥1	1 (initial)	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial set-up, and 1 to check and fuel occasionally.	1 hr	0.5 hr

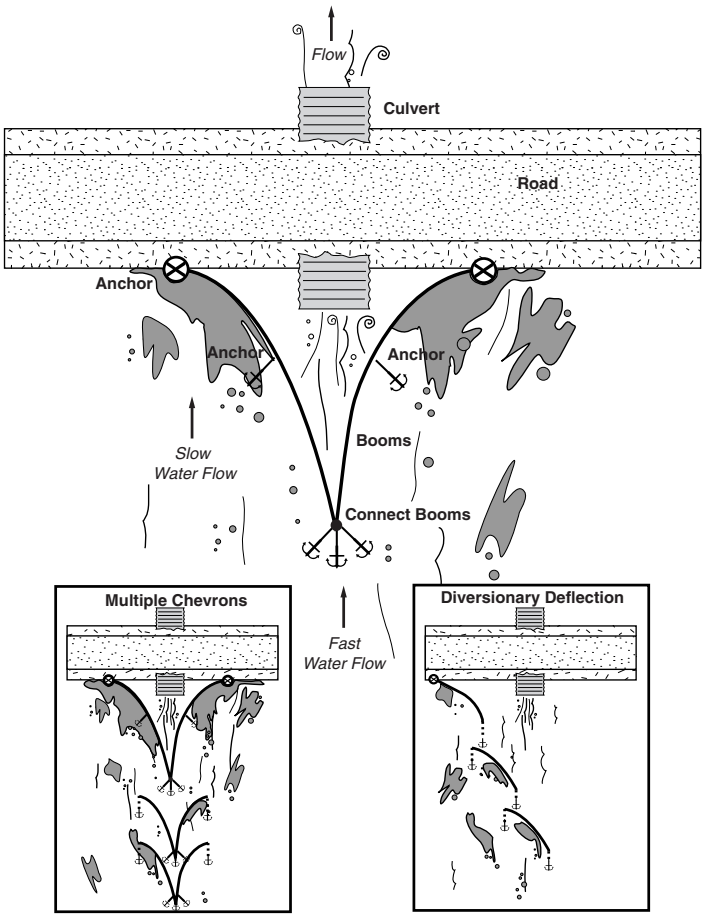
CAPACITIES FOR PLANNING

- A wide-track dozer can build an initial snow berm around the largest tank spill within an hour. Any shoring would take 3 hours or less.
- Normally, a front-end loader can build a snow berm on a pad within 1 hour.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- The wide-track dozer is the most efficient piece of equipment in snow berm construction, and can access tundra and ice-covered lakes. If insufficient snow cover exists, front-end loaders would provide snow for the wide-track dozer.
- When working with equipment around or near flowlines, add a spotter to each front-end loader and wide-track dozer.
- When ice-reinforced, snow berms are useful to contain oil that melts out during breakup.
- A civil work permit from the operator is required for all work on owner-company pads.

C-2: Deflection Booming at a Culvert (Pg 1 of 2)



Boom is deployed in either chevron or diversionary configurations to deflect oil from mouth of culvert to collection sites along the road. This technique is especially useful when there is sheet flow across the frozen tundra. At that time, there is often a violent whirlpool at the upstream opening of a culvert, with lighter currents off to the sides. Blocking the culvert would be inadvisable because of the likelihood of washing out the road. Deadmen are typically used for anchors on the road, and collected oil can be directly pumped to a vacuum truck on the road.

EQUIPMENT AND PERSONNEL

- Select vessels and boom according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Work Boat	All	Containment	2	6	1 hr	3 hr
or Ropes & Pulleys	All	Boom positioning	Variable			
Boom	All	Deflection booming	≥ 50'			
Anchor System	All	Anchor booming	> 2	3	1 hr	
			TOTAL STAFF FOR SETUP	**6**		
			TOTAL STAFF TO MONITOR AND SUSTAIN OPERATIONS	**3**		

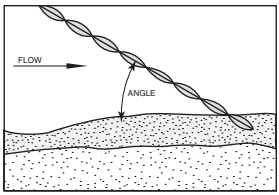
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Bed Truck	All	Transport equipment	1	1	1 hr	0
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr

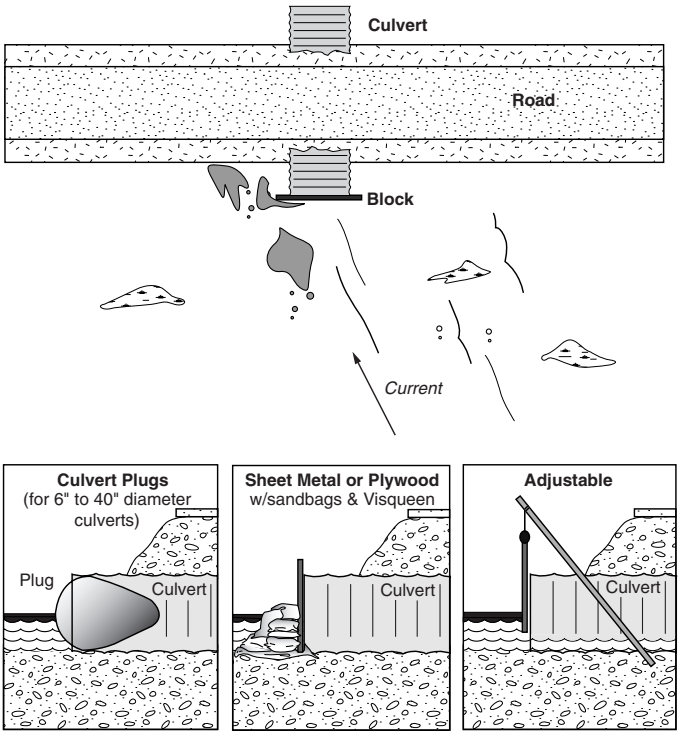
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- 8x6 Delta boom is most commonly used for this tactic.
- The speed of the current perpendicular to the boom must be maintained at 3/4 knot or less to prevent oil loss.
- Number and configuration of booms depend on flow rate and number of collection sites. With any boom system, do not assume 100% containment with one system.
- An assortment of skimmers can be used alongside the roadway. When selecting a skimmer, consideration must be given to oil viscosity, available capacity, and volume of oil to be recovered.

CURRENT (knots)	CURRENT (ft/second)	BOOM ANGLE RELATIVE TO CURRENT REQUIRED TO KEEP COMPONENT OF CURRENT <3/4 KNOT
1.5	2.5	30° to 42°
1.75	2.9	25° to 35°
2.0	3.4	22° to 30°
2.25	3.8	19° to 26°
2.5	4.2	17° to 24°
2.75	4.6	16° to 21°
3.0	5.0	15° to 19°



C-3: Culvert Blocking (Pg 1 of 2)



A culvert is blocked using sheet metal, plywood barriers, or inflatable culvert plugs. Use a full block only when the culvert will be blocked for the entire cleanup operation, if the oil floating on the water will not contaminate additional soil or tundra, and if blocking the water flow will not threaten the road. Otherwise, an adjustable weir should be used.

Plywood and/or sandbags can also be used as culvert blocks, but are more labor-intensive and pose a higher potential for injury. A wood block may require a headwall with kickers oriented to support the boards or plywood. Place the blocking materials over the upstream end of the culvert. Plastic sheeting over the outside of the block will prevent oil penetration.

A MegaSecure dam may also be used if water depth is shallow enough.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Visqueen	All	Containment	≥10 ft	2	1 hr	1 hr
	Inflatable Culvert Plugs	ACS, WOA, Alpine	Containment	1	2	1 hr	2 hr
or	Sheet Metal or Plywood Barriers	All	Containment	1	2	2 hr	2 hr
or	Sandbags	ACS, GPB, KRU, Alpine	Containment	>10	>6*	2 hr	2 hr
or	Gravel	—	Containment	—	—	—	—
or	MegaSecure Dam	ACS/Alyeska	Containment	1	2	1	1
	TOTAL STAFF FOR SETUP				**≥2****		

**Number of personnel depends on number of sandbags needed.*

***The recovery team would conduct monitoring and sustain operations.*

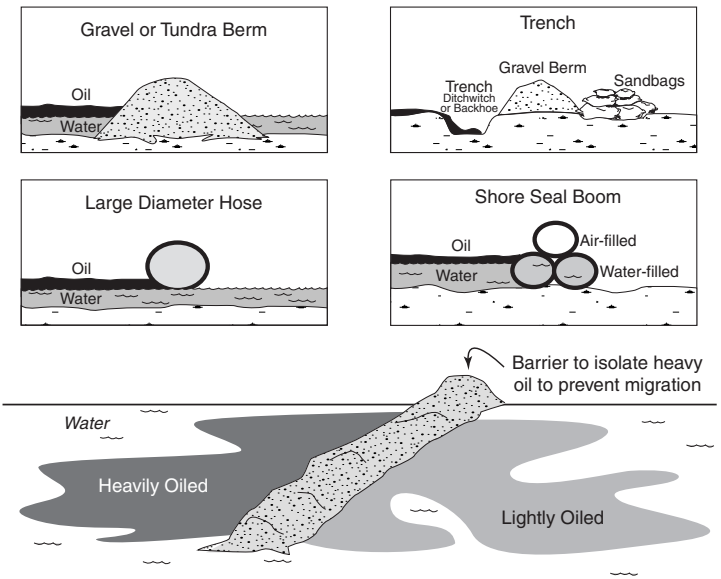
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Air Compressor	All	Inflate culvert plugs	1	1	1 hr	0.5 hr
Front-End Loader	All	Unload sandbags	1	1	1 hr	0.5 hr
Flatbed Truck	All	Transport sandbags	1	1	1 hr	0

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Appropriate during breakup and summer when the flow to the culvert is small enough so that the road won't be washed out.
- Also can be used if high-volume pumps are available to pump water over the road to the other side of the culvert.
- When working with equipment around or near flow lines, a spotter must be added to each front-end loader or wide-track dozer.

C-4: Barriers on Land (Pg 1 of 2)



A containment berm can be constructed of available materials such as earth, gravel, or snow. Use earth-moving equipment or manual labor to construct the berm. Form the materials into a horseshoe shape ahead of the flow of oil. Use plastic sheeting to line the walls of a soil berm to prevent oil penetration. Because of the sorbent quality of snow, it makes an excellent berm for both containment and recovery. A snow berm can be strengthened by spraying it with a fine water mist that forms an ice layer on top of the snow. Sandbags filled with sand or other heavy material also make excellent containment barriers.

Sorbent boom can be used when overland flows are relatively minor or in wetlands. The sorbent boom should be staked in place with stakes approximately 5 feet apart.

These barriers can serve to:

- Contain and stabilize a contaminated area
- Contain or divert oil on water or oil that has potential to migrate
- Create cells for recovery
- Block natural depressions to act as containment areas for recovery

An excavated trench or a berm on the tundra can also be used to intercept the flow of a spill or divert the flow around a sensitive area. Dig the trench at right angles to the flow of the spill. The trench should be angled slightly downslope (in the direction of surface flow) to avoid excessive pooling in the trench. Place excavated material on the downhill side of the trench. In areas with a low water table, line the sides and bottom of the trench with plastic sheeting or similar impermeable materials. Where the groundwater table is high, line the downhill side of the trench. The trench can be flooded with water to inhibit spill penetration into sediments and to stimulate flow toward the recovery device in the trench or pit.

A MegaSecure dam may also be used.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Visqueen	All	Containment	≥10 ft	2	1 hr	1 hr
	Backhoe	GPB, KRU, Peak, AIC, Alpine	Trenching	1	1	2 hr	0.5 hr
or	Bobcat w/Trencher	ACS, KRU, Alpine	Trenching	1	1	1 hr	0.5 hr
or	Front-End Loader w/Bucket	All	Build Berms	1	1	1 hr	0.5 hr
or	Hose (5-inch)	KRU, Alpine	Berm/Contain	≥1 ft	2	2 hr	1 hr
or	Shore Seal Boom	ACS, KRU, MPU, Alpine	Berm/Contain	>50 ft	>4	1 hr	1 hr
or	Sandbags	ACS, KRU, GPB, Alpine	Berm/Contain	>10	>6*	2 hr	2 hr
or	MegaSecure Dam	ACS/Alyeska	Containment	1	2	1	1
			TOTAL STAFF FOR SETUP		**≥3****		

**Number of personnel depends on number of sandbags needed.*

***The recovery team would conduct monitoring and sustain operations.*

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Transport backhoe	1	1 driver	1 hr	0
Fuel Truck	All	Fuel equipment	1	Once per shift	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Water Truck	All	Spray snow berm	1	2	2 hr	0.5 hr
Floating Pump and Blower	ACS, KRU, MPU, Alpine	Shore Seal inflation	1	2	1 hr	1 hr
Plywood	All	Walkway	Variable	2	2 hr	2 hr

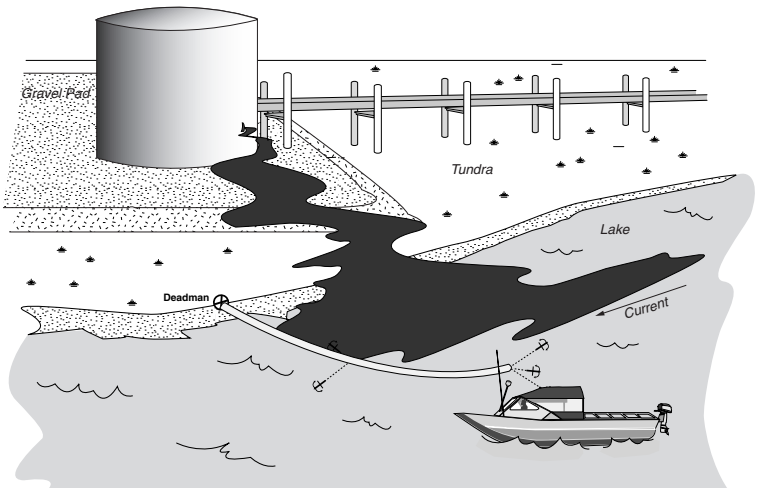
CAPACITIES FOR PLANNING

- During summer, a backhoe can dig a ditch or trench 2 ft deep by 40 ft long in approximately 1 hour.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Disposal of construction material should be taken into account before using this tactic.
- This tactic is appropriate for use with low flow and shallow water on pad or tundra. The least intrusive methods for building berms are preferred on tundra.
- Do not excavate where excavation will cause more damage than the spill. The Bobcat trimmer is the last option for trenching. A permit may be needed from the landowner.
- Before excavating in tundra, check for the presence of groundwater or permafrost. Do not excavate into frost-laden (cemented) soils, since disruption of the permafrost could accelerate thermal erosion. The depth of the trench is limited by the depth of the permafrost. A plastic liner or sheeting can be used on the walls of the soil or gravel berm to inhibit spill penetration into the soils or gravel.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- When working with equipment around or near flow lines, a spotter must be added to each front-end loader.
- A civil work permit from the operator is required for all work on owner-company leases.

C-5: Deflection or Exclusion Boom on Lake or Tundra (Pg 1 of 2)



During breakup and summer, lengths of conventional boom can be deployed on a lake or flooded tundra once there is enough open water available. The boom deployment techniques are the same as those in open water.

The purpose of deflection booming is to divert oil to a collection point for removal with skimmers. It can also be used as exclusion booming to protect lengths of shoreline.

EQUIPMENT AND PERSONNEL

- Select vessels and boom according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Boom	All	Deflection booming	≥50 ft	3	1 hr	3 hr
Work Boat	All	Booming support	1		1 hr	
Anchor System	All	Anchoring boom	Variable	3	1 hr	
			TOTAL STAFF	**3**		

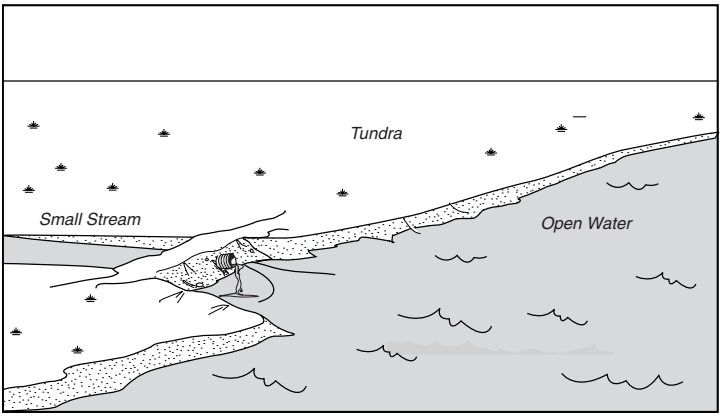
SUPPORT

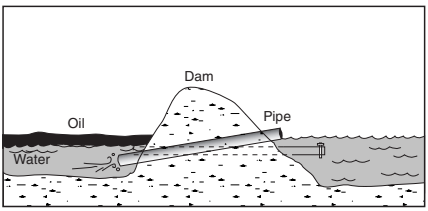
EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, GPB, KRU Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr
Mechanic Support	All	Support Equipment	1	1	1 hr	0.5 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- When working with equipment around or near flow lines, a spotter must be added to each front-end loader.
- A civil work permit from the operator is required for all work on owner company pads.
- SUMMER CONSIDERATIONS:
  - Equipment is same as for breakup (just make sure you're not tearing up the tundra)
  - Prop boats can be used
  - Can use tundra berm or trench after thaw
- FREEZEUP CONSIDERATIONS:
  - No ice under water in ponds
  - Slush ice possible
  - Consider tundra same as in summer
  - Thin ice
- 8x6 Delta boom is most commonly used for this tactic.

C-6: Underflow Dam (Pg 1 of 2)





An underflow dam can be used when there is too much water flow to allow for a complete blockage of a drainage channel. The dam is built of earth, gravel, or other barriers such as sandbags or plywood sheets. A MegaSecure dam may also be used if water depth is shallow enough.

Wherever possible, line the upstream side of the dam with plastic sheeting to prevent erosion and penetration of oil into the dam material.

Underflow dams use inclined pipes to move water downstream while leaving the spill contained behind the dam. The capacity of the pipe (or pipes) should exceed the stream flow rate. It may be necessary to use pumps.

Pipes must be placed on the upstream side of the dam, with the elevated end on the downstream side. Make sure that the upstream end of the pipe is submerged and below the oil/water interface. The height of the elevated downstream end of the pipe will determine the water level behind the dam.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Wide-Track Dozer	All	Dam construction	1 (3 available on Slope)	1	1 hr	0.5 hr
or	Front-End Loader (with bucket and forks)	All	Dam construction	1	1	1 hr	0.5 hr
or	MegaSecure Dam	ACS/Alyeska	Containment	1	2	1	1
or	Sandbags (bulk bags may be used)	ACS, KRU, GPB, Alpine	Dam	Minimum quantity of fill	≥6*	2 hr	2 hr
or	Plywood	All	Liner	>1	2	2 hr	
	Visqueen (reinforced)	All	Dam	1 roll	—	1 hr	
	Pipe, 6-inch or larger	All	Dam	>20 ft	>2	1 hr	
			TOTAL STAFF FOR SETUP		**≥3****		

**Number of personnel depends on number of sandbags needed.*

***The recovery team would conduct monitoring and sustain operations.*

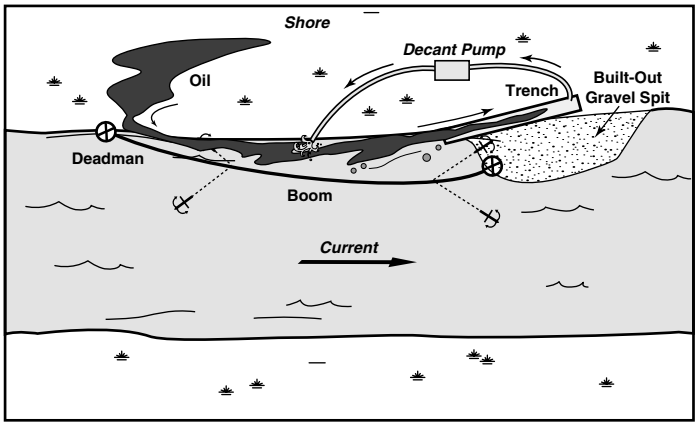
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Transport wide-track dozer	1	1 driver	1 hr	0
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- When working with equipment around or near flowlines, add a spotter to each front-end loader and Challenger.
- Check dams periodically for leakage and integrity, replace eroded materials, and continually monitor the water/oil interface. Valved pipes, pumps, or number of siphons may require periodic adjustment to compensate for minor changes in stream flow.
- If sufficient underflow cannot be maintained or if excessive overflow occurs, additional dams downstream may be required.
- Gravel or topping may have to be added continually to the dam if erosion is a problem.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- Approval of State On-Scene Coordinator and ADF&G is necessary for civil work in anadromous fish streams, as well as a Title 16 permit from ADF&G.
- Damming of stream mouth may block fish passage. Remove dams immediately when no longer needed.
- Sandbags are labor-intensive and should be the last consideration.
- In larger streams, consider the use of bulk bags for dam construction.

C-7: Deadarm Trench on River Bank (Pg 1 of 2)



A natural or man-made deadarm trench can be used along the bank of a river to keep oil from migrating downstream from a spill on land. The deadarm will serve as a control point downstream of where the oil is entering the river. Deflection boom is deployed to help divert the oil into the deadarm, which may be lined with an impermeable liner.

In addition, the entry of oil at the mouth of the deadarm can be controlled with an adjustable weir.

EQUIPMENT AND PERSONNEL

- Select vessels and boom according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Boom	All	Diversion	≥50 ft	3	1 hr	3 hr
Work Boat	All	Booming support	1		1 hr	
Backhoe	GPB, KRU, Peak, Alpine	Trenching	1	1	2 hr	
Anchor System	All	Anchoring boom	Variable	3	1 hr	
Trash Pump (3-inch)	All	Decanting from trench	1	1	1 hr	
Suction Hose (3-inch)	All	Decanting from trench	≥20 ft	2 for setup	1 hr	
Discharge Hose (3-inch)	All	Decanting from trench	>50 ft	—	1 hr	

TOTAL STAFF FOR SETUP **7**

TOTAL STAFF TO MONITOR AND SUSTAIN BOOM CONFIGURATION DURING RECOVERY **3**

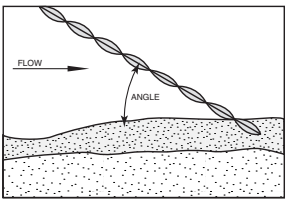
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Haul backhoe	1	1	1 hr	0
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Lube Truck	All	Provides fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

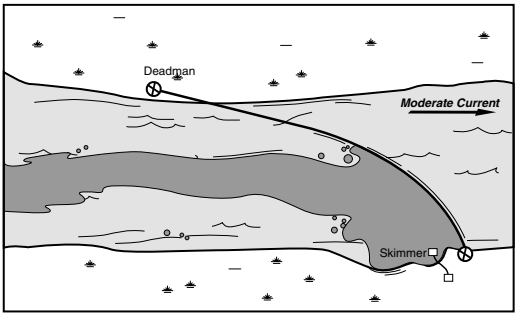
- 8x6 Delta boom is most commonly used for this tactic.
- The angle of the trench to current is important. Keep the current perpendicular to the boom at 3/4 knot or less.
- Oil will follow current along the shore.
- A Title 16 permit from ADF&G is required when digging trenches in river beds and river banks.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- Readjust angles and widths between boom sections as current and wind change. Constantly monitor nearshore boom systems to prevent escape of oil.

CURRENT (knots)	CURRENT (ft/second)	BOOM ANGLE RELATIVE TO CURRENT REQUIRED TO KEEP COMPONENT OF CURRENT <3/4 KNOT
1.5	2.5	30° to 42°
1.75	2.9	25° to 35°
2.0	3.4	22° to 30°
2.25	3.8	19° to 26°
2.5	4.2	17° to 24°
2.75	4.6	16° to 21°
3.0	5.0	15° to 19°

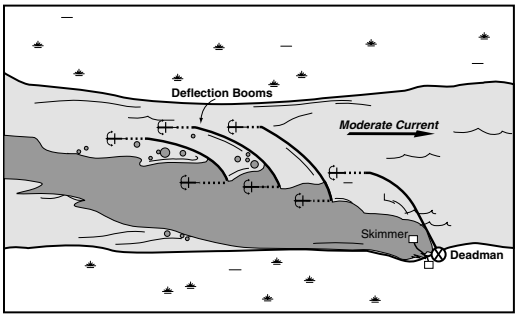


C-8: Deflection Booming in Stream (Pg 1 of 6)

DEFLECTION/DIVERSIONARY (SINGLE BOOM)



DIVERSIONARY (CASCADE)



The object of stream booming is to remove oil from the fastest water and divert it to slower water. A stream can be boomed by deploying the boom either upstream or downstream. In either case, the boom is first set out on the stream bank. Before the boom is deployed, rig anchor points on the boom. The boom is attached to a shore anchor, and then the boom is either towed upstream to a midstream anchor point, or the boom is allowed to drift downstream with the current. Once the boom is set, intermediate anchors are set as needed to ensure that the boom maintains the proper configuration (remembering that the current perpendicular to the boom should not exceed 3/4 knot). Examples of deployment configurations follow.

Diversionary (single boom): A boom is deployed from one bank at an angle to the current and anchored midstream or on the opposite bank for diverting the oil to an eddy or other quiet-water collection point on the shoreline. Alternatively, a single long boom can be used in a multichannel stream to divert oil so that it stays in one channel.

Diversionary (cascade): Several booms are deployed in a cascade fashion when a single boom can't be used because of a fast current or because it's necessary to leave openings for boats to get through. This configuration can be used in strong currents where it is impossible or difficult to deploy one long boom. Shorter sections of boom used in a cascade deployment are easier to handle in fast water. However, more equipment is needed than when a single boom is used.

EQUIPMENT AND PERSONNEL

- Select vessels and boom according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Boom	All	Deflection booming	≥50 ft	6 for setup 3 to maintain	1 hr	3 hr
Work Boat	All	Booming support	2		1 hr	
Anchor System	All	Anchoring boom	Variable		1 hr	

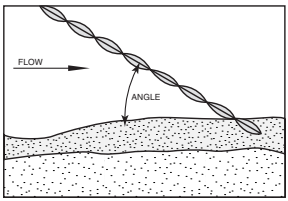
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

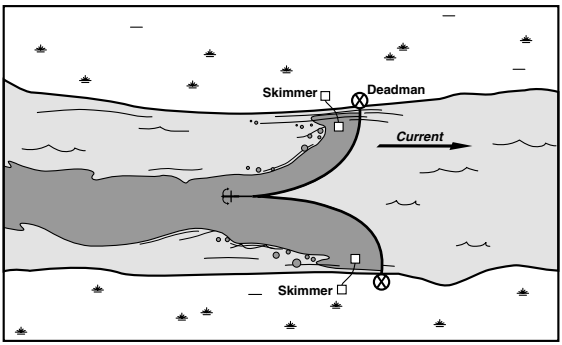
- 8x6 Delta boom is most commonly used for this tactic.
- Since the speed of the current perpendicular to the boom must be maintained at 3/4 kt or less, the length of boom needed to stretch across a stream depends on the current. For a stream 100 ft across with a 1 kt current, a boom approximately 140 ft long is needed. If the current is 2 kt, the same stream would require 320 ft of boom. The speed of the current is not equal across the stream; the fastest water is with the deepest water. Oil moving in a stream will be entrained in the fastest water.
- The shortest length of boom available is 50 ft. Generally, the minimum length required to boom a river such as the Sagavanirktok or Kuparuk is 500 ft.
- Readjust angles and widths between boom sections as current and wind change. Constantly monitor nearshore boom systems to prevent escape of oil.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.

CURRENT (knots)	CURRENT (ft/second)	BOOM ANGLE RELATIVE TO CURRENT REQUIRED TO KEEP COMPONENT OF CURRENT <3/4 KNOT
1.5	2.5	30° to 42°
1.75	2.9	25° to 35°
2.0	3.4	22° to 30°
2.25	3.8	19° to 26°
2.5	4.2	17° to 24°
2.75	4.6	16° to 21°
3.0	5.0	15° to 19°

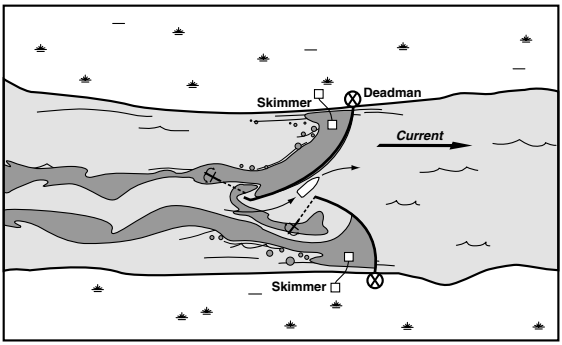


C-8: Deflection Booming in Stream (Pg 3 of 6)

CLOSED CHEVRON



OPEN CHEVRON



Chevron boom configurations are also for use in fast water. Two booms are deployed from an anchor in the middle of the stream and attached to each bank. A chevron configuration is used to break a slick for diversion to two or more collection areas. An open chevron can be used where boat traffic must be able to pass. (The two booms are anchored separately midstream, with one anchor point upstream or downstream of the other).

EQUIPMENT AND PERSONNEL

- Select vessels and boom according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Boom	All	Deflection booming	≥50 ft	9 for setup 3 to maintain*	1 hr	3 hr
Work Boat	All	Booming support	3		1 hr	
Anchor System	All	Anchoring boom	Variable		1 hr	

**Recovery crews can assist with monitoring boom if necessary.*

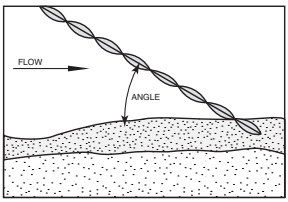
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

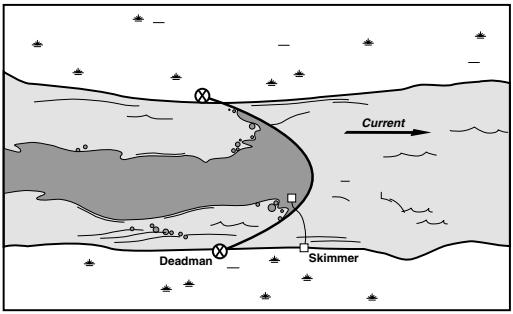
- 8x6 Delta boom is most commonly used for this tactic.
- Since the speed of the current perpendicular to the boom must be maintained at 3/4 kt or less, the length of boom needed to stretch across a stream depends on the current. For a stream 100 ft across with a 1 kt current, a boom approximately 140 ft long is needed. If the current is 2 kt, the same stream would require 320 ft of boom. The speed of the current is not equal across the stream; the fastest water is with the deepest water. Oil moving in a stream will be entrained in the fastest water.
- The shortest length of boom available is 50 ft. Generally, the minimum length required to boom a river such as the Sagavanirktok or Kuparuk is 500 ft.
- Readjust angles and widths between boom sections as current and wind change. Constantly monitor nearshore boom systems to prevent escape of oil.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.

CURRENT (knots)	CURRENT (ft/second)	BOOM ANGLE RELATIVE TO CURRENT REQUIRED TO KEEP COMPONENT OF CURRENT <3/4 KNOT
1.5	2.5	30° to 42°
1.75	2.9	25° to 35°
2.0	3.4	22° to 30°
2.25	3.8	19° to 26°
2.5	4.2	17° to 24°
2.75	4.6	16° to 21°
3.0	5.0	15° to 19°

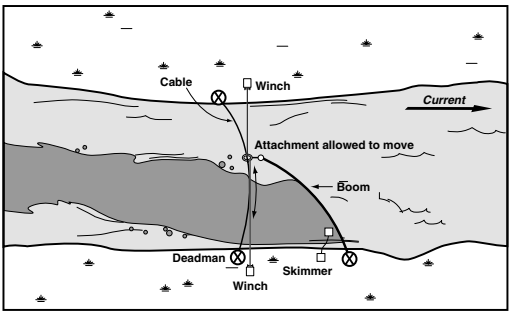


C-8: Deflection Booming in Stream (Pg 5 of 6)

CATENARY



DEFLECTION/TROLLEY



Catenary (currents less than 1/4 knot): The boom is attached to an anchor on one bank, and the other end is towed to the other bank and attached to an anchor there. The current naturally puts the boom in a "U" shape ("catenary"). The deployment and maintenance of a single long boom can be difficult and labor-intensive. It is usually used for recovery operations.

Trolley (cable-supported diversionary boom): A cable or line is strung across a river and the boom attached to the trolley line with a pulley.

EQUIPMENT AND PERSONNEL

- Select vessels and boom according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Boom	All	Deflection booming	≥50 ft	6 for setup 3 to maintain	1 hr	3 hr
Work Boat	All	Booming support	2		1 hr	
Chain Saw Winch	KRU, GPB, Alpine	Booming support	2	4 for setup*	1 hr	
Anchor System	All	Anchoring boom	Variable		1 hr	
Floating Winch	ACS, EOA, Alyeska	Boom support	2		1 hr	

TOTAL STAFF FOR SETUP 10

TOTAL STAFF TO SUSTAIN OPERATIONS 3

**Recovery crews will maintain anchors and winches (see Tactic R-16).*

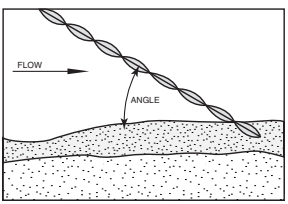
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr

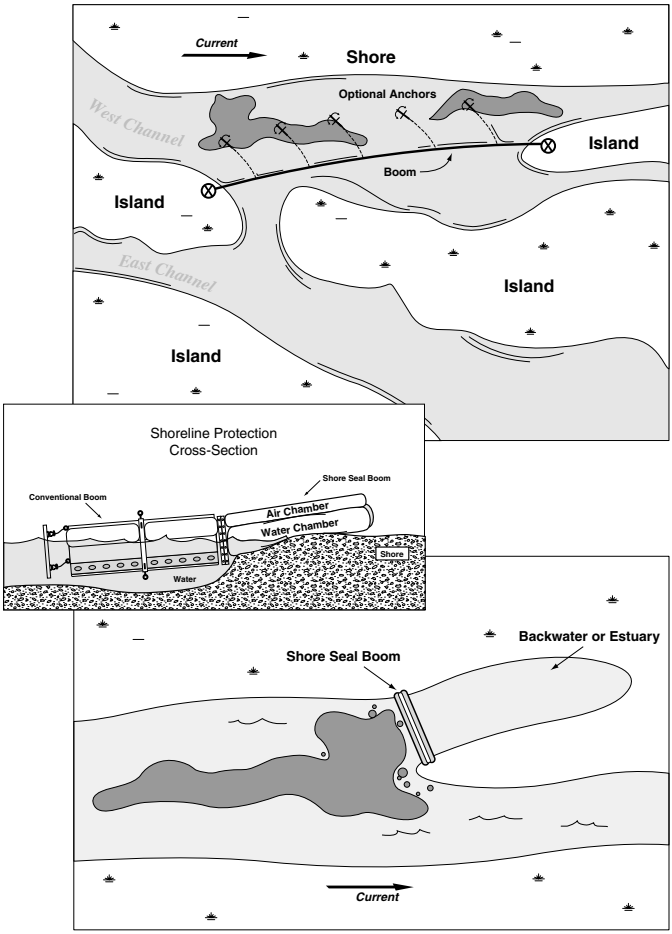
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- 8x6 Delta boom is most commonly used for this tactic.
- Since the speed of the current perpendicular to the boom must be maintained at 3/4 kt or less, the length of boom needed to stretch across a stream depends on the current. For a stream 100 ft across with a 1 kt current, a boom approximately 140 ft long is needed. If the current is 2 kt, the same stream would require 320 ft of boom. The speed of the current is not equal across the stream; the fastest water is with the deepest water. Oil moving in a stream will be entrained in the fastest water.
- A cable extended across the river can be dangerous. Make sure everyone knows it's there and that any approaching boats are warned. Mark the cable with buoys.
- The shortest length of boom available is 50 ft. Generally, the minimum length required to boom a river such as the Sagavanirktok or Kuparuk is 500 ft.
- Readjust angles and widths between boom sections as current and wind change. Constantly monitor nearshore boom systems to prevent escape of oil.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.

CURRENT (knots)	CURRENT (ft/second)	BOOM ANGLE RELATIVE TO CURRENT REQUIRED TO KEEP COMPONENT OF CURRENT <3/4 KNOT
1.5	2.5	30° to 42°
1.75	2.9	25° to 35°
2.0	3.4	22° to 30°
2.25	3.8	19° to 26°
2.5	4.2	17° to 24°
2.75	4.6	16° to 21°
3.0	5.0	15° to 19°



C-9: Exclusion Booming on River (Pg 1 of 2)



Either conventional boom or a Shore Seal boom can be used to exclude oil from a sensitive area. For example, the Shore Seal boom can be used in shallow water to boom off a backwater, or a conventional boom can be placed across the mouth of a side channel to keep oil out. In addition, Shore Seal boom can be connected to conventional boom to protect the shoreline.

EQUIPMENT AND PERSONNEL

- Select vessels and boom according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Boom	ACS, GPB, KRU, Endicott, Alpine	Exclusion booming	≥50 ft	3	1 hr	3 hr
and/or	Shore Seal Boom	ACS, KRU, MPU, Alpine	Exclusion booming	≥50 ft	4	1 hr	1.5 hr
	Work Boat	All	Booming support	1		1 hr	3 hr
	Floating Pump and Blower	ACS, KRU, MPU, Alpine	Shore Seal inflation	1		1 hr	1.5 hr
	Anchor System	All	Anchoring boom	Variable	2	1 hr	3 hr
			TOTAL STAFF FOR SETUP		**≥5**		

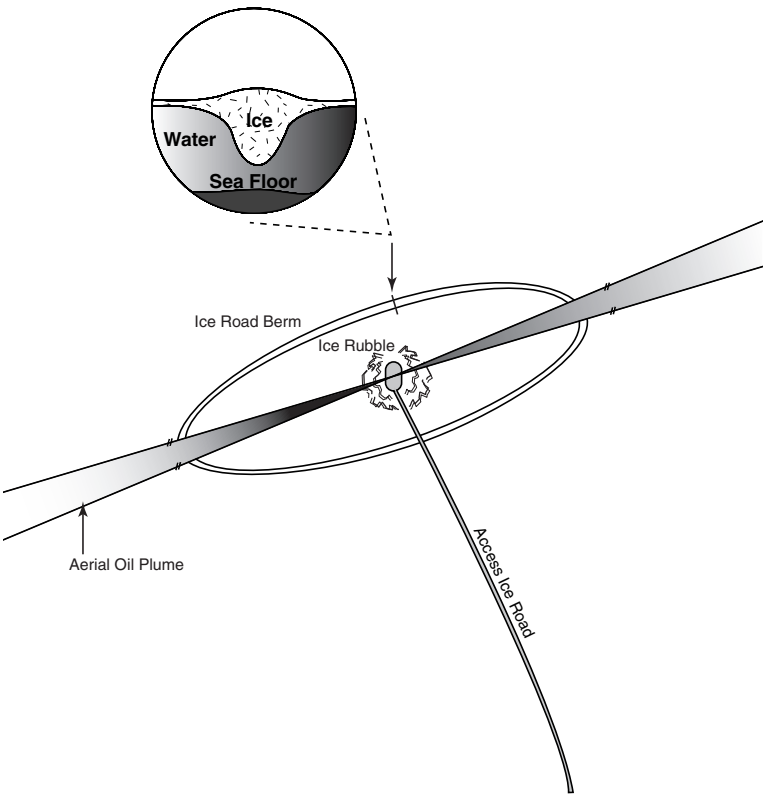
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- 8x6 Delta boom is most commonly used for this tactic.
- Since the speed of the current perpendicular to the boom must be maintained at 3/4 kt or less, the length of boom needed to stretch across a stream depends on the current. For a stream 100 ft across with a 1 kt current, a boom approximately 140 ft long is needed. If the current is 2 kt, the same stream would require 320 ft of boom.
- The speed of the current is not equal across the stream; the fastest water is with the deepest water. Oil moving in a stream will be entrained in the fastest water.
- Don't assume 100% containment with one boom system.
- Readjust angles and widths between boom sections as current and wind change. Constantly monitor nearshore boom systems to prevent escape of oil.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.

C-10: Containment Using Ice Road Ring (Pg 1 of 2)



For a blowout that is depositing oil on top of solid sea ice, an ice road can be constructed around the source at a safe distance. Since the ice road causes the sea ice to deflect downward under the road, an under-ice barrier is created to the movement of any oil that may have gotten under the ice. The road also serves as a surface barrier because it is higher than the surrounding ice, and will provide a working platform into the breakup season, when the ice inside the ring decays.

In addition, ice work pads can be created adjacent to contaminated areas to provide working platforms for heavy equipment needed to remove large volumes of oil-contaminated snow.

An alternative method to create an ice ring barrier is to remove the snow from the ice surface. Ice not covered by snow will grow thicker.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Rolligon w/Auger	CATCO, AES, Peak	Ice road construction	≥2	≥2	6 hr	1 hr
or	Water Truck	All	Ice road construction	≥2	≥2	2 hr	
	Front-End Loader w/Drag	Peak	Ice road construction	>1	>1	1 hr	
or	Grader w/Wing Blade	Peak, AIC, GPB, KRU	Ice road construction	>1	>1	2 hr	
	TOTAL STAFF TO SUSTAIN OPERATIONS			**≥3**			

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	0.5 hr
Heater	All	Equipment support	1	1 initial setup	1 hr	0.5 hr

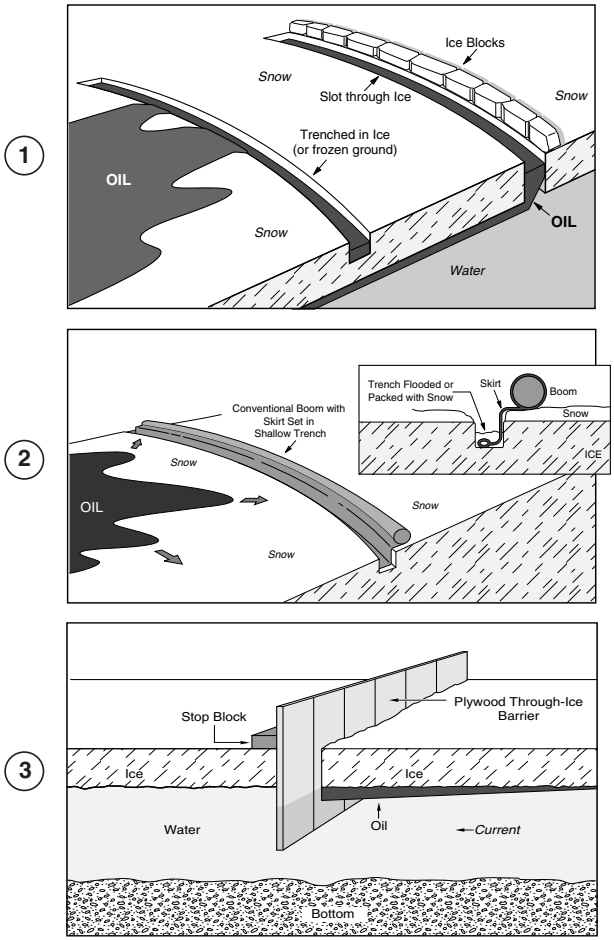
CAPACITIES FOR PLANNING

- A loader with a drag and a water truck hauling fresh water can make approximately one-third mile of ice road 6 inches thick in 12 hours. If the ice is already thick enough to support activities, 6-inch lifts would not be necessary, and the length of ice road completed in 12 hours would increase.
- Rolligons with ice augers can build approximately 3,000 ft of road 4 inches thick in 12 hours using sea water.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Check ice thickness for safe bearing capacity before working on ice. The ice must be sufficiently strong to support personnel and heavy equipment. See Tactic L-7 for realistic maximum operating limitations (RMOL) for ice thickness and temperature.
- If the ice is not thick enough, a Rolligon may be needed to pull the drag.

C-11: Containment on Ice with Trenches and Sumps (Pg 1 of 2)



Various techniques that are used on land can also be used on solid ice. (1) Partial trenches or through-ice slots can be dug in the ice surface with a trencher to encourage oil flow to a collection point. (2) The skirt of a containment boom can be set in a shallow trench to provide additional containment. (3) Another approach is to insert a plywood or metal barrier in a slot so that the barrier freezes in place. This tactic can be used to divert under-ice oil to a recovery point.

For smaller volumes of oil on ice, small snow berms can be created to contain the oil, but only where ice is thick enough and/or grounded to prevent cracking, pooling, and forced migration of oil below the ice.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Trencher	Rental	Trenching	1	2	3 hr	2 hr
or	Rube Witch w/Chain Saw	All	Trenching	3	6	1 hr	
	Visqueen	All	Liner	≥50 ft	—	1 hr	
	Boom	All	Liner	>50 ft	—	1 hr	
or	ATVs	ACS, GPB, END, KRU, Alpine	Snow berm construction	2	2	1 hr	
or	Plywood	All	Through-ice barrier	>1	—	2 hr	
			TOTAL STAFF FOR SETUP		**≥4***		

**The recovery crew will perform maintenance (see Tactic R-13).*

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	0.5 hr
Heater	All	Equipment support	1	1 initial setup	1 hr	0.5 hr

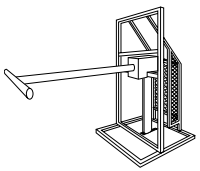
CAPACITIES FOR PLANNING

- A trencher with a 6-ft bar can cut approximately 100 ft of trench per hour through ice 6 ft deep. Cutting in frozen ground is much slower.

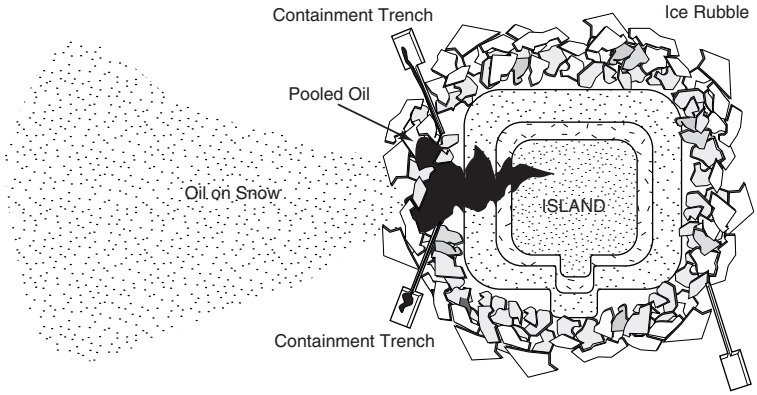
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Check ice thickness for safe bearing capacity before working on ice. The ice must be sufficiently strong to support personnel and heavy equipment. See Tactic L-7 for realistic maximum operating limitations (RMOL) for ice thickness and temperature. Also, ensure ice can withstand extra load of oil and ice on the surface without either breaking the ice or forcing oil to migrate through existing cracks. Extreme care must be taken when positioning or operating any heavy equipment close to trenches or slots in the ice. Stresses in the ice for a given load can double under these situations. Ensure that oil that accumulates in an ice trench is continually removed. If allowed to build up to a thick layer, some oil may escape the ice slot.
- Use of the Rube Witch with chain saw is labor-intensive and therefore slower than a trencher.

ACS Rube Witch



C-12: Trenching Ice to Direct Flow to Containment Point (Pg 1 of 2)



Trenching can help recover oil from a blowout on an offshore island in winter when the sea ice is solid.

Gravel islands develop ice rubble fields around their perimeter, and a large volume of oil from a well blowout plume would fall either on the island or over the rubble field. Where oil is flowing away from an ice rubble pile adjacent to an island where a well is blowing out, it may be possible to dig an ice trench away from the island to encourage rivulets of oil to flow to a collection sump a safe distance away. Liners can be used in both the trench and sump.

Such an activity is attempted only if it is possible to work safely near the blowout plume.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Trencher	Norgasco	Trenching	1	1	3 hr	0.5 hr
or	Rube Witch w/Chain Saw	All	Trenching	1	2	1 hr	0.5 hr
	Backhoe	GPB, KRU, Peak, Alpine	Clear a trench area	1	1	2 hr	0.5 hr
				TOTAL STAFF	**≥2**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Transport Ditch Witch	1	1 driver	1 hr	0
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	0.5 hr
Heater	All	Heat	1	1 initial setup	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr

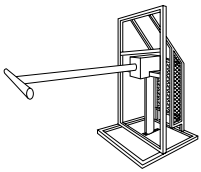
CAPACITIES FOR PLANNING

- A trencher with a 6-ft bar can cut approximately 100 ft of trench per hour through ice 6 ft deep. Cutting in frozen ground is much slower.

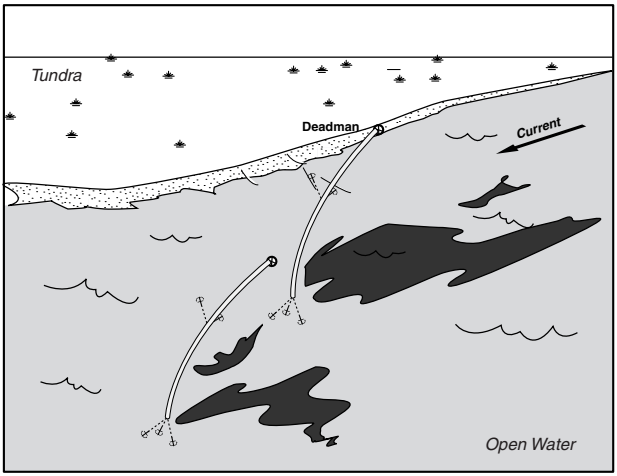
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Check ice thickness for safe bearing capacity before working on ice. The ice must be sufficiently strong to support personnel and heavy equipment. See Tactic L-7 for realistic maximum operating limitations (RMOL) for ice thickness and temperature. Also, ensure ice can withstand extra load of oil and ice on the surface without either breaking the ice or forcing oil to migrate through existing cracks. Extreme care must be taken when positioning or operating any heavy equipment close to trenches or slots in the ice. Stresses in the ice for a given load can double under these situations. Ensure that oil that accumulates in an ice trench is continually removed. If allowed to build up to a thick layer, some oil may escape the ice slot.
- Use of the Rube Witch with chain saw is labor-intensive and therefore slower than a trencher.
- Cut the trench only to a depth that will allow a collection area — not all the way through the ice.
- A backhoe may be required to clear an area for cutting of the containment trench.

ACS Rube Witch



C-13: Deflection Booming in Open Water (Pg 1 of 2)



Deflection booming is often used where the water current is greater than 1 knot or where exclusion boom does not protect the shoreline. Deflection booming diverts oil to locations that are less sensitive or more suitable for recovery.

Boom is anchored at one end at the shoreline, while the free end is held at an angle by an anchor system. Deflection boom is deployed at an angle to the current to reduce and divert surface flow. This allows the oil to move along the boom and eliminates vortexes and entrainment. Anchoring is usually placed every 50 feet depending on the current. Anchoring distance will vary depending on current.

Cascading deflection boom involves two or more lengths of boom ranging from 100 feet to 500 feet placed in a cascading formation in the water. The lead boom deflects the slick, and subsequent booms placed downstream of the lead boom continue the deflection process until the slick is directed to the desired area.

EQUIPMENT AND PERSONNEL

- To determine the approximate length of boom required, multiply 1.5 times the length of shoreline to be protected. Select vessels and booms according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Work Boat	All	Deploy deflection boom	2	6	1 hr	3 hr
Boom	All	Deflection	Variable		1 hr	
Anchor System	All	Anchor boom	Variable	2	1 hr	
Onshore Anchors (e.g., deadmen)	All	Anchor boom	Variable	—	1 hr	

TOTAL STAFF FOR SETUP **8**

TOTAL STAFF TO SUSTAIN OPERATIONS **3 (AND 1 BOAT)**

SUPPORT

- Recovery systems are sometimes used in conjunction with deflection boom.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr

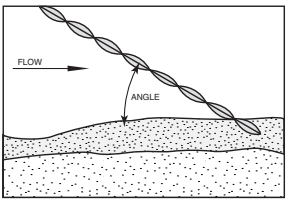
CAPACITIES FOR PLANNING

- One response team can deploy and tend up to 8,000 ft of boom in a 12-hour shift along 2 miles of shoreline (assumes 10 working hours in a 12-hour shift).

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- The optimum angle of boom deployment depends on the current speed and the length and type of boom. The angle is smaller in strong currents than in weak currents and decreases as boom length increases. The more stable the boom is, the larger the optimum deployment angle is for a given current speed. Because deflection booms significantly reduce surface current, successive booms are deployed at increasingly larger angles.

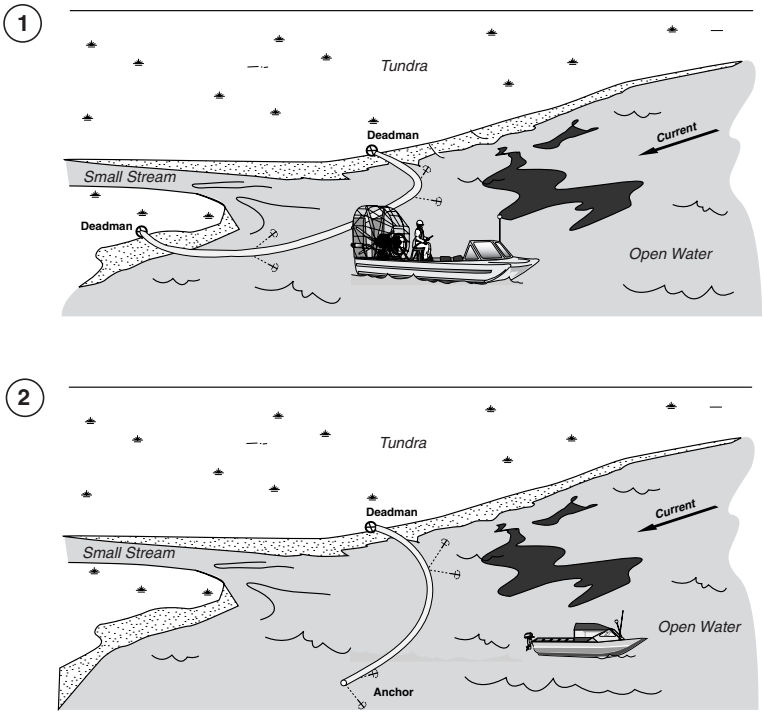
CURRENT (knots)	CURRENT (ft/second)	BOOM ANGLE RELATIVE TO CURRENT REQUIRED TO KEEP COMPONENT OF CURRENT <3/4 KNOT
1.5	2.5	30° to 42°
1.75	2.9	25° to 35°
2.0	3.4	22° to 30°
2.25	3.8	19° to 26°
2.5	4.2	17° to 24°
2.75	4.6	16° to 21°
3.0	5.0	15° to 19°



- Don't assume 100% containment with one boom system.
- Readjust angles and widths between boom sections as current and wind change. Constantly monitor nearshore boom systems to prevent escape of oil.
- In extreme shallow water conditions, sheet metal may be used in lieu of boom in the apex. Use 36 pieces of metal and 37 stakes per 100 ft.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- Below are boom towing limitations for airboats during overflood conditions in the nearshore Beaufort Sea (based on 2005 ACS seasonal recovery testing):

ICE CONDITIONS	FIRE BOOM (20 lb/linear ft)	FIRE BOOM (7 lb/linear ft)	FIRE BOOM (6 lb/linear ft)	DELTA BOOM
Groundfast or Shorefast Ice (with overflood)	100 ft	300 ft	350 ft	750 ft
Broken Ice: Large, Dense, First-Year, Afloat	100 ft	300 ft	350 ft	750 ft
Broken Ice: Smaller, Less Dense, Rotted	200 ft	600 ft	700 ft	1,000 ft

C-14: Exclusion Booming in Open Water (Pg 1 of 2)



Boom is placed across small inlets and creek mouths identified as sensitive areas. Exclusion booming is used where currents are less than 3/4 knot and breaking waves are less than 0.5 foot in height. The boom is either (1) anchored from shore to shore across the mouths of streams or (2) at an angle to a shoreline to guide oil past the sensitive area. Crews with work boats deploy and tend boom along the shoreline in marshes and inlets.

EQUIPMENT AND PERSONNEL

- To determine the approximate length of boom required, multiply 1.5 times the length of shoreline to be protected. Select vessels and booms according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Work Boat	All	Deploy and tend boom	2	6	1 hr	3 hr
Boom	All	Deflection	Variable		1 hr	
Anchor System	All	Anchor boom	Variable		1 hr	

TOTAL STAFF FOR SETUP **6**

TOTAL STAFF TO SUSTAIN OPERATIONS **3 (AND 1 BOAT)**

SUPPORT

- Recovery systems are sometimes used in conjunction with exclusion boom. Sorbent boom may be deployed parallel and inside exclusion boom.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, KRU, GPB, Alpine, Badami (300 gal)	Airboat fuel	1	1 initial	1 hr	0.5 hr

CAPACITIES FOR PLANNING

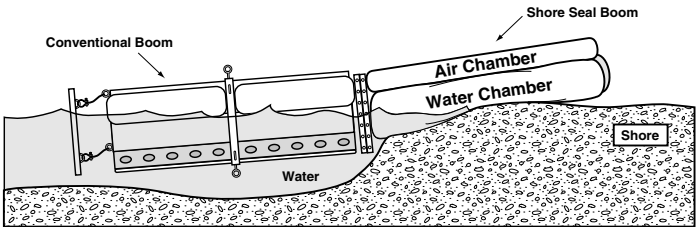
One tactical unit can deploy and tend up to 4,000 ft of boom in a 12-hour shift along 2 miles of shoreline (assumes 1 working hours in a 12-hour shift).

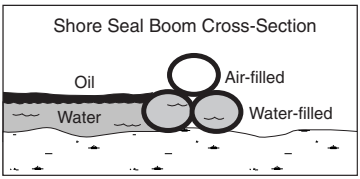
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Exclusion booming is effective if the water currents are less than 3/4 kt, breaking waves are less than 0.5 ft, and water depth is at least twice the boom depth in other than intertidal areas.
- A flexible curtain-type boom reacts more favorably to tidal level fluctuation than a rigid fence-type boom.
- Exclusion booming is most effective across small stream mouths or inlets. Other areas may be more sensitive and require protection, but ability to protect efficiently needs to be considered when determining exclusion booming areas.
- Don't assume 100% containment with one boom system.
- Readjust angles and widths between boom sections as current and wind change. Constantly monitor nearshore boom systems to prevent escape of oil.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- Below are boom towing limitations for airboats during overflood conditions in the nearshore Beaufort Sea (based on 2005 ACS seasonal recovery testing):

ICE CONDITIONS	FIRE BOOM (20 lb/linear ft)	FIRE BOOM (7 lb/linear ft)	FIRE BOOM (6 lb/linear ft)	DELTA BOOM
Groundfast or Shorefast Ice (with overflood)	100 ft	300 ft	350 ft	750 ft
Broken Ice: Large, Dense, First-Year, Afloat	100 ft	300 ft	350 ft	750 ft
Broken Ice: Smaller, Less Dense, Rotted	200 ft	600 ft	700 ft	1,000 ft

C-15: Intertidal Booming (Pg 1 of 2)





Shore Seal boom is bottom-founded and anchored at tideline and in very shallow water. Sorbent boom would be used at connections to prevent leaching.

EQUIPMENT AND PERSONNEL

To determine the approximate length of Shore Seal boom required, multiply 1.1 times the length of shoreline to be protected. Select vessels and booms according to area, water depth restrictions, and function (see Tactic L-6).

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Shore Seal Boom	ACS, KRU, MPU, Alpine	Oil exclusion	≥50 ft	4	1 hr	1.5 hr
Floating Pump and Blower	ACS, KRU, MPU, Alpine	Shore Seal inflation	1		1 hr	
Work Boat	All	Boom placement	1		1 hr	
Anchor System	All	Anchor boom	Variable		1 hr	
		TOTAL STAFF FOR SETUP		**4***		

**Recovery crews will perform maintenance.*

SUPPORT

Sorbents are used in conjunction with Shore Seal boom. Shovels or light excavating equipment help establish onshore anchors. Floats and chains are used in conjunction with offshore anchors.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 initial	1 hr	0.5 hr

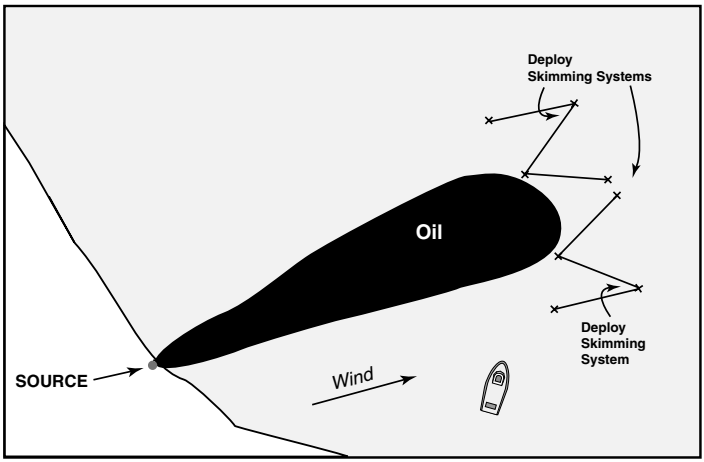
CAPACITIES FOR PLANNING

- One response team can deploy and tend up to 1,000 ft of Shore Seal boom in a 12-hour shift.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Shore Seal boom uses water ballast so that it can float free in high tide and seal to the intertidal shore during low tide. Shore Seal booms also protect shoreline from wave events. Shore Seal boom will adjust to changing water levels.
- When the boom is grounded, the heavy water ballast seals the boom to the shoreline and prevents oil from moving along the intertidal zone.

C-16: Anchored W Deflection Boom (Pg 1 of 2)



Lengths of deflection boom are anchored in a "W" configuration. Boom sections up to 1,000 feet long are oriented at an angle to the wind and to each other. Oil encountering the center "V" of the boom becomes more concentrated at the downwind end of the configuration and is recovered with a positioned skimming system. Oil is collected from the pockets of the "V"s with a vessel with a skimmer and mini-barge.

See Tactic R-30 for boom configuration for subsea pipeline leak.

EQUIPMENT AND PERSONNEL

- Initial deployment of a section of boom and setting of anchor points involve one boat with one operator and two crew members. Select vessels and boom according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Boom	All	Spill deflection	≥300 ft	9 for setup 6 to maintain	1 hr	6 hr
Work Boat	All	Deploy and tend boom	3 for setup 2 to maintain		1 hr	
Anchor Systems	40-lb: All 66-lb: ACS	Anchor boom	Variable		1 hr	

SUPPORT

- An aircraft can track oil from above and coordinate the on-water task forces.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Fuel Truck	All	Fuel	1	Once per shift	1 hr	0.5 hr

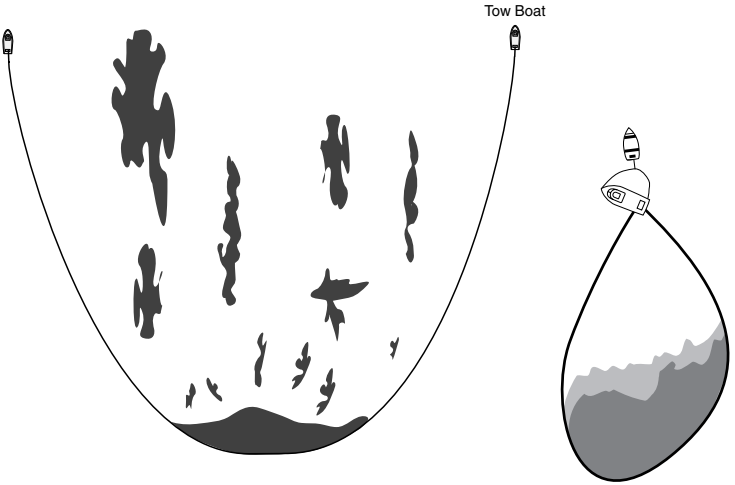
CAPACITIES FOR PLANNING

- Swath width varies with currents, wind, and the total length of booms.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Check anchor points frequently and reposition them as necessary by lifting the crown line.
- Change the length and position of the boom as conditions change.
- See recovery tactics for information on recovery equipment used with this tactic.

C-17: Containment Using U Boom (Pg 1 of 2)



The containment boom has a swath width of up to 1,000 feet. The two tow boats pull up to 3,000 feet of boom. This method can be used for temporary containment and/or transport of oil.

EQUIPMENT AND PERSONNEL

- Select vessels and booms according to area, water depth restrictions, and function (see Tactic L-6).

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Work Boat	All	Tow boom	2	6	1 hr	2 hr
Boom	All	Containment	Variable	—	1 hr	
			TOTAL STAFF	**6**		

SUPPORT

- An aircraft tracks the oil from above and coordinates the on-water task forces (preferably twin-engined aircraft or single-engined aircraft on floats).

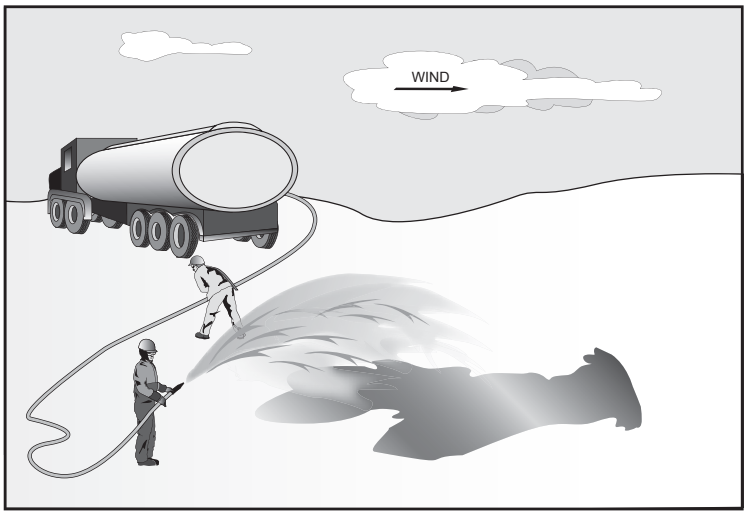
CAPACITIES FOR PLANNING

- Swath width varies with currents, wind, and the total length of boom.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- See recovery tactis for information on recovery equipment used with this tactic.

C-18: Contain Light Layer of Oil on Snow w/Water Spray (Pg 1 of 2)



An area of lightly oiled snow can be stabilized for recovery by spraying a light water mist onto the contaminated snow to coat it with a thin layer of ice.

EQUIPMENT AND PERSONNEL

- The number of staff to erect snow fencing depends on the size of the contaminated area.

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Water Truck	All	Water source	1	2	2 hr	0.5 hr
or	Upright Tank (400 bbl)	KRU, Alpine	Water source	1	2	2 hr	1 hr
or	Ice Auger (when appropriate)	All	Water source	1	2	1 hr	0
	Trash Pump (2-inch)	All	Spraying system	1	2	1 hr	1 hr
	Suction Hose (2-inch)	All	Spraying system	≥20 ft		2 hr	1 hr
	Discharge Hose (1- or 2-inch)	All	Spraying system	>50 ft		1 hr	1 hr
	Spray Nozzle	ACS	Spraying system	>1		1 hr	1 hr

TOTAL STAFF 4 to 6*

**If an ice auger is used to obtain water from a surface water source, 2 staff are needed to operate the auger.*

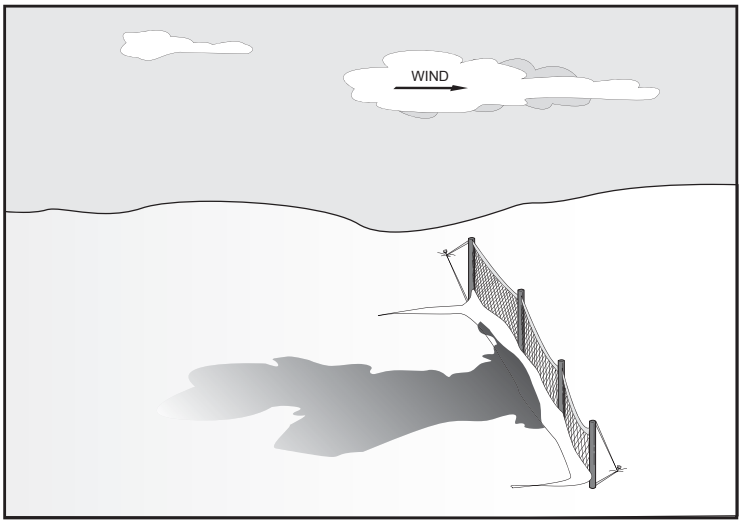
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Heater	All	Support heavy equipment	≥1	1 initial setup	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Light Plant	All	Illumination	>1	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Covering lightly oiled snow with a thin layer of ice is a viable option only when air temperatures permit.
- A “Y” valve may be used to operated two nozzles at the same time.
- A fire truck can be used to replace the equipment systems identified above since the fire truck contains the water source and spray equipment. Personnel, mobe time, and deploy time would remain the same.

C-19: Contain Light Layer of Oil on Snow w/Snow Fence (Pg 1 of 2)



A snow fence can be erected on the downwind side of lightly oiled snow to keep the wind from spreading the contaminated snow before being recovered.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Snow Fencing	ACS, KRU	Containment	Varies	≥2*	2 hr	Varies
T-Post Driver	ACS, KRU	Support fence	Varies			
T-Posts	ACS, KRU	Support fence	Varies			
Wire Ties	ACS, KRU	Support fence	Varies			

*The number of staff to erect snow fencing depends on the size of the contaminated area.

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Snow machine or ATV with trailer	All	Haul equipment	Varies	2	0.5 hr	Varies

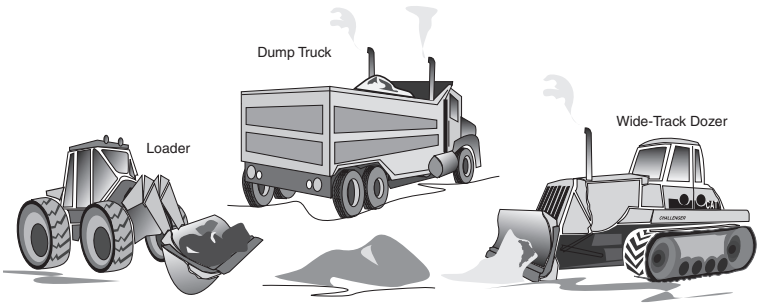
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- A temporary snow fence can be as long as needed to effect containment. The fence should be placed far enough downwind of the spill to collect drifting and migrating oiled snow. The fence should be at least 4 ft high, but can be made up to 8 ft high by double-stacking ACS' plastic 4-ft fence. The fencing itself should have at least 50% porosity. Tighten the fence as much as possible, and use T-posts, rebar, or survey lath for temporary fence posts.
- This tactic is based on information from *Controlling Blowing and Drifting Snow with Snow Fences and Road Design.* Prepared by Ronald D. Tabler, Tabler and Associates, Niwot, CO, for the National Cooperative Highway Research Program, Transportation Research Board of the National Academy. August 2003.

C

RECOVERY AND STORAGE TACTICS

R-1 Mechanical Recovery of Lightly Oiled Snow (Pg 1 of 2)



Snow provides a good sorbent material for oil and forms a mulch-like mixture that is easily removed with heavy equipment such as front-end loaders and dump trucks.

A wide-track dozer and front-end loader pile the snow, and then a loader loads it into dump trucks on nearby gravel pads, roads, or ice roads. After a loader has filled a truck, the truck hauls the oiled snow off for disposal. A Bobcat would replace the front-end loader in hard-to-reach or tight quarters.

If nearby heavily oiled snow needs blending to ease recovery, then loaders and dozers may be used to push the lightly oiled snow into the heavily oiled snow area. Mixing the lightly oiled snow with the heavily oiled snow would generate less waste.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Wide-Track Dozer	All	Piling oiled snow	1	1	1 hr	0.5 hr
Front-End Loader	All	Transfer oiled snow into dump trucks	1	1	1 hr	0.5 hr
Dump Truck	GPB, KRU, Peak, CH2M Hill, Alpine	Transfer oiled snow to disposal site	≥2*	≥2	1 hr	0.5 hr

**Number of dump trucks depends on distance to disposal area.*

TOTAL STAFF ≥ 5

(includes 1 spotter that works with equipment to protect tundra)

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Transport wide-track dozer	1	1 driver	1 hr	0
Heater	All	Heat	≥1	1 initial setup	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support heavy equipment	1	1	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr

CAPACITIES FOR PLANNING

- One cubic yard of lightly oiled snow contains 0.3 bbl of oil. Snowmelters can typically handle 30 cubic yd of lightly oiled snow per hour.
- A wide-track dozer can build an initial snow berm around the largest tank spill on the Slope within an hour.
- A front-end loader with an 8-cubic-yd snow bucket can move 500 cubic yd of snow in an hour and fill a dump truck in 10 minutes. See Tactic L-6, Table 9A, for capacities of dump trucks available on the North Slope.
- Following is an example of recovery of lightly oiled snow for one 20-cubic-yd dump truck, with 2 miles between load and unload points:

$$\textit{Dump Truck Recovery Rate} = \frac{T_c}{L_t + T_t + U_t} = \frac{20 \text{ cubic yd}}{0.17 \text{ hr} + \left(\frac{2 \text{ mi} * 2}{35 \text{ mph}}\right) + 0.08 \text{ hr}} = 55 \text{ cubic yd/hr (or 16.5 bbl/hr)}$$

Where:

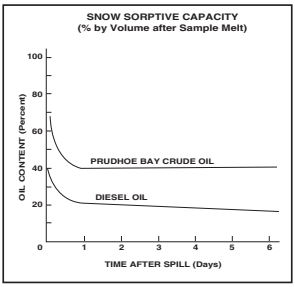
T_c = *Truck Capacity*

L_t = *Load Time (10 min or 0.17 hr)*

U_t = *Unload Time (5 min or 0.08 hr)*

T_t = *Travel Time* $\left(\frac{\text{miles to disposal} * 2}{35 \text{ mph}}\right)$

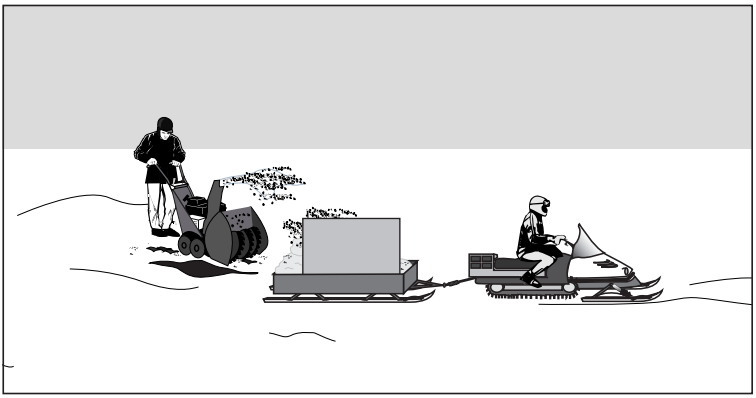
The ratio of dump trucks to loaders to fill trucks without delay = 1 / (0.17 hr + 0.114 hr + 0.08 hr) = 1 / (0.364) = 2.7 trucks per loader.



DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- This tactic is limited to oiled snow with no free liquids. Collect the top 6 inches of snow into piles for recovery. If snow cover is light or the snow will be used for blending, collect all of the snow.
- When working with equipment around or near flowlines, add a spotter to each front-end loader or wide-track dozer.
- An ice road allows dump trucks into recovery sites on tundra.

R-1A Use Snowblower to Remove Lightly Misted Snow (Pg 1 of 2)



Lightly misted snow can be cleaned up using a snow blower and snow machine with trailer. The snow can be cleaned up either directly off of the ground or by using brooms to sweep oiled snow into windrows for more effective recovery. Once the trailer is full, it is transferred by snow machine to a front-end loader on the gravel pad or road. The loader then transfers the snow into dump trucks on the pad or road.

EQUIPMENT AND PERSONNEL

- Crew size consists of two sweepers, a snow blower operator, and a snow machine operator. The number of crews will not exceed the number of snow blowers available.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Shovel and Broom	All	Recovery	Variable	—	0.5 hr	0.5 hr
Snow Machine with Trailer	All	Transfer	3	3	1 hr	
Snow Blower	ACS, Badami, Northstar, Alpine	Recovery	1	1	1 hr	
Front-End Loader (8-cubic-yd)	All	Transfer	1	1	1 hr	
Dump Truck	GPB, KRU, CH2M Hill, Peak, AIC, Alpine	Transfer	≥2	≥2	1 hr	
			TOTAL STAFF	**≥7**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	0.5 hr
Heater	All	Heat	1	1 for initial setup	1 hr	
Fuel Trailer	All	Fuel	1	1 for initial setup	1 hr	

CAPACITIES FOR PLANNING

- Snow machine trailers have a 1/2 cubic yd capacity.
- Snowmelters typically handle 30 cubic yd of lightly oiled now per hour, providing 30 bbl/hr of water, plus the oil.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- This tactic is limited to oiled snow with no free liquids.
- The number of crews on the spill depends on the size of the spill.
- Lightly oiled snow may be blended with heavily oiled snow in the area to enhance recovery.
- Warm-up areas are needed for responders.

R-2 Manual Recovery of Lightly Oiled Snow (Pg 1 of 2)

Broom and shovel the oiled snow into piles. The piles are then transferred with shovels to garbage cans, totes, or similar containers. Once a container is full, it is transferred with a snow machine or Argo to a front-end loader near the gravel pad or road. The loader then transfers the snow into dump trucks on the pad or road.

EQUIPMENT AND PERSONNEL

- Crew size consists of six shovelers, and the number of crews varies with the size of the spill.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Shovel and Broom	All	Recovery	6	6	0.5 hr	0.5 hr
Snow Machine or ATV	All	Transfer	3	3	1 hr	
Front-End Loader	All	Transfer	1	1	1 hr	
Dump Truck	GPB, KRU, Peak, AIC, CH2M Hill, Alpine	Transfer	1	1	1 hr	
			TOTAL STAFF	**11 (10 if dump-truck operator loads truck)**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr
Heater	All	Heat	1	1 initial	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr

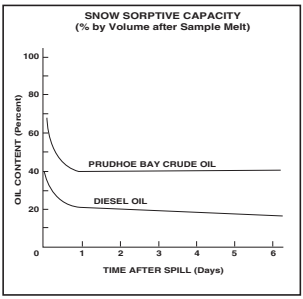
CAPACITIES FOR PLANNING

- With 6 workers, this technique can recover 30 cubic yd of snow in 10 hours (10 hours worked in a 12-hour shift), depending on weather and terrain. In cold weather a typical 12-hr work shift provides 8 labor hours from a shoveler. Because lightly oiled snow contains 0.3 bbl of oil per cubic yd of snow, one crew of 6 can recover 9 bbl of oil in 10 hours, or 0.9 bbl/hr oil.

$$30 \text{ cubic yd snow} \times \frac{1 \text{ cubic yd water}}{10 \text{ cubic yards snow}} = 3 \text{ cubic yd liquids}$$

$$3 \text{ cubic yd liquids} \times \frac{27 \text{ cubic ft}}{1 \text{ cubic yd}} \times \frac{1 \text{ bbl}}{5.6 \text{ cubic ft}} = 14.5 \text{ bbl liquids}$$

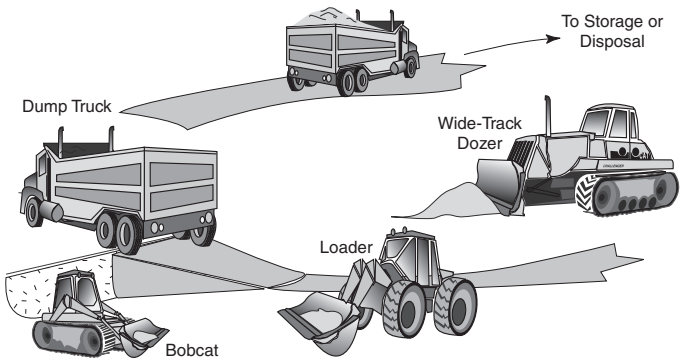
$$\frac{30 \text{ cubic yd snow}}{14.5 \text{ bbl liquids}} \approx 2 \text{ cubic yd snow per bbl of liquids}$$



DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- This tactic is limited to oiled snow with no free liquids.
- When working with equipment around or near flowlines, add a spotter to each front-end loader.
- Manual recovery is the preferred technique when working in tight areas, when the ground is too rough for equipment, or there is insufficient snow cover for equipment.
- The number of crews on the spill depends on the size of the spill.
- The lightly oiled snow may be blended with heavily oiled snow in the area.
- Snowmelters typically handle 30 cubic yd of lightly oiled snow per hour, providing 14.5 bbl/hr of water, plus the oil.
- Warm-up areas are needed for responders.

R-3 Recovery of Oil-Saturated Snow (Pg 1 of 2)



Snow provides a good sorbent material for oil and forms a mulch-like mixture that is easily removed with heavy equipment such as front-end loaders and dump trucks. A Bobcat replaces the front-end loader in hard-to-reach or tight quarters.

Access the oiled snow with dozers and loaders, pile the snow with the dozers, and then load it into dump trucks located on nearby gravel pads, roads, or ice roads. After a front-end loader has filled a truck, the truck hauls the oiled snow off for disposal, typically to snowmelters in lined pits. If heavily oiled snow needs blending to ease recovery, loaders and dozers push nearby lightly oiled snow into the heavily oiled snow area for recovery. Clean snow can also be used for blending.

Oil in areas inaccessible by vacuum trucks or heavy equipment is recovered with sorbents and manual labor. The sorbents are collected in totes, garbage cans, or bags and transferred with snow machine, ATVs, or pickup truck to a front-end loader, which transfer the waste into a dump truck for removal and disposal. Sorbents must be placed in oily waste bags and then put in an oily waste dumpster.

EQUIPMENT AND PERSONNEL

- A dump truck requires one operator. Personnel numbers deploying and collecting sorbents vary with the size and configuration of the spill. Personnel typically work in pairs for sorbent deployment and recovery.

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Wide-Track Dozer	All	Piling oiled snow	1	1	1 hr	0.5 hr
	Front-End Loader	All	Transfer oiled snow into dump trucks	1	1	1 hr	
or	Bobcat	ACS, EOA, KRU, Alpine	Transfer oiled snow to loaders	1	1	1 hr	
	Dump Truck	GPB, KRU, Peak, AIC, Alpine	Transfer oiled snow to disposal site	2	2	1 hr	
	Snowmelter	EOA, Alpine	Melt snow	2	8	2 hr	
	Sorbent	All	Recovery	Variable	Variable	0.5 hr	

TOTAL STAFF **11 (includes 1 spotter that works with equipment to protect tundra)**

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Transport wide-track dozer	1	1 driver	1 hr	0
Heater	All	Support heavy equipment	≥1	1 initial setup	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Light Plant	All	Illumination	Variable	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr

CAPACITIES FOR PLANNING

- A front-end loader with an 8-cubic-yd snow bucket can fill a dump truck in 10 minutes and move 500 cubic yd of snow per hour. The dump trucks available on the Slope typically have 10-, 20-, or 25-cubic-yd capacity. Because the front-end loaders fill dump trucks as fast as they pull into position, dump trucks are the bottleneck.
- Heavily oiled snow may contain up to 100 gal of oil per cubic yd at 3.7 gal of oil per cubic ft of snow. A snowmelter at 70 bbl/hr of resulting oil can handle approximately 30 cubic yd of heavily oiled snow per hour.
- One cubic yard of oil-saturated snow contains up to 2.4 bbl of oil.
- Following is an example of recovery of oiled snow for one 20-cubic-yd dump unit:

$$\text{Dump Truck Recovery} = \frac{T_c}{L_t + T_t + U_t} = \frac{20 \text{ cubic yd}}{0.17 \text{ hr} + \left(\frac{2 \text{ mi} * 2}{35 \text{ mph}}\right) + 0.08 \text{ hr}} = 55 \text{ cubic yd/hr}$$

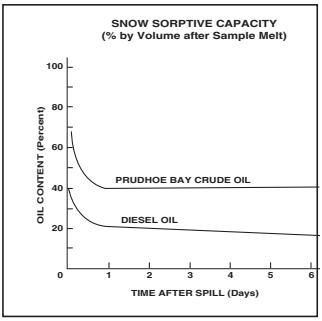
Example: T_c = Truck Capacity

L_t = Load Time (10 min or 0.17 hr) T_t = Travel Time $\left(\frac{\text{miles to disposal} * 2}{35 \text{ mph}}\right)$

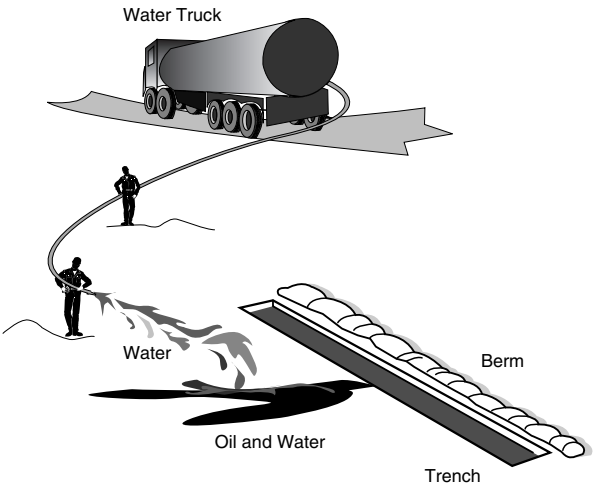
U_t = Unload Time (5 min or 0.08 hr)

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

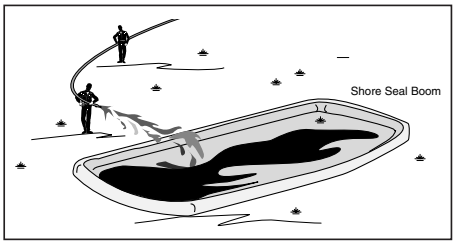
- This tactic is limited to oiled snow with no free liquids. Otherwise, lined or leak-proof dump trucks may be used.
- If the oiled snow is too saturated for handling, blend lightly oiled snow or clean snow with it, or use Tactic R-6.
- If delivery of snow exceeds snowmelter capacity, the snow can be contained in lined pits until it is processed. Existing lined pits, upright tanks, or dry ponds can be used, when available, to store snow; otherwise temporary lined pits can be constructed as necessary.
- If the dump trucks cannot access the oiled area, build an ice road to keep the loaders from traveling too far.
- After removal of free oil, oiled snow, and after flushing, contain and monitor the area until breakup. Insulate ice roads or ice berms to provide containment during breakup, when the oil can be removed with direct suction, portable skimmers, or burning.



R-4 Flushing Oil on Tundra Surface (Pg 1 of 2)



FLOATING OIL WITHIN SHORE SEAL BOOM



In spring or fall, flushing is used to concentrate oil into pits or trenches, where it is collected with direct suction using a Manta Ray skimmer head, sorbents, or a portable skimming system. The pits or trenches are constructed by cutting slots in ice, utilizing natural depressions, digging into tundra or gravel with a backhoe or Bobcat, or by augmenting a depression or pit with sandbags and Shore Seal boom (see Tactic C-4). Shore Seal boom is particularly effective when frozen in place. Constructed pits or trenches are lined with Visqueen or similar plastic sheeting.

The water source for the flushing unit is either a water truck or an auger hole in the ice of a nearby lake. Flushing usually occurs after pooled areas and contaminated snow have been removed.

The flush should consist of high-volume, low-energy flushing with water less than 106°F. This is essentially a mop-up technique after the majority of oil and oiled snow has been removed.

See Tactic R-7 for recovery of concentrated oil.

EQUIPMENT AND PERSONNEL

- The number of staff to deploy sandbags depends on the size of the constructed concentration area.

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Water Truck	All	Water source	1	2	2 hr	0.5 hr
or	Upright Tank (400 bbl)	KRU, Alpine	Water source	1		2 hr	1 hr
	Ice Auger	All	Water source	1	2	1hr	0
	Trash Pump (2-inch)	All	Flushing of oil	1		1 hr	1 hr
	Suction Hose (2-inch)	All	Flushing of oil	≥20 ft	—	2 hr	1 hr
	Discharge Hose (3-inch)	All	Flushing of oil	>50 ft	—	1 hr	1 hr
				TOTAL STAFF	**2**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Heater	All	Support heavy equipment	≥1	1 initial setup	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Light Plant	All	Illumination	>1	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr

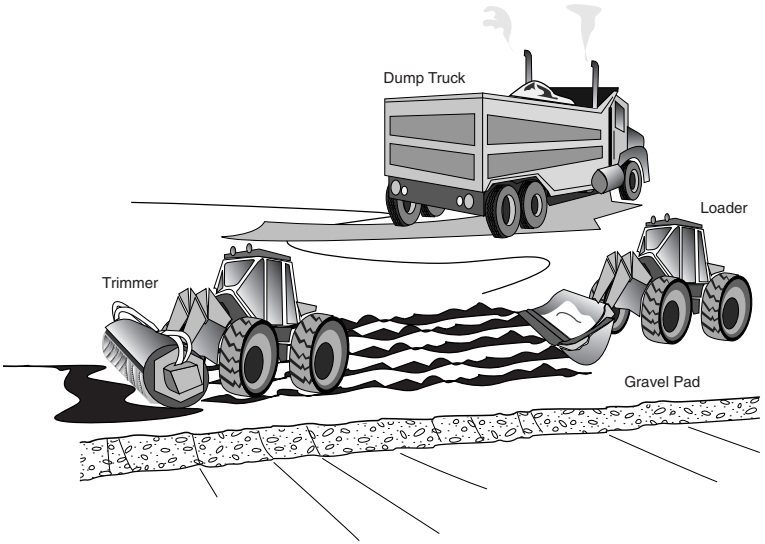
CAPACITIES FOR PLANNING

- Recovery capacity depends on the nature of the spill, the size of the concentration area, and terrain features.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Flushing is a viable option only when air temperatures permit. Warm water (no more than 106°F) is preferred for flushing.
- Flushing works on oil contained on and in the surface of tundra, gravel, and ice, and is particularly effective on ice. The tundra can be damaged if it thaws; don't flush the same area more than 2 or 3 times or suck the tundra dry. Also, stay off the tundra that's being flushed.
- Personnel or small equipment should traverse the tundra on plywood sheets.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.

R-5 Recovery of Embedded Oil (Pg 1 of 2)



A trimmer is used to recover oil embedded in the surface of a frozen pad or ice. A trimmer uses a rotary blade system to chop and collect the surface material at varying depths. The worked-over material is collected with a front-end loader and transferred to a dump truck.

A scratcher is used to break up frozen gravel or ice in areas where a trimmer cannot reach. A scratcher is a fork attachment for a front-end loader which can reach areas in tight quarters. A Super Sucker may also be used to remove a thin top layer.

Where the embedded oil is not recovered, the area is stabilized and the perimeter bermed and sealed, and monitored until breakup. Breakup is accelerated in the contained area by placing a layer of black Visqueen over it. The Visqueen is lifted as necessary, and the pools of oil removed with direct suction, portable skimmers, or burning.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Trimmer (Loader-mounted, 10-ft wide)	Peak	Recovery of frozen surface material	1	1	2 hr	0.5 hr
or	Trimmer (Bobcat-mounted, 2-ft wide)	ACS, KRU, Alpine	Recovery of frozen surface material	1	1	1 hr	0.5 hr
or	Front-End Loader w/ Scratcher and Bucket	All	Transfer oiled snow into dump trucks	1	1	1 hr	0.5 hr
or	Backhoe	GPB, KRU, Peak, AIC, Alpine	Recovery of frozen surface material	1	1	2 hr	0.5 hr
or	Super Sucker	Peak, CH2M Hill, Alpine	Recovery of frozen surface material	1	2	1 hr	0.5 hr
	Dump Truck	GPB, KRU, Peak, AIC, Alpine	Transfer oiled snow to disposal site	≥2	≥2	1 hr	0.5 hr
				TOTAL STAFF	**≥4**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Transport heavy equipment	1	1 driver	1 hr	0
Heater	All	Support heavy equipment	≥1	1 initial setup	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr

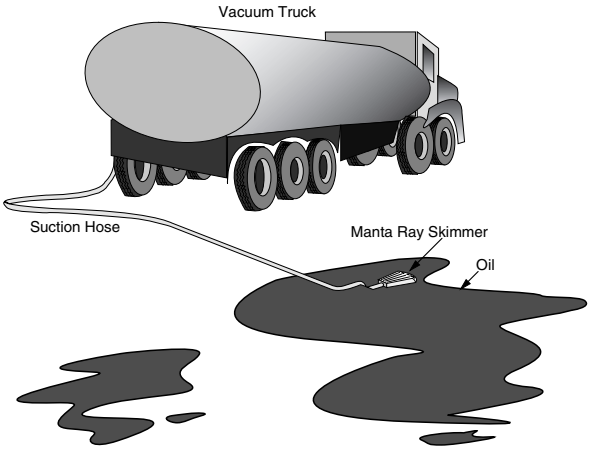
CAPACITIES FOR PLANNING

- A front-end loader can fill a dump truck in 30 minutes. The average dump truck available on the Slope has a 20-cubic-yd capacity.
- One cubic yard of oiled gravel contains 0.125 bbl of oil.
- A Super Sucker uses an 8-inch hose and can recover 14 cubic yd of gravel in one hour. The storage capacity of a Super Sucker is 65 bbl or 14 cubic yd. A Super Sucker can also be reduced to 6-inch, 4-inch, or 2-inch hose, and "Ys" allow the use of more than one hose.
- The speed of a trimmer operation depends on many variables, including depth of contamination, hardness of surface, and size of trimmer.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- A trimmer is preferred over a backhoe to remove frozen gravel. When gravel is loose enough, a backhoe or front-end loader may be used.
- Removal of oil embedded in tundra can be achieved by removing the tundra or burning it out with weed burners. Alternatively, the tundra can be contained and monitored until breakup when oil melts out, allowing recovery with direct suction, portable skimmers, or burning.
- A civil work permit from the operator is required for work on a pad.

R-6 Recovery by Direct Suction (Pg 1 of 2)



For spills off pad or road, a vacuum truck can effectively reach out 200 feet. If the oil is pooled on water, a Manta Ray skimmer head is attached to the hose extending from the vacuum truck. The hose or skimmer head is placed in the pooled oil for recovery. SRT staff man the hose or skimmer head and move it to other pooled areas as necessary. A Super Sucker can also be used for direct suction.

Archimedes screw pumps or 4-inch trash pumps can also be used for this task since they can move oil more than 200 feet, and could either pump the pooled oil into vacuum trucks on a pad/road, into holding tanks, or into the slop oil tank at a nearby production facility.

Free oil can be recovered from any pooled area including natural depressions, barriers, constructed trenches, or containment dikes.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Vacuum Truck	All	Direct suction	1	2	1 hr	0.5 hr
or	Archimedes Screw Pump	ACS	Direct suction	1	2	1 hr	0.5 hr
or	Trash Pump (4-inch)	ACS, GPB, Alpine	Direct suction	1	2	1 hr	0.5 hr
	Suction Hose (4-inch)	ACS, WOA, Alpine	Transfer	≥20 ft	2 for setup	2 hr	0
	Discharge Hose (4-inch)	ACS, WOA, KRU, Alpine	Transfer	>50 ft	—	1 hr	0
	Manta Ray Skimmer Head (optional)	GPB, KRU, ACS,MPU, Alpine	Direct suction	1	—	0.5 hr	0
	Upright Tank (400 bbl)	KRU, Alpine	Store fluids	1	1 initial	2 hr	1 hr
				TOTAL STAFF	**≥3**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Heater	All	Support heavy equipment	≥1	1 initial setup	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support heavy equipment	1	1	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr

CAPACITIES FOR PLANNING

- The typical suction rate for liquids by a vacuum truck is 200 bbl/hr in the summer and 150 bbl/hr in the winter. The typical suction rate for pooled diesel remains at 200 bbl/hr year round. (Vacuum truck recovery rate is reduced to about 34 bbl/hr if a Manta Ray skimmer is used.)
- Vacuum truck recovery of pooled oil with one unit equals:

$$Time = \left(\frac{miles\ to\ disposal * 2}{35\ mph}\right) + 2\left(\frac{T_c}{S_r}\right) \qquad ORR = \left(\frac{Vac\ Truck\ Capacity}{Time}\right)$$

T_c = Vac Truck Capacity (bbl)

S_t = Suction Rate = 150 bbl/hr of oil in winter; 200 bbl/hr of oil in summer (and for diesel)

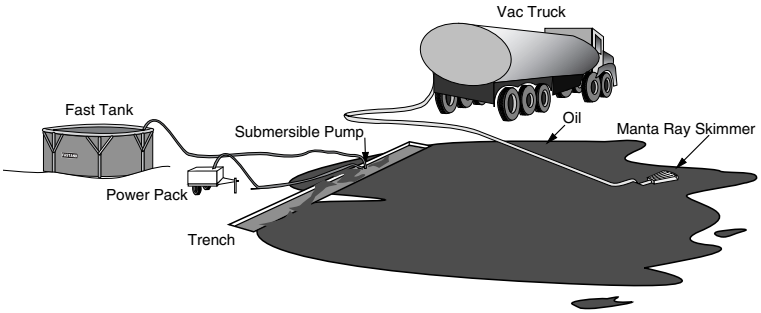
Example of ORR for a 300 bbl vac truck: $ORR = \left(\frac{300\ bbl}{4.6\ hr}\right) = 65\ bph$

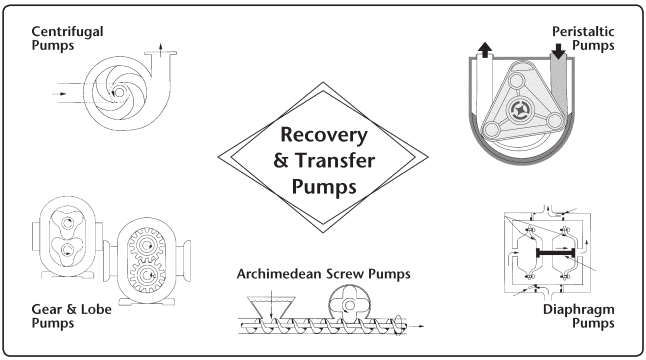
$$T = \left(\frac{10\ mi * 2}{35\ mph}\right) + 2\left(\frac{300\ bbl}{150\ bph}\right) = 4.6\ hr$$

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Vacuum trucks provide efficient spill recovery, unless vehicle access is prohibited or not possible, the spill is unpumpable (highly viscous, cold or weathered), the spill is in a thin layer, or debris will clog the recovery line.
- Identify the disposal facility to be used before calling out a vacuum truck.
- Viscous liquids accessible within 200 ft by a vacuum truck are recovered with direct suction of that vacuum truck. Access could be made available to areas in the winter with ice roads. Pooled areas could be in natural depressions or in constructed trenches.
- Vacuum trucks can access pooled diesel up to 400 ft away from the truck.
- Use of Manta Ray skimmers with vacuum trucks decreases recovery capacity.
- Super Suckers are available to remove liquids with solids that vacuum trucks cannot handle. See Tactic R-5 for more details.
- With a trash pump, the suction head must be completely submerged.
- Since an Archimedes screw pump is submersible, oil must be deep enough for effective pumping.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-7 Recovery from Pit or Trench (Pg 1 of 2)





An excavated trench is used to intercept the flow of a spill or divert the flow around a sensitive area (see Tactic C-4). Dig the trench at right angles to the flow of the spill. The trench should be angled slightly downslope (in the direction of surface flow) to avoid excessive pooling in the trench.

Place excavated material on the downhill side of the trench. In areas with a low water table, line the sides and bottom of the trench with plastic sheeting or similar impermeable materials. Where the groundwater table is high, line the downhill side of the trench.

The trench can be flooded with water to inhibit spill penetration into sediments and to stimulate flow toward the recovery device in the trench or pit.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Vacuum Truck	All	Recovery	1	2	1 hr	0.5 hr
	Manta Ray Skimmer Head	GPB, KRU, ACS, MPU, Alpine	Direct suction	1	—	0.5 hr	0
or	Archimedes Screw Pump	ACS	Recovery	1	2	1 hr	
or	Peristaltic Pump (2-inch)	ACS, Alpine, KRU	Recovery	1	2	1 hr	
or	Trash Pump (3-inch)	All	Recovery	1	2	1 hr	
or	Diaphragm Pump (3-inch)	All	Recovery	1	2	1 hr	
or	TransVac	ACS, WOA	Recovery	1	2	2 hr	1 hr
	Portable Tank	All	Storage	1	2 for setup	1 hr	
	Suction Hose (2-inch)	All	Transfer	≥20 ft	—	2 hr	
	Suction Hose (3-inch)	All	Transfer	>20 ft	—	2 hr	
	Discharge Hose (3-inch)	All	Transfer	>50 ft	2 for setup	1 hr	

TOTAL STAFF FOR SETUP **4 (2 if only vacuum truck**
TOTAL STAFF TO SUSTAIN OPERATIONS **2**

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	0.5 hr
Semi and Trailer	GPB, KRU, Alpine, ACS	Haul backhoe	1	1	1 hr	0

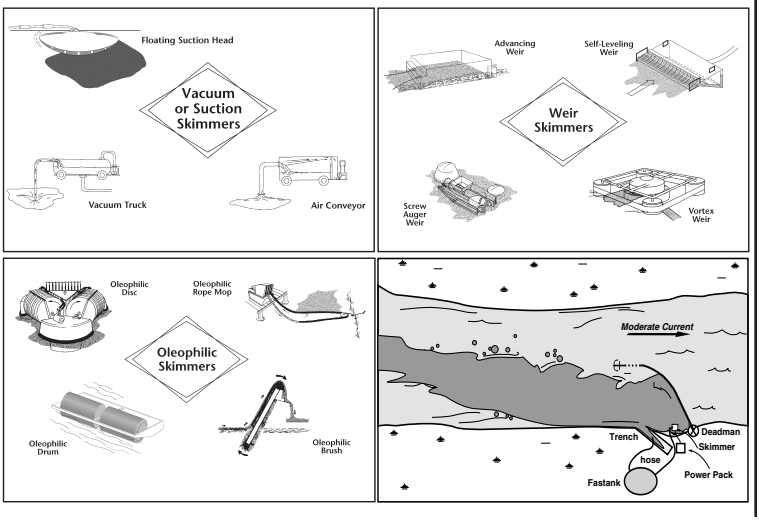
CAPACITIES FOR PLANNING

- Vacuum truck recovery rate: 200 bbl/hr, 150 bbl/hr winter (reduced to 34 bbl/hr if a Manta Ray skimmer is used with the vacuum truck). Remains at 200 bbl/hr year-round for pooled diesel.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Disposal of construction material should be taken into account before using this tactic.
- Do not excavate an interception trench in an area where the excavation will cause more damage than the spill itself. Before excavating in tundra, check for the presence of groundwater or permafrost. Do not excavate into frost-laden (cemented) soils, since disruption of the permafrost could accelerate thermal erosion. The depth of the trench is limited by the depth of the permafrost.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- On pads, check for buried pipe and/or cables prior to excavation. Obtain a civil work permit from the operator.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-8 Portable Skimmers w/Pumps (River and Lake) (Pg 1 of 2)



Portable skimmers are easily mobilized, transported, and deployed and can be used in most spill situations for recovery. They can be used to recover oil from containment areas such as the apex of a diversion boom or natural or artificial deadarms. The typical portable skimming system includes:

- Skimmer, pump, or skimmer/pump (with fuel) with power pack
- Hose (suction and discharge with fittings)
- Storage container (tank truck, storage bladder, barrels, Fastank, etc.)

Portable skimmers can be deployed on land or from small boats to recover oil contained on water.

A weir skimmer has a "lip" or weir at its intake over which liquids flow into the skimmer pump. The user can adjust the working depth of the weir. Weir skimmers will pick up any product on water, including emulsified and weathered product; however, they recover more water than oil in thin oil layers. (Avoid using a centrifugal pump since emulsification will occur.)

Oil adheres to an oleophilic skimmer, while water is repelled. These skimmers include rotating disks, rotating drums, or endless belts (including rope mop). Brush and rope mop skimmers can be effective in any oil thickness, while disk and drum skimmers require fresh oil. (Any pump can be used as long as the pump rate can be adjusted so as not to exceed the recovery rate of the skimmer.)

EQUIPMENT AND PERSONNEL

- Typically, portable skimmers require 2 persons for setup and 1 or 2 to operate.

SUPPORT

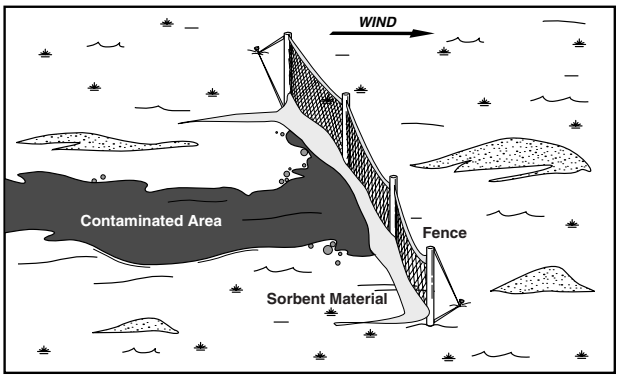
- Portable tanks, bladders, Rolligon with tank, mini-barge possible.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Portable skimmers are initially used to pick up concentrations of oil, then are used in containment areas. The skimmers can be land-based or deployed from boats, and require power packs (a jon boat can be used for the power pack). When requesting a skimmer, always ask for the total skimming system.
- The only differences in equipment or techniques for road access or no road access are logistical in nature.
- Position the skimmer or pump with suction hose in area of heaviest spill concentration. Make sure intake end of hose is fitted with a screen. Do not use a centrifugal pump with a weir skimmer.

R-9 Use of Sorbents (Pg 1 of 2)

USE OF SORBENT FENCE



Sorbent pads and rolls can be used onshore to remove small pools of liquid or oil layers on rocks or man-made structures. If the spill is at the shoreline, sorbent boom can be deployed and backed up with conventional containment boom as necessary to keep the oil from drifting away.

Sorbents can be used with Shore Seal boom or fences to create an oil absorbent barrier.

Place oiled sorbents in plastic bags marked “oily waste” for removal and disposal. Larger quantities can be placed in barrels or debris boxes. Minimize the amount of sorbent material used. Oily sorbent bags must be placed in oily waste dumpsters.

EQUIPMENT AND PERSONNEL

- Personnel requirements depend on the nature and area of oil contamination. Personnel typically work in pairs for sorbent deployment and recovery. Additional personnel are required for loaders, dump trucks, vessel, etc.

EQUIPMENT	BASE LOCATION
Sorbent Boom (8 inch)	All
Double Sorbent Boom (8 inch)	ACS
Sorbent Boom (4 inch)	All
Double Sorbent Boom (4 inch)	ACS
Sorbent Pad (18 x 18 inch)	All
Sorbent Sweep (18 x 18 inch)	All
Sorbent Pad (36 x 36 inch)	All
Sorbent Roll (36 inch x 150 ft)	All
Pom Pom	ACS, WOA

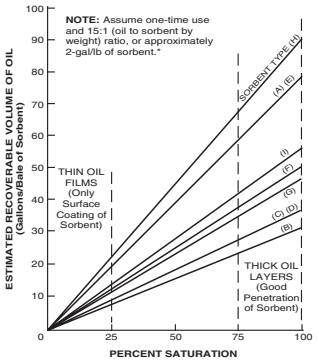
SUPPORT

- Support equipment may include heavy-duty plastic bags and liners, shovels, rakes, poles with gripping claws, pitchforks with wire mesh, and heavy equipment.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Rake	All	Recovery	≥1	1 per	1 hr	0
Pitchfork w/Screen	All	Recovery	≥1	1 per	1 hr	0
Shovel	All	Recovery	≥1	1 per	1 hr	0
Oily Waste Bag	All	Disposal	>1 Box	—	1 hr	0
Fencing Material	All	Containment	Variable	2	1 hr	2 hr

CAPACITIES FOR PLANNING

TYPICAL OIL HOLDING CAPACITIES (For Fibrous Polypropylene Sorbents with Medium-Grade Crude Oil)



COMMON SORBENT PACKAGING CHARACTERISTICS (For Fibrous Polypropylene Products)

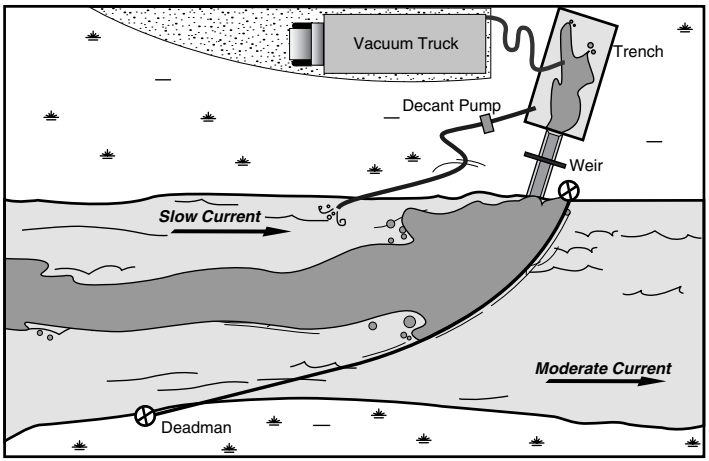
Sorbent Type	Dimensions	Units/Bale	Approximate Weight (Pounds/Bale)
(A) Rolls	3/8" x 36" x 150'	1 Roll	38
(B) Sweeps	3/8" x 19" x 100'	1 Sweep	15
(C) Sheets	3/16" x 18" x 18"	200 Sheets	18
(D) Sheets	3/8" x 18" x 18"	100 Sheets	18
(E) Sheets	3/8" x 36" x 36"	50 Sheets	38
(F) Particulate	—	1 Bag	25
(G) Pillows	5" x 14" x 25"	10 Pillows	23
(H) Booms	8" Diam. x 10' Long	4 Booms	44
(I) Double Booms	5" Diam. x 10' Long	4 Double Booms	28

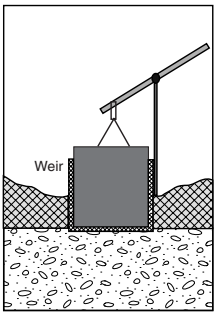
* Ratio of oil weight to sorbent weight at saturation may be as low as 10:1 for light oils (e.g., avgas, JP-4, and gasoline) and greater than 20:1 for heavy lube oils and Bunker C.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- Use of sorbents should be minimized because of disposal problem.
- Sorbent wringers can be used to extend the life of sorbents.
- Do not use Pom Poms in conjunction with pumping.
- Sorbents work well on fresh crude, light refined oils, and thick sheens, but are only partially effective on solidified or weathered oil, highly viscous oil, very thin sheens, or emulsified oil. Sorbent products are ineffective unless all layers become saturated when in contact with spilled product. Use sorbent boom when overland flow is minor, and terrain has low slope or is wetland.
- Hay bales could be deployed in place of or in conjunction with sorbent material.

R-10 Fairchild Gate Weir Collections System (Pg 1 of 2)





The Fairchild gate weir provides a closable opening for an existing storage trench or deadarm along a river bank. Oil moving on the river is deflected so that it enters the recovery weir into the storage area, and the liquid flow can be controlled as necessary.

A 3- or 4-inch trash pump is used to decant fluids back upstream into the boomed area. This will allow for greater storage capacity in the trench area.

EQUIPMENT AND PERSONNEL

- Select vessels and boom according to area, water depth restrictions, and function (see Tactic L-6). Specific personnel requirements depend on the length and type of boom and the nature of the area.
- Equipment and personnel required to set up and maintain boom are listed in the applicable containment tactic.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Backhoe	GPB, KRU, Peak, AIC, Alpine	Trenching	1	1	2 hr	3 hr
Vacuum Truck (300-bbl)	All	Recovery	1	1	1 hr	
Slide Gate Weir System	KRU	Recovery	1	2	1 hr	
Trash Pump (4-inch)	ACS, GPB, Alpine	Decanting	1	1	1 hr	
Suction Hose (4-inch)	ACS, WOA, Alpine	Liquid transfer	≥20 ft	2 for setup	2 hr	
Discharge Hose (4-inch)	ACS, WOA, KRU, Alpine	Liquid transfer	≥50 ft	—	1 hr	
			TOTAL STAFF FOR SETUP	**7**		
			TOTAL STAFF TO SUSTAIN OPERATIONS	**5**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr

CAPACITIES FOR PLANNING

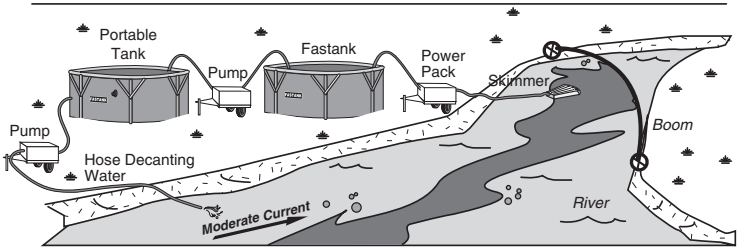
- The typical suction rate for liquids by a vacuum truck is 200 bbl/hr in the summer and 150 bbl/hr in the winter. The typical suction rate for pooled diesel remains at 200 bbl/hr year round. (Vacuum truck recovery rate is reduced to 34 bbl/hr if a Manta Ray skimmer is used.)
- For planning purposes, 80% of the liquid passing over the gate is oil and 20% is free water. The responder adjusts the moveable gate to maximize oil flow into the containment area and minimize water flow through the weir.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Use an existing trench or deadarm. If necessary, dig a new one or modify an existing one.
- Disposal of construction material should be taken into account before using this tactic.
- Do not excavate where excavation will cause more damage than the spill. Before excavating in tundra, check for the presence of groundwater or permafrost. Do not excavate into frost-laden (cemented) soils, since disruption of the permafrost could accelerate thermal erosion. The depth of the trench is limited by the depth of the permafrost.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-11 Decanting Separated Water in River (Pg 1 of 2)

NOTE: *This illustration depicts a typical deployment for this tactic. See Tactic R-8 for recovery equipment.*



When oil is being skimmed from the water surface, it is likely that considerable volumes of water will be recovered as well. Decanting excess water from oily water storage is an important tool to reduce the volume of oil water that must be taken for disposal.

Oily water is pumped to a primary storage tank such as a Fastank or larger tanks. As the water separates, it can be pumped back into the containment area on the water.

EQUIPMENT AND PERSONNEL

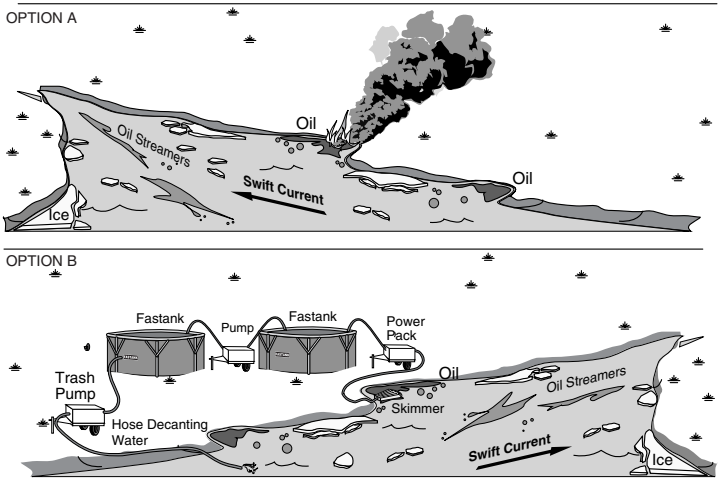
- Equipment and personnel required to set up and maintain boom are listed in the applicable containment tactic.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Small Stationary Skimmer System	ACS, GPB, KRU, Endicott, Alpine	Recovery	1	1	1 hr	0.5 hr
Pump (3-inch)	All (ACS, MPU, Alpine have diesel)	Transfer	1	1	1 hr	
Suction Hose (3-inch)	All	Transfer	≥20 ft	—	1 hr	
Discharge Hose (3-inch)	All	Transfer	≥50 ft	2 for setup	1 hr	
Pump (2-inch)	All	Decanting	1	1	1 hr	
Portable Tank	All	Temporary storage	2	2 for setup	1 hr	
Suction Hose (2-inch)	All	Decanting	>20 ft	1	1 hr	
Discharge Hose (2-inch)	All	Decanting	>50 ft	1	1 hr	
		TOTAL STAFF FOR SETUP		**5**		
		TOTAL STAFF TO SUSTAIN OPERATIONS		**3**		

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

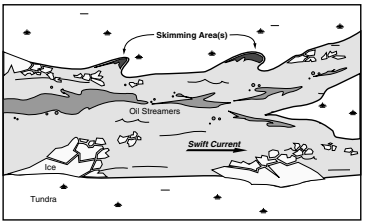
- Gravity flow is the best method for decanting water from a tank.
- Ensure decanting operation is constantly monitored to ensure only water is decanted.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- Consider use of valves on discharge hoses.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-12 Aggressive Breakup in River (Pg 1 of 2)



Tactical options are limited during the aggressive river breakup period when currents are strong from bank to bank, large pieces of ice are flowing in the river, and it is not safe to deploy airboats or other vessels. Personnel will not be placed at risk to deploy any containment or recovery equipment in the river channel.

The overall strategy is to go downstream from the point where the spill is entering the water to look for mechanical recovery or burn opportunities in quiet-water areas along the stream banks where boom could be deployed. The Heli-torch can be used to ignite inaccessible oil pockets, while skimmers and pumps or vacuum trucks can be used where road access is available.



EQUIPMENT AND PERSONNEL

OPTION A

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Heli-torch (55 gal)	ACS	Ignition	2	2 for setup	1 hr	2 hr
Helicopter with FAR Part 137 Approved Pilot	Alyeska	Sling-load Heli-torch	1	1	2 hr	
Hand-held Igniter	ACS	Ignition	≥6	1	1 hr	
Gelled Fuel	ACS	Firestarter Material	>5 lb.	—	1 hr	
Fire Extinguisher	All	Suppress accidental fires	>2	—	0.5 hr	
Batch Mixer (300 gal)	ACS, KRU	Mix gel	1	2	1 hr	

TOTAL STAFF WITH HELI-TORCH 3

TOTAL STAFF WITH HAND-HELD IGNITERS 2

OPTION B

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Small Stationary Skimmer System	All	Recovery	1	1	1 hr	3 hr
Diaphragm Pump (3-inch)	All (ACS, MPU, Alpine have diesel)	Transfer	1	1	1 hr	
Suction Hose (3-inch)	All	Recovery	2≥20 ft	2 for setup	2 hr	
Discharge Hose (3-inch)	All	Recovery	2>50 ft	—	1 hr	
Trash Pump (2-inch)	All	Decanting	1	1	1 hr	
Portable Tank	All	Temporary Storage	2	2 for setup	1 hr	

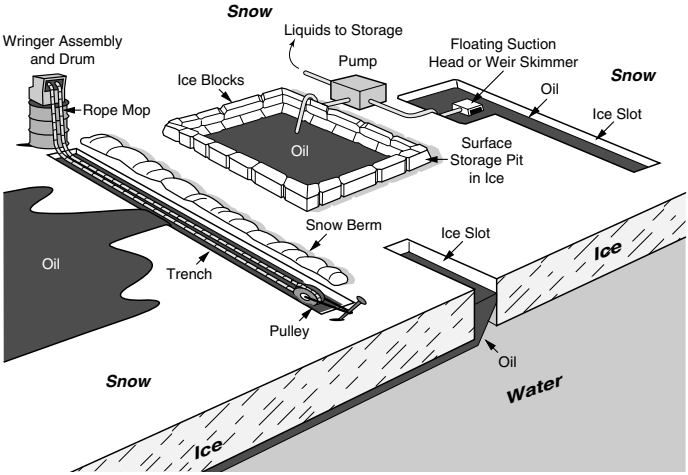
TOTAL STAFF FOR SETUP 5

TOTAL STAFF TO SUSTAIN OPERATIONS 3

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Oil will tend to be naturally dispersed by the water's turbulence and by adherence to silt and sinking.
- Two people are needed to mix gelled fuel for the Heli-torch and to attach it to the helicopter.
- Batch mixer can be used for mixing large amounts of gelled fuel for Heli-torch.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-13 Cutting Ice Slots for Recovery (Pg 1 of 2)



Oil moving both on the surface of ice and underneath it can be concentrated in slots cut in the ice and recovered by skimming with rope mops or other types of skimmers. If the oil in the slot is thick enough, it can be removed using weir skimmers or direct suction.

Oil entrained in subsurface pockets can be reached by drilling holes with ice augers and pumping the oil directly to storage containers such as drums or bladders. Temporary storage can also be provided by excavating shallow pits in the ice surface using chain saws and chipper bars. These oil concentrations can be pumped off or burned.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Rube Witch w/Chain Saw	All	Trenching	3	6	1 hr	0.5 hr
	Ice Auger	All;	Recovery hole	1		1 hr	0.5 hr
	Rope Mop (4-inch)	All	Recovery	1		1 hr	1 hr
or	Small Stationary Skimmer System	All	Recovery	1	4	1 hr	1 hr
	Portable Shelter (10x12)	All	Shelter	1		1 hr	1 hr
	Pump (3-inch)	All	Recovery	1		1 hr	0.5 hr
	Suction Hose (3-inch)	All	Recovery	2 ≥20 ft	2 for setup	2 hr	0.5 hr
	Discharge Hose (3-inch)	All	Recovery	2 >50 ft	—	1 hr	0.5 hr
	Generator	All	Rope mop power	1	2 for setup	1 hr	0.5 hr
	4-Wheeler w/Plow	All, except Badami, MPU and ACS	Berming	2	2	1 hr	0.5 hr

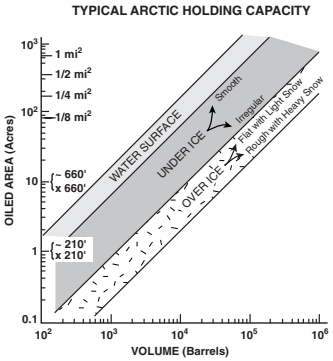
TOTAL STAFF FOR SETUP AND TRENCHING 12

TOTAL STAFF TO SUSTAIN OPERATIONS 3

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Mechanic Support	All	Support Equipment	1	1	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	0.5 hr
Heater	All	Heat	>1	1 initial setup	1 hr	0.5 hr

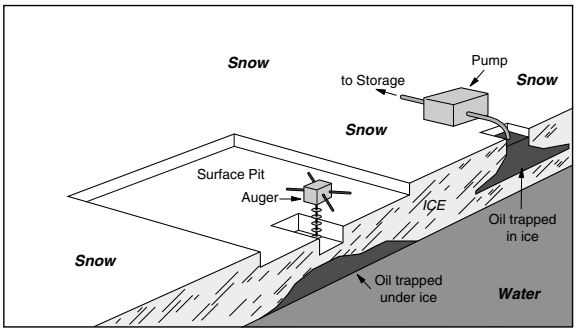
CAPACITIES FOR PLANNING

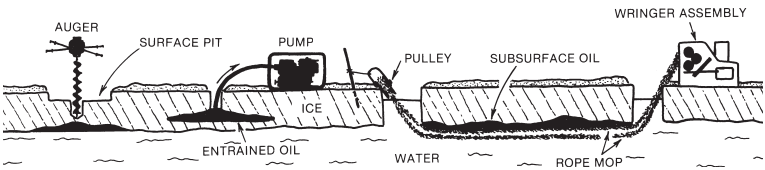


DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Check ice thickness for safe bearing capacity before working on ice. The ice must be sufficiently strong to support personnel and heavy equipment. See Tactic L-7 for realistic maximum operating limits (RMOL) for ice thickness and temperature. Also, ensure ice can withstand extra load of oil and snow on the surface without either breaking the ice or forcing oil to migrate through existing cracks. Extreme care must be taken when positioning or operating any heavy equipment close to trenches or slots in the ice. Stresses in the ice for a given load can double under these situations. Ensure that oil that accumulates in an ice trench is continually removed. If allowed to build up to a thick layer, some oil may escape the ice slot.
- "In-ice" trenches do not extend through the ice and contain spills flowing over the ice surface. "Through-ice" or slots or trenches extend through ice to free water to contain spills moving under the ice.
- Ice trenches can be configured in "U" shapes or herringbone patterns to contain oil. Remove cut ice blocks in 1-cubic-ft pieces and place on side opposite oil. The width of the trench should not exceed 4 ft.
- Use of Rube Witch chain saw is labor-intensive.
- Use of heat will make the rope mop and pump more effective.

R-14 Recovery of Oil Under Ice (Pg 1 of 4)





A sump is cut in the ice around a hole augered through the ice to pockets of oil under the ice or encapsulated in the ice. The oil is pumped directly from the sump to temporary storage containers. A heated shelter can be erected over the sump.

Another option involves deploying rope mop through holes in the ice to recover oil trapped in under-ice depressions. Two holes are drilled in the ice using ice augers or chainsaws, and the rope mop is strung under the ice between the holes.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Rube Witch w/Chain Saw	All	Sump construction	3	6	1 hr	0.5 hr
Portable Shelter (10x12)	All	Shelter	1	4	1 hr	1 hr
Ice Auger	GPB, KRU, ACS, Endicott, Alpine	Recovery hole	1		1 hr	0.5 hr
Rope Mop (4-inch)	All	Recovery	1		1 hr	1 hr
Pump (3-inch)	All	Recovery	1		1 hr	0.5 hr
Suction Hose (3-inch)	All	Recovery	2 ≥20 ft	2 for setup	2 hr	0.5 hr
Discharge Hose (3-inch)	All	Recovery	2 >50 ft	—	1 hr	0.5 hr

TOTAL STAFF FOR SETUP ≥10

TOTAL STAFF TO SUSTAIN OPERATIONS 4

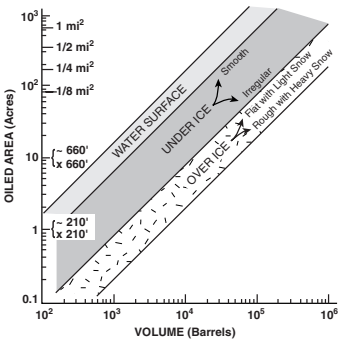
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Heater	All	Heat	1	1 initial setup	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	0.5 hr

CAPACITIES FOR PLANNING

- Depending on the thickness of a trapped oil pool, a single sump or auger hole may drain a very small lateral area. Repeated holes may have to be drilled at a close spacing to recover most of the oil. This technique is most effective for thicker oil pockets on the order of 4 to 6 inches or more. Thin oil lenses in the ice on the order of 2 to 3 inches or less may not drain effectively to individual holes.

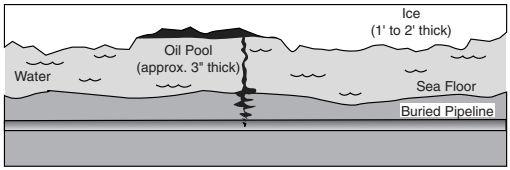
TYPICAL ARCTIC HOLDING CAPACITY

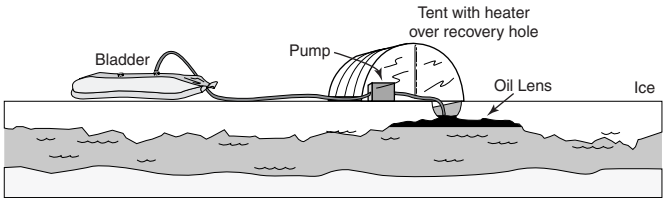


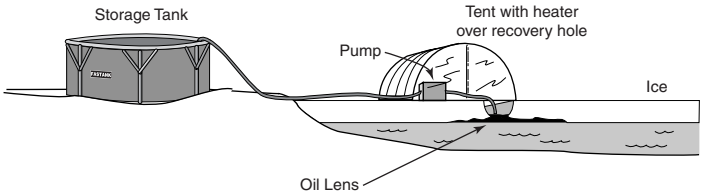
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

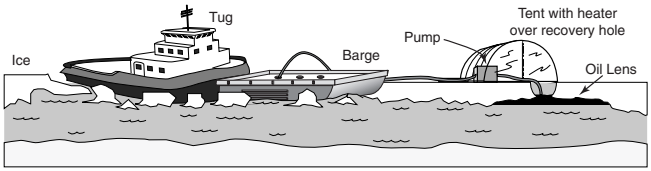
- Heat inside the shelter will make the rope mop and pump more effective.
- Use of the Rube Witch with chain saw is labor-intensive.
- Check ice thickness for safe bearing capacity before working on ice. The ice must be sufficiently strong to support personnel and heavy equipment. See Tactic L-7 for realistic maximum operating limits (RMOL) for ice thickness and temperature. Also, ensure ice can withstand extra load of oil and snow on the surface without either breaking the ice or forcing oil to migrate through existing cracks. Extreme care must be taken when positioning or operating any heavy equipment close to trenches or slots in the ice. Stresses in the ice for a given load can double under these situations. Ensure that oil that accumulates in an ice trench is continually removed. If allowed to build up to a thick layer, some oil may escape the ice slot.

R-14 Recovery of Oil Under Ice (Pg 3 of 4)









Oil trapped under solid ice or in a lens within solid ice can be removed by augering into the oil lens and pumping out the oil. If the ice is thick enough to support heavy equipment, the oil can be pumped directly into bladders or other portable tanks and hauled to shore. In the case of thin nearshore ice, the oil can be pumped to storage containers on shore. Finally, if the site can be reached by an ice-strengthened tug-and-barge combination, the oil can be pumped directly into the barge.

A heated portable shelter should be placed over the auger holes to protect personnel and pumps.

EQUIPMENT AND PERSONNEL

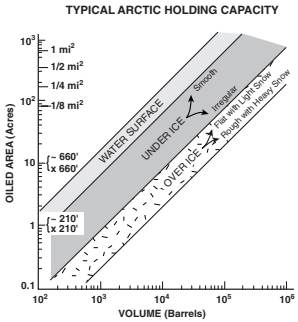
	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Ice Auger	ACS, GPB, KRU, Endicott, Alpine	Recovery	1	2	1 hr	0.5 hr
	Portable Shelter (10x12)	All	Shelter	1	3 for setup	1 hr	1 hr
	Pump (3-inch)	All	Recovery	1	1	1 hr	0.5 hr
	Suction Hose (3-inch)	All	Recovery	2≥20 ft	2 for setup	2 hr	0 hr
	Discharge Hose (3-inch)	All	Recovery	2>50 ft	—	1 hr	0 hr
	Tank Bladder	ACS, WOA	Storage	1	—	1 hr	1 hr
or	Portable Tank	All	Storage	1	2 (initial)	1 hr	0.5 hr
or	Barge	West Dock	Storage	1	8	4 hr	6 hr
	Tug	West Dock	Tow barge	1	4	2 hr	

TOTAL STAFF FOR SETUP **≥4 (12 if barge used)**
TOTAL STAFF TO SUSTAIN OPERATIONS **2 (12 if barge used)**

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Heater	All	Heat	1	1 initial setup	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	0.5 hr

CAPACITIES FOR PLANNING

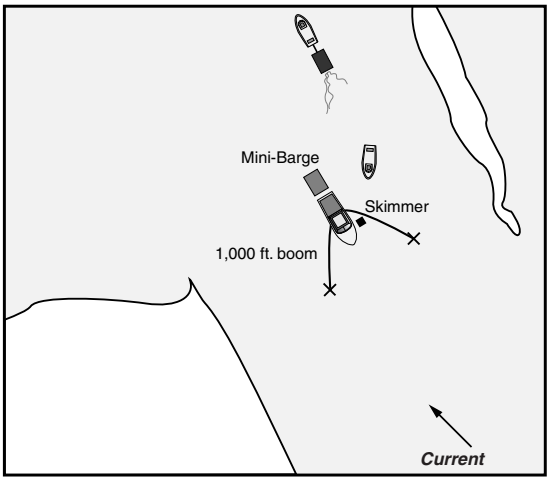


DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Check ice thickness for safe bearing capacity before working on ice. The ice must be sufficiently strong to support personnel and heavy equipment. See Tactic L-7 for realistic maximum operating limits (RMOL) for ice thickness and temperature. Also, ensure ice can withstand extra load of oil and snow on the surface without either breaking the ice or forcing oil to migrate through existing cracks. Extreme care must be taken when positioning or operating any heavy equipment close to trenches or slots in the ice. Stresses in the ice for a given load can double under these situations. Ensure that oil that accumulates in an ice trench is continually removed. If allowed to build up to a thick layer, some oil may escape the ice slot.
- Heat in the shelter will make the rope mop and pump more effective.
- When appropriate, the amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

NOTE: All values given on these pages are for planning purposes only.

R-15 Anchored V-Boom to Skimmer (Pg 1 of 2)



A V-shaped boom configuration is anchored with two booms of 1,000 feet each, with a typical sweep opening of 800 feet. Anchors are placed as appropriate. A skimmer will be tied in at the apex. A workboat supports the skimmer and tends the boom. The skimmer pumps oil and water into a mini-barge anchored immediately downcurrent.

EQUIPMENT AND PERSONNEL

- Select vessels, booms, and skimmers according to area, water depth restrictions, and function (see Tactic L-6).

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Skimmer	All	On-water recovery	1	4	4 hr	3 hr
Work Boat	All	Support skimmer and tend boom	1		1 hr	
Boom	All	V boom	2,000 ft		1 hr	
Anchor System	All	Anchor boom	Variable		1 hr	
Anchor System	All	Anchor discharge hose	Variable		1 hr	
Anchor System	All	Anchor mini-barge	Variable		1 hr	
249-bbl Mini-barge (237 bbl available storage)	West Dock, Oliktok	Intermediate storage	2	—	1 hr	
Work Boat or Runabout	All	Deploy boom	1	3 for setup	1 hr	
Work Boat	All	Tow mini-barge to unload	1	2	1 hr	
		TOTAL STAFF FOR SETUP		**9**		
		TOTAL STAFF TO SUSTAIN OPERATIONS		**6**		

SUPPORT

- An aircraft will track the oil and help coordinate the on-water task forces. A work boat with propeller tows the mini-barge into place and leaves once the barge is anchored.

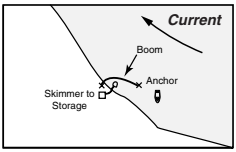
CAPACITIES FOR PLANNING

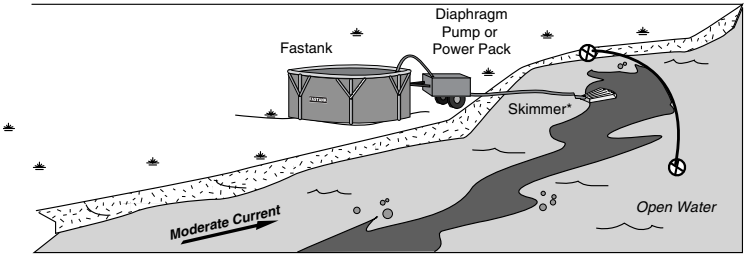
- Boom throughput efficiency is 100% in open sea water and 90% in rivers.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Approval to decant is needed from the State On-Scene Coordinator. Appropriate agencies will be consulted to determine site-specific stipulations.
- The amount of oil recovered will be estimated based on gauging by appropriate means (e.g., ullage tape). Emulsion samples will be collected and analyzed for oil content.
- In shallow water operations, a mini-barge may be grounded and used as a work platform.

R-16 Hook Boom to Skimmer and Storage (Pg 1 of 2)





*A Manta Ray skimmer is shown, but other types of portable skimmers may be used.

Boom is anchored on the shore in lengths of 50 to 300 feet. An anchor holds the boom off the shore, and a work boat tends the booms and anchors.

A skimmer is placed near the shore in the recovery area of the boom. Diesel power packs on shore power the skimmer. A temporary tank and a trash pump are set up on shore (see Tactic R-22).

Liquids are pumped to the temporary tank on shore. Onshore tanks decant 80% of the fluids as free water into the collection boom area, with approval of the State On-Scene Coordinator.

Additional portable tanks and pumps can be added as needed depending on oil encounter rates.

EQUIPMENT AND PERSONNEL

- Select vessels, booms, and skimmers according to area, water depth restrictions, and function (see Tactic L-6).
- Equipment and personnel required to set up and maintain boom are listed in the applicable containment tactic.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Small Stationary Skimmer System	All	Recovery	1	4 for setup 2 to maintain	1 hr	3 hr
Pump (3-inch)	All	Transfer	1		1 hr	
Suction Hose (3-inch)	All	Recovery	2≥20 ft		2 hr	
Discharge Hose (3-inch)	All	Recovery	2>50 ft		1 hr	
Portable Tank	All	Storage	1		1 hr	
or Tank Bladder (500 gal)	ACS, WOA, Alpine	Storage	1	—	1 hr	1hr

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Avgas Trailer	ACS, GPB, KRU, Badami, Alpine	Airboat fuel	1	1 (initial)	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr

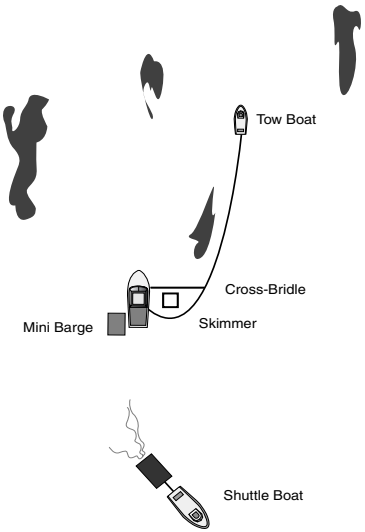
CAPACITIES FOR PLANNING

- Up to 10 tactical units deployed within a 5-mile area can share the boom deployment/tending crew (e.g., one boom crew can deploy and tend up to 2,000 ft of boom within 5 miles), but a skimmer, power pack, storage and operators must be included for each hook boom deployed. For example, to set 10 hooks deployed within a 5-mile area, the following are needed: 2,000 ft boom, 1 boat with 3 personnel, 10 skimmers each with an operator, 10 power packs each with an operator, and 10 portable tanks with associated hoses.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- Rubber-tracked wide-track dozers or Rolligons can pull tanks across the tundra to waiting vacuum trucks on a pad or road. Backhoes or Bobcats can dig collection pits along the shore for storage.
- Airboats can be used to move oil into collection points.
- KRU has Rolligons with cranes to lift skimmers, if necessary.
- 500-gallon bladders with cargo nets placed underneath could also be used for helicopter slinging or storage.
- Bigger bladders could be used if Rolligon transport is available.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-17 J-Boom to Skimmer and Mini-Barge (Pg 1 of 2)



A work boat tows 350 to 500 feet of boom, with swath widths of 100 to 150 feet, respectively. The other end of the boom is connected to the boat that operates the skimmer. The boom is towed in a J-boom configuration that directs oil into a skimmer in the apex. Continued operations offshore involve boom of 350 feet. Operations that enter near-shore areas and encounter lesser waves involve boom of 500 feet.

Skimmed liquids are pumped into mini-barges. A skimmer vessel tows and fills a mini-barge until it is replaced by an empty mini-barge. Free water from the bottom of the mini-barge tank is decanted during the skimming and loading. The discharge hose, fastened upcurrent of the skimmer, directs the free water into the boomed area. The operator turns off the pump when the discharge water becomes black with oil. Mini-barges are towed to, and deliver liquids to, an intermediate storage barge.

EQUIPMENT AND PERSONNEL

- Select vessels, booms, and skimmers according to area, water depth restrictions, and function (see Tactic L-6).

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Skimmer	All	On-water recovery	1	3	1 hr	2 hr
Work Boat	All	Tow boom and mini-barge, operate skimmer and pump	1		1 hr	
Work Boat	All	Tow J-boom	1	2	1 hr	
Boom	All	On-water collection	Variable		1 hr	
Work Boat	All	Shuttle mini-barge	1	2	1 hr	
249-bbl Mini-Barge (237-bbl available storage)	West Dock, Oliktok	Intermediate storage	2	—	1 hr	
			TOTAL STAFF	**7**		

DECANTING

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Trash Pump (3-inch)	All	Decanting	1	1	1 hr	2 hr
Suction Hose (3-inch)	All	Decanting	≥20 ft	2 for setup	2 hr	
Discharge Hose (3-inch)	All	Decanting	>50 ft	2 for setup	2 hr	

SUPPORT

- An aircraft tracks the oil and helps coordinate the on-water task forces (preferably twin-engined aircraft or single-engined aircraft on floats).

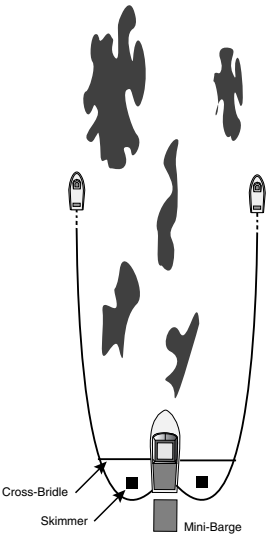
CAPACITIES FOR PLANNING

- 1 hr to load mini-barge; 1.5 hr to unload.
- When used with a weir skimmer and after decanting, a mini-barge contains 79 bbl oil, 53 bbl water in emulsion, 104 bbl free water, 237 total bbl.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Approval to decant is needed from the State On-Scene Coordinator. Appropriate agencies will be consulted to determine site-specific stipulations.
- The amount of oil recovered will be estimated based on gauging by appropriate means (e.g., ullage tape). Emulsion samples will be collected and analyzed for oil content.

R-18 U-Boom to Skimmer and Mini-Barge (Pg 1 of 2)



NOTE: This operation may also be conducted using a work boat with integrated oil recovery system and built-in recovered oil storage tank. This option is ideal for handling smaller spills, as well as supporiing larger responses.

Two work boats each tow 500 feet of ocean boom in a 300-foot-wide sweep. The skimming vessel is tied into the boom. The oil passes into the boom configuration and then into a skimmer. The vessel's hydraulics power the skimmer and the skimmer pump. The skimmer pumps recovered liquids into a towed storage platform (mini-barge or floating storage bladder). Free water is decanted during the loading step. When the storage platform is full, a work boat replaces it and tows it to an intermediate storage platform for off-loading. Skimming continues uninterrupted.

EQUIPMENT AND PERSONNEL

- Select vessels, booms, and skimmers according to area, water depth restrictions, and function (see Tactic L-6).

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Work Boat	All	Tow boom, up to 500 ft	2	4	1 hr	2 hr
	Boom	All	On-water recovery	1,000 ft	—	1 hr	
	Work Boat* w/ 2 integrated Skimmers	Shell	Tow boom and mini-barge or floating storage bladder; skim, decant and store or pump oil	1	2	0.5 hr	0.5 hr
or	Work Boat	All	Run skimmer and pump; tow mini-barge while loading; tow boom	1	4	1 hr	2 hr
	Skimmer	All	On-water recovery	2		1 hr	
	Work Boat	All	Shuttle storage platforms	1	2	1 hr	
	249-bbl Mini-Barge (237 bbl available storage)	West Dock, Oliktok	Intermediate storage	2	—	1 hr	
or	Floating Storage Bladder**	Shell	Intermediate storage	2	—	0.5 hr	0.5 hr

TOTAL STAFF 11-13

** 50 bbl onboard recovered oil tank and off-loading PDP*
*** Onboard 3-inch diaphram diesel decanting pump*

DECANTING

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Trash Pump (3-inch)	All	Decanting	1	1	1 hr	2 hr
Suction Hose (3-inch)	All	Decanting	≥20 ft	2 for setup	2 hr	
Discharge Hose (3-inch)	All	Decanting	>50 ft	2 for setup	2 hr	

SUPPORT

- A trained aerial observer in a fixed-wing aircraft or helicopter tracks the oil location and movement from above and coordinates the on-water task force recovery effort.

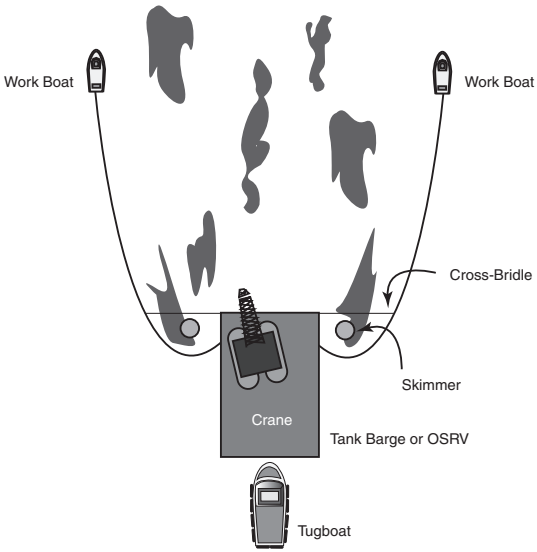
CAPACITIES FOR PLANNING

- When used with a weir skimmer and after decanting, a mini-barge contains 79 bbl oil, 53 bbl water in emulsion, 104 bbl free water, 237 total bbl.
- 1 hr to load mini-barge; 1.5 hr to unload.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- The oil recovery rate and number of mini-barges required (fill to 95% capacity) vary with the oil encounter rate.
- Approval to decant is needed from the State On-Scene Coordinator. Appropriate agencies will be consulted to determine site-specific stipulations.
- The amount of oil recovered will be estimated based on gauging by appropriate means (e.g., ullage tape) prior to offloading. Emulsion samples will be collected and analyzed for oil content.

R-19 J-Boom to Tank Barge or OSRV (Pg 1 of 2)



Two work boats each tow 1,000 feet of ocean boom into a J-shape to make a 700-foot sweep. The boom is inflated and deployed from the deck of the tank barge or OSRV. A crane lifts a skimmer from one side of barge's deck into the apex of the boom. The crane positions the skimmers where the oil is deepest. The barge pumps up to 80% of its free water back into the boomed area. The task force advances at a speed no greater than 0.7 knot.

EQUIPMENT AND PERSONNEL

- Select vessels, booms, and skimmers according to area, water depth restrictions, and function (see Tactic L-6).

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Work Boat (ACS Bay Class or equivalent*)	West Dock	Tow boom	2	6	1 hr	3 hr
	Boom	West Dock, Oliktok	On-water collection	Variable	4	1 hr	
	Transrec 250 Skimmer* (w/ power pack)	ACS	On-water recovery	1	—	2 hr	
or	Walosep W4 Skimmer* (w/ power pack)	ACS	On-water recovery	1	—	2 hr	
or	Crucial 13/30 Skimmer	ACS	On-water recovery	2	—	1 hr	
or	LORI LFS Skimmer*	ACS	On-water recovery	2	—	1 hr	
or	Lamor LSC-5 Skimmer*	Shell	On-water recovery	2	—	—	1 hr
	Tug	West Dock	Towing	1	4	2 hr	3 hr
	Tank Barge	West Dock	Storage	1	6	4 hr**	
or	OSRV	Shell	Storage	1	12	1 hr	1 hr
	Mobile Crane	GPB, KRU, Peak	Skimmer deployment	1	1	2 hr	3 hr
	Archimedes Screw Pump	ACS, KRU	Decanting	1	—	1 hr	
	Discharge Hose (4-inch w/ 6-inch to 4-inch reducer)	ACS, WOA, KRU	Decanting	≥50 ft	—	1 hr	
or	PDP, with diesel/hydraulic power-pack (annular injection flanges)	Shell	Decanting/Offload	8	—	1 hr	1 hr

TOTAL STAFF 21-27

** Two LORI LFS or Lamor LSC-5 skimmers are interchangeable with the Transrec 250 and Walosep W-4 skimmers, depending on ice conditions.*
*** 200 hp minimum*
**** This mobilization time applies after tank barge arrives on North Slope.*

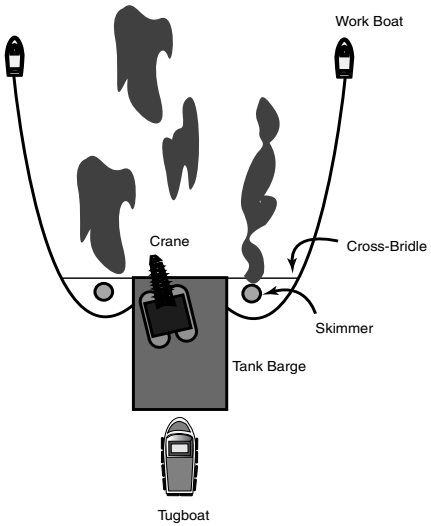
SUPPORT

- A trained aerial observer in a fixed-wing aircraft or helicopter tracks the oil location and movement from above and coordinates the on-water task force recovery effort.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- The oil recovery rate and number of mini-barges required (fill to 95% capacity) vary with the oil encounter rate.
- Approval to decant is needed from the State On-Scene Coordinator. Appropriate agencies will be consulted to determine site-specific stipulations.
- The amount of oil recovered will be estimated based on gauging by appropriate means (e.g., ullage tape) prior to offloading. Emulsion samples will be collected and analyzed for oil content.

R-19A Use of J-Booms in Broken Ice (Pg 1 of 2)



Two work boats each tow 400 feet of ocean boom from the barge into a J-shape to make a 300-foot sweep. Length of boom depends on the ice conditions. A crane lifts a skimmer from one side of the storage barge's deck into the apex of the boom. The crane positions the skimmers where the oil is deepest, and the barge fills with recovered liquids.

EQUIPMENT AND PERSONNEL

- Select vessels, booms, and skimmers according to area, water depth restrictions, and function (see Tactic L-6).

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Work Boat (ACS Bay Class or equivalent*)	West Dock	Tow boom	2	6	1 hr	
	Tug	West Dock	Tow barge	1	4	2 hr	
	Tank Barge	West Dock	Skimmer mount	1	14	4 hr***	
	Boom	West Dock	On-water collection	Variable	4 for setup	1 hr	
	Mobile Crane	GPB, KRU, Peak	Skimmer deployment	1	1	2 hr	
	Desmi 250 (Ocean)	ACS	On-water recovery	1	—	1 hr	
	Desmi 250 (Harbor)	ACS	On-water recovery	1	—	1 hr	3 hr
	LORI LFS Skimmer**	ACS	On-water recovery	2	—	1 hr	
and/or	Crucial 13/30 Skimmer	ACS	On-water recovery	2	—	1 hr	
and/or	Foxtail Rope Mop V.A.B 2-9	ACS	On-water recovery	1	—	2 hr	
and/or	Foxtail Rope Mop V.A.B. 4-9	ACS	On-water recovery	1	—	2 hr	
and/or	Transrec 250 Skimmer** (w/ power pack)	ACS	On-water recovery	1	—	2 hr	
and/or	Walosep W4 Skimmer** (w/ power pack)	ACS	On-water recovery	1	—	2 hr	
				TOTAL STAFF	**25**		

** 200 hp minimum*
*** Two LORI LFS skimmers are interchangeable with the Transrec 250 and Walosep W-4 skimmers, depending on ice conditions.*
**** This mobilization time applies after barge arrives on North Slope.*

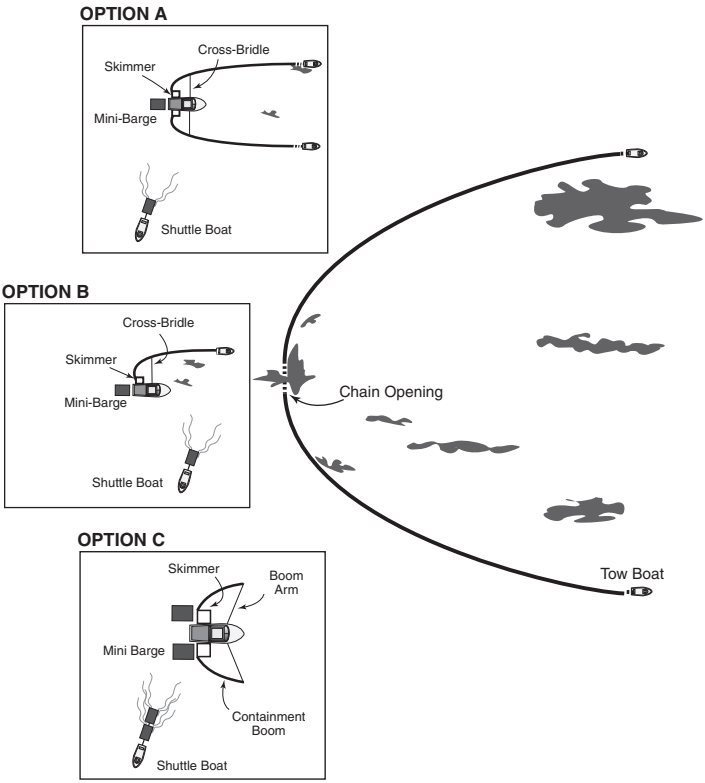
SUPPORT

- A trained aerial observer in a fixed-wing aircraft or helicopter tracks the oil location and movement from above and coordinates the on-water task force recovery effort.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Ice management may be used to decrease ice concentrations encountered by the containment system.
- Approval to decant is needed from the State On-Scene Coordinator. Appropriate agencies will be consulted to determine site-specific stipulations.
- The amount of oil recovered will be estimated based on gauging by appropriate means (e.g., ullage tape). Emulsion samples will be collected and analyzed for oil content.

R-20 U-Boom with Open Apex to Skimming System (Pg 1 of 2)



The length of boom and boom swath width are determined by the towing capacity of the boats and the water depth. For a swath width of 650 feet, two work boats each pull 1,000 feet of ocean boom. (Shorter lengths of boom may be necessary to avoid boom planing or entrainment based on sea conditions).

Oil funnels through the boom's chained opening in the apex, with concentrated oil moving directly into a collection boom consisting of one or two 250-foot sections, each towed by a work boat (Options A and B). A recovery vessel (work boat, OSRB or OSRV) with skimming capability is tied into the apex of the collection boom. The recovery vessel's engines power a hydraulic system to drive the skimmer and the pumps. For Option C, the 250-foot sections of boom and towboats are replaced by two 42-foot sections of boom held in place off the recovery vessel by means of boom arms.

Oil and sea water are pumped into a mini-barge or floating storage bladder. To replace when full, a shuttle boat hooks up an empty replacement to the skimmer vessel and tows away the full one.

EQUIPMENT AND PERSONNEL

- Select vessels, booms, and skimmers according to area, water depth restrictions, and function (see Tactic L-6).

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Work Boat	West Dock, Oliktok, Northstar	Tow boom for open apex	2	6	1 hr	Opt. A: 4 hr Opt. B: 4 hr Opt. C: 4.5 hr
	Work Boat	All	Tow boom, up to 250 ft	Opt. A: 2 Opt. B: 1 Opt. C: 0	Opt. A: 6 Opt. B: 3 Opt. C: 0	1 hr	
	Boom	All	On-water recovery	Variable	—	1 hr	
	LORI LSC Skimmer	West Dock	On-water recovery	Opt. A: 2 Opt. B: 1 Opt. C: 2	—	1 hr	
or	Lamor LSC-5 Skimmer	Shell	On-water recovery	Opt. A: 2 Opt. B: 1 Opt. C: 2	—	—	
or	Crucial 13/30 Skimmer	West Dock	On-water recovery	Opt. A: 2 Opt. B: 1 Opt. C: 2	—	1 hr	
or	LORS-2C	Shell	On-water recovery	Opt. A: 2 Opt. B: 1 Opt. C: 2	—	—	
	Work Boat	West Dock	Run skimmer and pump; tow mini-barge while loading	1	4	Opt. A: 1 hr Opt. B: 1hr Opt. C: 1.5 hr	
or	Tug and OSRB w/crane	Shell	Run skimmer and pump; store recovered oil; deploy equipment	1 each	Tug: 5 OSRB: 6 Crane: 1	Opt. A: 1 hr Opt. B: 1hr Opt. C: 1.5 hr	
or	OSRV	Shell	Run skimmer and pump; store recovered oil; deploy equipment	1	12	Opt. A: 1 hr Opt. B: 1hr Opt. C: 1.5 hr	
	249-bbl Mini-Barge (237-bbl available storage)	West Dock, Oliktok	Intermediate storage	Opt. A: 2 Opt. B: 2 Opt. C: 4	—	2 hr	
or	Floating Storage Bladder	Shell	Intermediate storage	2	—	0.5 hr	

TOTAL STAFF **OPT. A: 16-24**
OPT. B: 13-21
OPT. C: 10-18

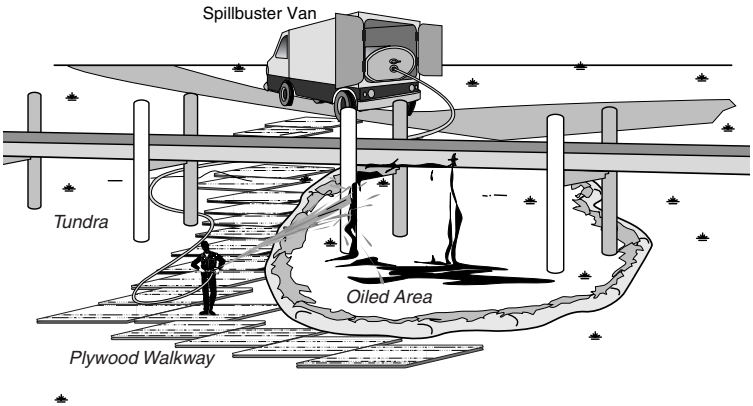
SUPPORT

- A trained aerial observer in a fixed-wing aircraft or helicopter tracks the oil location and movement from above and coordinates the on-water task force recovery effort.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- The oil recovery rate and number of mini-barges required (fill to 95% capacity) vary with the oil encounter rate.
- Approval to decant is needed from the State On-Scene Coordinator. Appropriate agencies will be consulted to determine site-specific stipulations.
- The amount of oil recovered will be estimated based on gauging by appropriate means (e.g., ullage tape) prior to offloading. Emulsion samples will be collected and analyzed for oil content.

R-21 Hot Water, High-Pressure Washing Solid Surfaces (Pg 1 of 2)



Hot-water, high-pressure washing removes oil from concrete, rock, and metal surfaces. Sorbents, containment boom, and Shore Seal boom prevent re-oiling of adjacent areas. Sorbent boom and skimmers recover oil from adjacent water, while trenches collect surface and subsurface oil.

The “Spillbuster” van’s high-pressure, high-temperature spray is directed over the oiled surface to remove the oil. The van has a tank, with heater, hose, and nozzle. Water pressure is approximately 3,000 psi. The removed oil is trapped downstream in a man-made lined pit or trench or in a boomed-off area of open water close to shore. The oil is then removed by direct suction, skimming, burning, or sorbent pads. The Spillbuster van has a 200-gallon water tank with a diesel heater. The van can be coupled with a water truck to give it a continuous supply of water. Without a water truck the van can operate for 4 to 6 hours.

The Spillbuster is loaded onto a deck barge to access offshore oiled structures.

EQUIPMENT AND PERSONNEL FOR OPEN WATER

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Spillbuster Van	EOA, KRU	Surface oil removal	1	2 (3 if water truck used)	1 hr	1 hr
Tug*	West Dock	Tow barge	1	8	2 hr	4 hr
Deck Barge*	West Dock	Work platform, and equipment transport	1		4 hr	

**Optional*

TOTAL STAFF ≥2

EQUIPMENT AND PERSONNEL FOR ONSHORE

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Spillbuster Van	EOA, KRU	Surface oil removal	1	2 (3 if water truck is used)	1 hr	1 hr
Plywood	All	Walk path	Varies	2	2 hr	2 hr

SUPPORT

- Vacuum trucks, skimmers, and sorbents are used for collection. Pumps transfer the oil to mini-barges or bladders towed by work boats. Containment booming is used when recovering near or over water and the oil is washed into the boomed area (see Tactic C-4 for containment options). A water truck is attached to the Spillbuster for an additional water supply, when necessary.

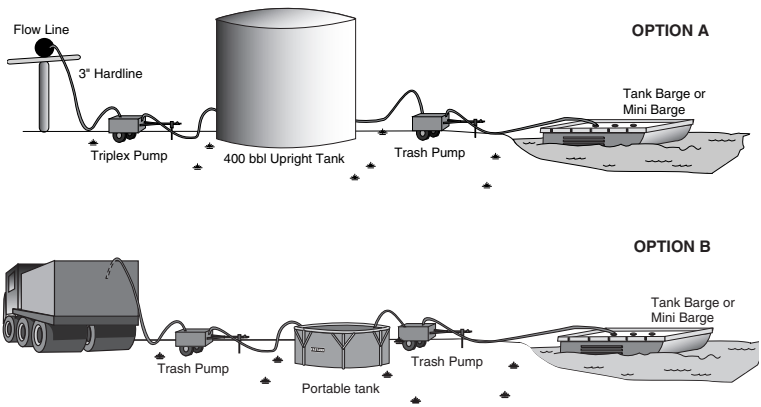
CAPACITIES FOR PLANNING

- The water tank on the Spillbuster van has a capacity of 200 gal.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Oiled surfaces are cleaned up as a non-emergency project. Cleaning begins at the highest point and continues downslope. Care is taken to avoid contaminating unaffected areas. Removed oil is concentrated for recovery. The Spillbuster van has vacuum capabilities.
- The Spillbuster units come skid-mounted (KRU) and as a mobile van (EOA). The Spillbuster units are kept in warm storage and are not used when the temperature is below freezing. During winter, ConocoPhillips' steam unit from Drill Site Maintenance is used. This unit virtually eliminates free liquids from cleaning.
- The hot-water, high-pressure wash method is harmful to flora and fauna and is not recommended for surfaces that support living plants or animals. When this method is used on oiled surfaces other than boulders, man-made structures, or rock, the oil may penetrate deeper into the sediments.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.

R-22 Temporary Storage Options (Pg 1 of 2)



In Option A, a pump at the dockhead moves liquids from a storage barge into a temporary upright tank using a trash pump, and a Triplex pump moves the liquid from the tank through a 3-inch hard line and flange connector into a production pipeline. In Option B, a temporary open-top tank such as a Fastank may also be used and trash pump moves the liquid from the open-top tank to a tank truck or tank trailer when a pipeline is not available.

EQUIPMENT AND PERSONNEL

OPTION A

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Upright Tank (400-bbl)	KRU, Alpine	Store recovered fluids	1	1 intial	2 hr	2 hr
	Trash Pump (4-inch)	ACS, GPB, Alpine	Liquid transfer	1	1	1 hr	
or	Archimedes screw pump	West Dock	Liquid transfer	1	—	1 hr	3 hr
	Triplex (6-inch)	GPB, KRU; Alpine has 2-inch	Liquid transfer	1	2	1 hr	2 hr
	Suction Hose (6-inch)	ACS	Liquid transfer	≥20 ft	2 for setup	2 hr	
	Discharge Hose (6-inch)	ACS, WOA, KRU	Liquid transfer	≥50 ft	—	1 hr	
	Suction Hose (4-inch)	ACS, WOA	Liquid transfer	≥20 ft	2 for setup	2 hr	
	Discharge Hose (4-inch)	ACS, WOA, KRU	Liquid transfer	≥50 ft	—	1 hr	
	Hard Line and Flange Connector (3-in)	Deadhorse	Liquid transfer	1 section	7 for setup	3 hr	

TOTAL STAFF FOR SETUP 13

TOTAL STAFF TO SUSTAIN OPERATIONS 6

EQUIPMENT AND PERSONNEL (CONT'D)

OPTION B

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Rolligon	CATCO	Transport tank	1	1	6 hr	2 hr
Diesel Power Pack	ACS, GPB, KRU, Endicott	Power recovery equipment	1	1	1 hr	1 hr
Portable Tank	All	Intermediate storage	1	2 for setup	1 hr	
Vacuum Truck	All	Transfer liquid	1	1	1 hr	0.5 hr
Trailer Tank (10,000 gal)	CATCO	Transfer liquid	1	—	6 hr	
Archimedes Screw Pump	West Dock	Transfer liquid	1	—	1 hr	3 hr
or Trash Pump (4-inch)	ACS, GPB, Alpine	Transfer liquid	2	2	1 hr	
Suction Hose (4-inch)	ACS, WOA, Alpine	Transfer liquid	≥20 ft	2 for setup	2 hr	1 hr
Discharge Hose (4-inch)	ACS, WOA, KRU, Alpine	Transfer liquid	>50 ft	—	1 hr	
			TOTAL STAFF	**7**		

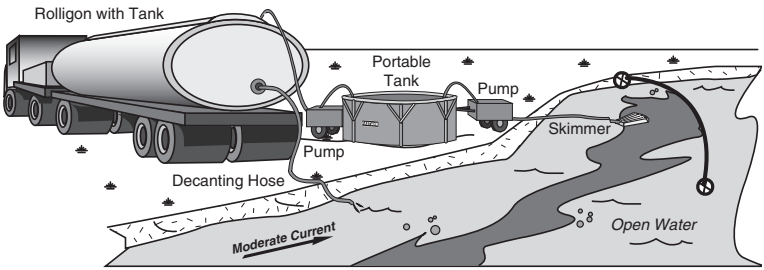
CAPACITIES FOR PLANNING

- The typical suction rate for liquids by a vacuum truck is 200 bbl/hr in the summer and 150 bbl/hr in the winter. The typical suction rate for pooled diesel remains at 200 bbl/hr year round. (Vacuum truck recovery rate is reduced to 34 bbl/hr if a Manta Ray skimmer is used.)

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- When working with equipment around or near flow lines, a spotter must be added to each front-end loader.
- A civil work permit from the operator is required for all work on owner-company pads.
- Decanting takes place from the temporary storage tanks with approval from the State On-Scene Coordinator to minimize the risk of secondary spills and to reduce the number of trips across the tundra, if necessary.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-23 Tank on Trailer (Fuel Tanker) (Pg 1 of 2)



A Rolligon pulls the empty 10,000-gallon trailer tank to a storage site. Liquids are pumped from a temporary tank into the trailer tank using a 4-inch trash pump. The Rolligon then pulls the trailer cross-country and transfers the liquid to a waiting vacuum truck or temporary storage tank on a pad or road. The Rolligon works under ACS's permit for emergency tundra travel.

EQUIPMENT AND PERSONNEL

- Equipment and personnel required to set up and maintain boom are listed in the applicable containment tactic.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Rolligon	CATCO, Peak	Transport tank	1	1	6 hr	2 hr
Trash Pump (4-inch)	ACS, GPB, Alpine	Liquid transfer	1	1	1 hr	
Suction Hose (4-inch)	ACS, WOA, Alpine	Liquid transfer	≥20 ft	2 for setup	2 hr	
Discharge Hose (4-inch)	ACS, WOA, KRU, Alpine	Liquid transfer	≥50 ft	—	1 hr	
Diaphragm Pump (3-inch)	All	Recovery	1	1	1 hr	
Suction Hose (3-inch)	All	Recovery	2>20 ft	2 for setup	2 hr	
Discharge Hose (3-inch)	All	Recovery	2>50 ft	—	1 hr	
Trailer Tank (10,000 gal.)	CATCO, Peak	Intermediate storage	1	—	6 hr	
			TOTAL STAFF	**3**		

SUPPORT

- Temporary storage tanks at a recovery site are the liquid source for the trailer tank. Vacuum trucks wait on gravel pads or nearby roads to empty the trailer tank.

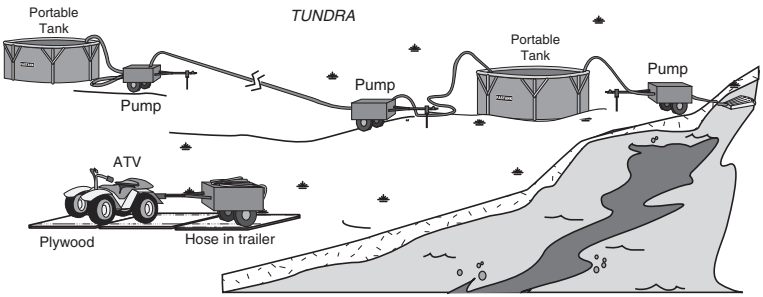
CAPACITIES FOR PLANNING

- Trailer tank holds 10,000 gal.
- Travel speed is approximately 5 mph across tundra; Rolligon travels up to 20 mph on roads.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Other trailer tanks are available on the Slope. The trailer tank and the temporary storage tanks decant free water to a recovery site. Travel across tundra by tracked vehicles and decanting require approval by the State On-Scene Coordinator.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-24 Hoses and Pumps in Series (Pg 1 of 2)



A system of hoses and pumps in series system is assembled to transfer stored liquids. Four- or 6-inch discharge hose is used in sections, with 4-inch or 6-inch trash pumps in series approximately 1,000 feet apart. Liquids are pumped to a storage tank or vacuum trucks, or are recycled into a pipeline. Hose and pumps in series are typically used across tundra, but if the hose crosses a road or pad, crossings are flagged and constructed with timbers over the hose. The hose is clearly marked.

To transport pumps and hose across the tundra, plywood sheets are laid out in the path. The trash pumps are towed behind an Argo all-terrain vehicle (ATV) or 4-wheeler across the plywood. A 4-inch trash pump weighs 825 pounds, and has an axle and wheels under its skid mount. An ATV towing a trailer carries the hose.

EQUIPMENT AND PERSONNEL

- The length of discharge hose required is approximated by the distance of the fluid transfer.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
ATV	All	Transport equipment	2	2	1 hr	4 hr
Trash Pump (3- or 4-inch)	ACS, GPB, Alpine	Liquid transfer	≥2	4	1 hr	
Suction Hose (3- or 4-inch)	ACS, WOA, Alpine	Liquid transfer	>20 ft	—	2 hr	
Discharge Hose (3- or 4-inch)	ACS, WOA, KRU, Alpine	Liquid transfer	>500 ft	6	1 hr	
		TOTAL STAFF FOR SETUP		**12**		
		TOTAL STAFF TO SUSTAIN OPERATIONS		**6**		

SUPPORT

- A pipeline, tank, vacuum truck, or other suitable storage receives the transported liquids from the hose and pump in series. Plywood sheets are laid across the tundra to ease travel and minimize impact to the tundra.

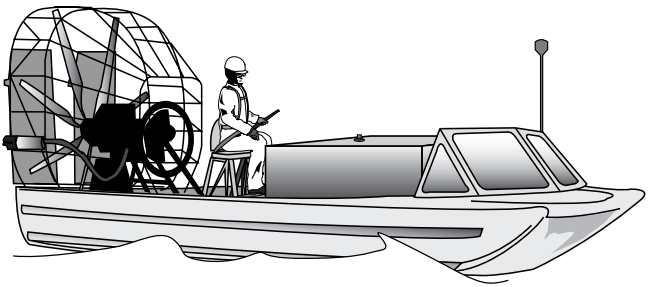
CAPACITIES FOR PLANNING

- One tactical crew unit can deploy approximately 1,500 ft of hose per hour if the hose is prestacked on a trailer.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- The ACS discharge hose test performed on September 27, 1997, with a Gorman Rupp pump, 4-inch suction hose, and 2,000 ft of 6-inch discharge hose demonstrated a capacity of 690 bbl/hr. The test was performed with water, and the pump had no problem pumping large volumes of water through 2,000 ft of hose.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-25 Freighter Boat with Tank (Pg 1 of 2)



A 300-gallon DOT tank is mounted on a freighter airboat. Liquid is pumped from a recovery site pit, trench, or tank with a 2-inch trash pump onboard. The boat hauls the liquids to a disposal, transfer or storage site.

The airboat's tank is unloaded with a vacuum truck or at a tank farm.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Freighter Airboat	ACS, KRU, Alpine	Transport tank	1	4	1 hr	1 hr
Trash Pump (2-inch)	MPU, ACS, KRU, Alpine	Fluid transfer	1	—	1 hr	
Discharge Hose (2-inch)	All	Fluid transfer	≥50 ft	—	1 hr	
Suction Hose (2-inch)	All	Fluid transfer	>20 ft	—	2 hr	
Tank (300-gallon)	KRU, Alpine	Fluid storage	1	—	1 hr	
			TOTAL STAFF	**4**		

SUPPORT

- The freighter airboat is offloaded to a tank farm or vacuum truck at a boat launch on the road system, or at a marine dock.
- A Manta Ray skimmer head onboard the airboat will serve as an option to recover from pits or trenches.

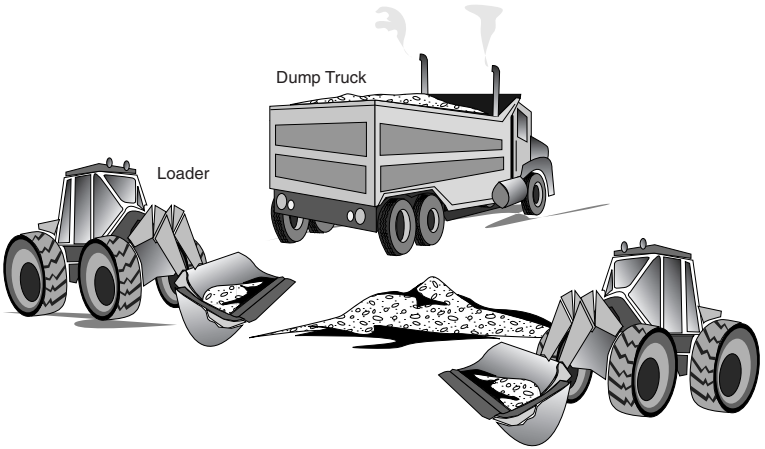
CAPACITIES FOR PLANNING

- The typical suction rate for liquids by a vacuum truck is 200 bbl/hr in the summer and 150 bbl/hr in the winter. The typical suction rate for pooled diesel remains at 200 bbl/hr year round. (Vacuum truck recovery rate is reduced to 34 bbl/hr if a Manta Ray skimmer is used.)
- Maximum load of freighter airboat = 4,000 lb.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Approval from the State On-Scene Coordinator is required for decanting available free water in inshore storage tanks.
- Have sorbent boom available at the transfer/disposal site as a contingency during tank offloading.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-26 Excavation and Storage of Oiled Gravel (Pg 1 of 2)



Oiled gravel not considered a regulated waste is excavated with a front-end loader into dump trucks, which then drive to a temporary storage site or a disposal site. Contaminated gravel is stockpiled in temporary lined and diked containment areas.

A bulldozer or grader loosens the gravel for the front-end loader when necessary. A Bobcat replaces the front-end loader in hard-to-reach or tight quarters. Manpower with shovels may also be required under lines or facilities with less than 6-foot clearance.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Front-End Loader	All	Recover oiled gravel	1	1	1 hr	0.5 hr
or	Bobcat	KRU, EOA, ACS, Alpine	Recover oiled gravel	1	1	1 hr	0.5 hr
	Grader, Backhoe or Dozer	All GPB, KRU, Peak, AIC, Alpine All	Loosen gravel	1	1	1 hr	0.5 hr
	Dump Truck	GPB, KRU, Alpine	Transfer oiled gravel	2 to 9	2 to 9	1 hr	0.5 hr
				TOTAL STAFF	**3 (4 if grader, backhoe, or dozer used)**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Transport backhoe	1	1 driver	1 hr	0
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Truck	All, except Badami	Support heavy equipment	1	1	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr

CAPACITIES FOR PLANNING

- A front-end loader with a 3-cubic-yd bucket recovers 100 cubic yd of gravel per hour, and can fill a dump truck in 30 minutes. The average dump truck available on the Slope has a 20-cubic-yd capacity.
- A front-end loader with a 4-cubic-yd bucket recovers 150 cubic yd of gravel per hour, and can fill a dump truck in 15 minutes.
- Following is an example of dump-truck delivery rate of gravel for one 20-cubic-yd dump truck traveling 4 miles round trip (equipment and crews operate 10 hr in 12-hr shift; 2 shifts per day):

$$\text{Dump Recovery} = \frac{T_c}{L_t + T_t + U_t} = \frac{20 \text{ cubic yd}}{0.25 \text{ hr} + \left(\frac{2 \text{ mi} * 2}{35 \text{ mph}}\right) + 0.08 \text{ hr}} = 45 \text{ cubic yd/hr or } 5.6 \text{ bbl/hr}$$

Example: T_c = Truck Capacity

L_t = Load Time (15 min or 0.25 hr)

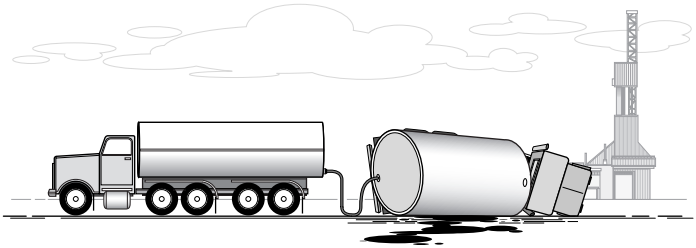
U_t = Unload Time (5 min or 0.08 hr)

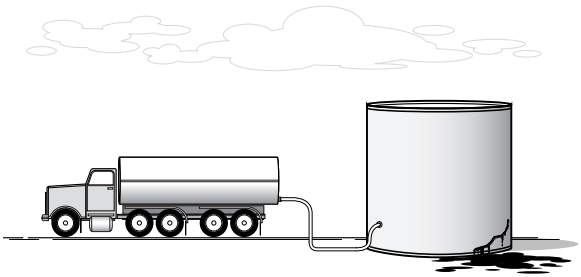
T_t = Travel Time $\left(\frac{\text{miles to disposal} * 2 \text{ trips}}{35 \text{ mph}}\right)$

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- This tactic is limited to oiled gravel with no free liquids. Depth of penetration of the spill into the gravel depends on the type of release and the released fluid. Diesel penetrates the gravel pad to a greater depth than crude oil.
- Storage sites must be located where they present minimal environmental impact.
- Set up a decontamination unit before oil handling work is performed.
- A temporary storage permit will be required from ADEC.
- On pads, check for buried pipe and/or cables prior to excavation. Obtain a civil work permit from the operator.

R-27 Damaged Tank Transfer Procedures (Pg 1 of 2)





Typically, transfer from a tank would be required if a stationary storage tank either was damaged or developed a serious integrity problem, or if a vacuum truck rolled over on the road and was damaged. Tank holes can be patched by different methods including plug and dike, wooden stakes, and patch kits.

Damaged tank transfers will generally involve flammable liquids, which require special considerations. Non-sparking pumps must be used for such transfers. Vacuum trucks are specially designed for most of these products and are readily available on the Slope. Product can also be transferred to a stationary tank in the vicinity of the damaged tank.

EQUIPMENT AND PERSONNEL

- Support personnel required include 2 responders per shift and one Safety Officer per shift.

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Vacuum Truck (300-bbl)*	All	Transfer	1	1	1 hr	0.5 hr
or	Fuel Truck	All	Transfer	1	1	1 hr	0.5 hr
or	Diaphragm Pump (3-inch)	All	Transfer	1	2	1 hr	1 hr
	Suction Hose (3-inch)	All	Transfer	≥20 ft	—	2 hr	
	Discharge Hose (3-inch)	All	Transfer	>50 ft	—	2 hr	
				TOTAL STAFF	**3**		

NOTE: Deploy times vary greatly based on the safety risk of the product involved.

** Badami vacuum truck capacity = 80 bbl*

RECOVERY CAPACITIES FOR PLANNING

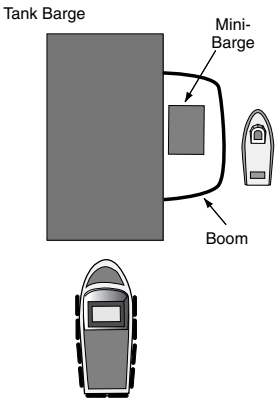
- The typical suction rate for liquids by a vacuum truck is 200 bbl/hr in the summer and 150 bbl/hr in the winter. The typical suction rate for pooled diesel remains at 200 bbl/hr year round. (Vacuum truck recovery rate is reduced to 34 bbl/hr if a Manta Ray skimmer is used.)

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

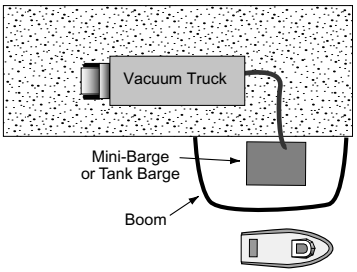
- Inert gases may be required for displacing flammable or explosive air mixtures.
- A Safety Officer should be on site conducting continuous air monitoring.
- Plug-and-patch kits are available from owner company HAZMAT teams.
- Non-sparking tools may be required for working on equipment.
- The amount of oil will be estimated based on gauging by appropriate means (e.g., Coliwasa tube). Emulsion samples will be collected and analyzed for oil content.

R-28 Lightering/Offloading (Pg 1 of 2)

LIGHTERING AT SEA



OFFLOADING AT SHORE



Work boats tow recovered oil-laden mini-barges or floating storage bladders to a waiting OSR platform (tank barge, OSRV, or tanker vessel). Towing speed is 5 knots. The mini-barge or floating storage bladder is tied off using appropriate fendering. Before offloading mini-barges, a bonding cable is connected for protection against accidental ignition. A tankerman assists with the entire off-loading operation, and a Declaration of Inspection form will be completed prior to commencing transfer.

To offload, a 3- to 4-inch trash or Archimedes screw pump is used depending on the oil viscosity. Personnel monitor tie-up lines during offloading to minimize surge. When pumping is complete, hatches are put back in place, hoses and pumps are retrieved and secured, and bonding cable removed (where necessary). At that time, the mini-barge or floating storage bladder is ready to return to service.

NOTE: Similar operations are utilized to off-load OSRBs or OSRVs to a tanker vessel.

Barges may also be offloaded directly to a vacuum truck onshore.

EQUIPMENT AND PERSONNEL

- Vessels are to be selected according to area, water depth restrictions, and function (see Tactic L-6).

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	OSRV	Shell	Fluid storage	1	6	0.5 hr	0.5 hr
or	Tug	West Dock	Tow barge	1	4	2 hr	2 hr
	Tank Barge	West Dock	Fluid storage	1	3	4 hr**	
	Boom	All	Surround off-loading vessel	Variable	2	1 hr	
	Work Boat*	All	Tow mini-barge or floating storage bladder	1	—	1 hr	
	Suction Hose (4-inch)	ACS, WOA	Lightering	>20 ft	—	2 hr	
	Discharge Hose (4-inch w/ 6-inch to 4-inch reducer)	All	Lightering	>50 ft	—	1 hr	
	Trash Pump (3- to 4-inch)	ACS, GPB, Alpine	Lightering	2	2	1 hr	
or	Archimedes Screw Pump	ACS, KRU	Lightering	1	2	1 hr	
or	Vacuum Truck (300-bbl)	All	Offloading	1	1	1 hr	

Work boat staff are counted in recovery.* **TOTAL STAFF 10-13
***This mobilization time applies after barge arrives on North Slope.*

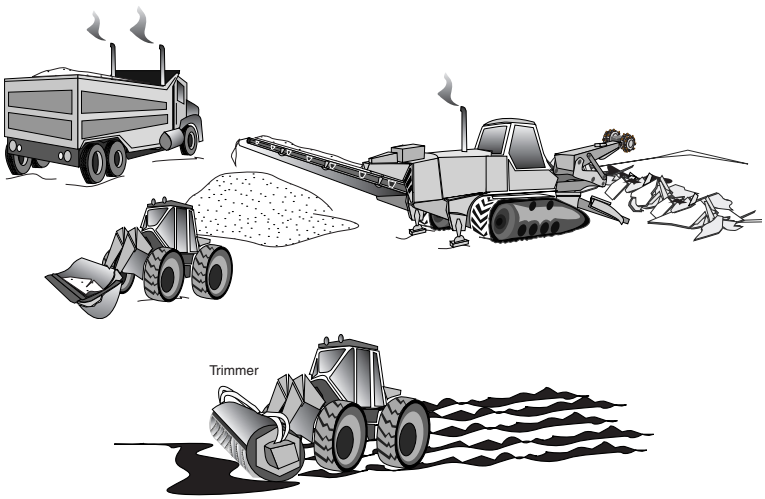
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Fuel Truck	All	Provide diesel fuel for boats and pumps	1	Once per shift	1 hr	0.5 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- The mini-barges have davits, but the Archimedes screw pump can be deployed by hand.
- If recovered oil is weathered to the point the 4-inch trash pump will not work, the Archimedes screw pump will be used.
- Hazards include open hatches, coiled lines, and hoses. Beware of pinch points between barges and boats. Hearing protection and possibly respirators will be required.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- The amount of oil recovered is estimated based on gauging by appropriate means (e.g., ullage tape). Emulsion samples are collected and analyzed for oil content.

R-29 Ice Mining (Pg 1 of 2)



During the winter, ice rubble piles can form at shorelines and manmade structures in the Beaufort Sea. Oil entrained in these piles can be accessed by removing the oiled ice with an ice-miner that grinds up the ice and deposits it in a pile that can be picked up with a front end loader and hauled away by dump truck.

This tactic can be used in winter and into breakup as long as the ice is thick enough to support the weight of vehicles and heavy equipment.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Ice Miner	GPB, KRU	Grinding oiled ice rubble	1 (3 are available on the Slope)	1	1 hr	0.5 hr
Roto Trimmer	KRU, GPB	Grinding oiled ice rubble	1 (3 are available on the Slope)	1	1 hr	0.5 hr
Front-End Loader	All	Transfer oiled snow into dump trucks	1	1	1 hr	0.5 hr
Dump Truck	GPB, KRU, Peak, AIC, Alpine	Transfer oiled snow to disposal site	≥2	≥2	1 hr	0.5 hr

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Transport ice miner	1	1 driver	1 hr	0
Heater	All	Heat	≥1	1 initial setup	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support heavy equipment	1	1	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Light Plant	All	Illumination	>1	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr

CAPACITIES FOR PLANNING

- Capacity of ice miner: 1,400 cubic yd per hour for sea ice, 1,420 cubic yd per hour for freshwater ice.
- A front-end loader with an 8-cubic-yd snow bucket can fill a dump truck in 10 minutes and move 500 cubic yd per hour. The dump trucks available on the Slope typically have 10-, 20-, or 25-cubic-yd capacity. To keep pace with the ice miner, it may be necessary to load more than one truck at a time.
- Following is an example of recovery of oiled ice for one 20-cubic-yd dump unit:

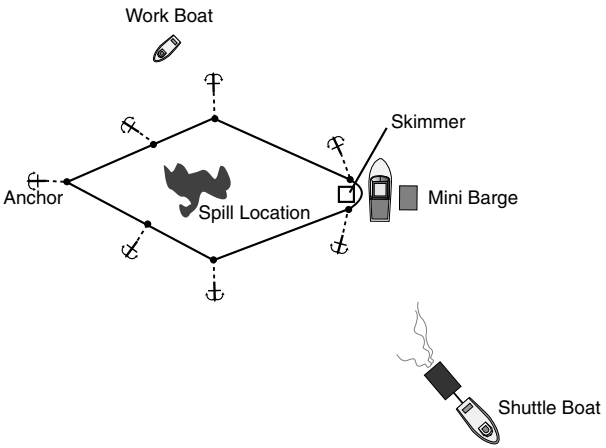
$$\textit{Dump Truck Recovery} = \frac{T_c}{L_t + T_t + U_t} = \frac{20 \text{ cubic yd}}{0.17 \text{ hr} + \left(\frac{2 \text{ mi} * 2}{35 \text{ mph}}\right) + 0.08 \text{ hr}} = 55 \text{ cubic yd/hr}$$

Example: T_c = Truck Capacity
L_t = Load Time (10 min or 0.17 hr)
U_t = Unload Time (5 min or 0.08 hr)
T_t = Travel Time $\left(\frac{\text{miles to disposal} * 2}{35 \text{ mph}}\right)$

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- This tactic is limited to oiled ice with no free liquids.
- If the dump trucks cannot access the oiled area, build an ice road to keep the loaders from traveling too far.
- After removal of free oil, oiled snow, and after flushing, contain and monitor the area until breakup. Insulate ice roads or ice berms to provide containment during breakup, when the oil can be removed with direct suction, portable skimmers, or burning.

R-30 Diamond Boom Recovery for Subsea Pipeline Break (Pg 1 of 2)



During a subsea pipeline break a diamond-patterned boom can be deployed around the break. A skimmer can be used at any point of the diamond to ensure collection regardless of the wind direction.

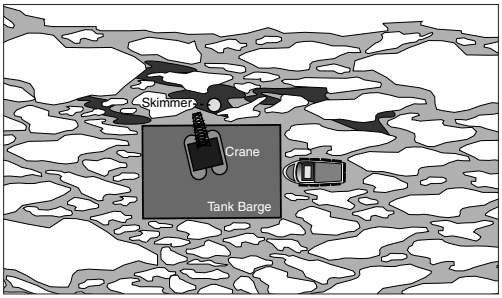
EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Work Boat	West Dock	Run skimmer and pump; tow mini-barge while loading	1	4	1 hr	4 hr
Work Boat	West Dock	Boom deployment and tending	1	3	1 hr	
Work Boat	West Dock	Tow mini-barge to unload	1	3		
Skimmer	ACS	On-water recovery	1	—	0.5 hr	
Boom	All	On-water recovery	Variable	—	1 hr	
Anchor System	All	Anchor boom	8	—	1 hr	
249-bbl Mini-Barge (237-bbl available storage)	West Dock, Oliktok	Intermediate storage	2	—	1 hr	2 hr
			TOTAL STAFF	**10**		

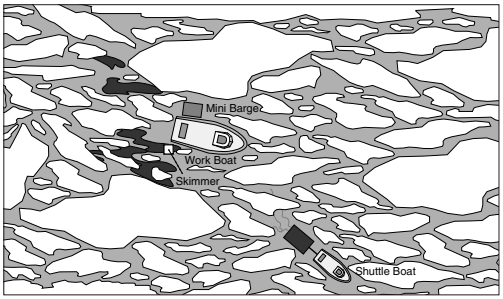
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- On the North Slope, this tactic is limited to shallow, slow-moving water.
- The skimming system would be located on the downwind side of the diamond.
- This tactic may also be used in broken ice conditions to deflect ice away from the spill location.
- Boom apex may be opened to direct oil to vessel-based containment.
- Approval to decant is needed from the State On-Scene Coordinator. Appropriate agencies will be consulted to determine site-specific stipulations.
- The amount of oil recovered will be estimated based on gauging by appropriate means (e.g., ullage tape). Emulsion samples will be collected and analyzed for oil content.

R-31 Free Skimming (Pg 1 of 2)



OPTION A



OPTION B

A tug-pushed tank barge, OSRB, OSRV or workboat utilizing various skimmers navigates the spill area collecting oil in pockets of broken sea ice. Onboard cranes place the skimmers into the deepest pools of oil. During collection/ recovery, vessels maintain no forward speed and are not using boom.

EQUIPMENT AND PERSONNEL

- Select vessels, booms, and skimmers according to area, water depth restrictions, and function (see Tactic L-6).

OPTION A

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	OSRV	Shell	Skimmer and pump platform; storage	1	12	1 hr	1 hr
or	OSRB	Shell	Skimmer and pump platform; storage	1	6	1 hr	1 hr
and	Tug	Shell	Tow OSRB	1	5	1 hr	1 hr
or	Tank Barge	West Dock	Skimmer and pump platform; storage	1	14	4 hr*	3 hr
and	Tug	West Dock	Tow tank barge	1	4	2 hr	
	Skimmer (various)	ACS, Shell	On-water recovery	1	—	1 hr	
	Mobile Crane	GPB, KRU, Peak	Skimmer deployment	1	1	1 hr	
	Discharge Hose (4-inch w/ 6-inch to 4-inch reducer)	ACS, WOA, KRU	Decanting	≥50 ft	—	1 hr	
	Archimedes Screw Pump	ACS, KRU, North Star	Decanting	1	—	1 hr	
or	PDP (w/ powerpack)	Shell	Decanting; Off-loading	8	—	—	1 hr

This mobilization time applies after barge arrives on North Slope.* **TOTAL STAFF 12-19

OPTION B

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Work Boat* w/integrated Skimmer	Shell	Tow storage platform or store internally; skimmer and pump platform	1	2	0.5 hr	0.5 hr
or	Work Boat	West Dock	Tow storage platform, skimmer and pump platform	1	4	1 hr	4 hr
	Skimmer (various)	West Dock, Shell	On-water recovery	1	—	1 hr	
	Trash Pump (3-inch)	All	Decanting	1	—	1 hr	
	Suction Hose (3-inch)	All	Decanting	≥20 ft	—	2 hr	
	Discharge Hose (3-inch)	All	Decanting	≥50 ft	—	2 hr	
	Work Boat	West Dock	Shuttle storage platforms	1	3	1 hr	
	249-bbl Mini-Barge (237-bbl available storage)	West Dock, KRU	Intermediate storage	2	—	1 hr	
or	Floating Storage Bladder**	Shell	Intermediate storage	2	—	0.5 hr	0.5 hr

** 50 bbl onboard recovered oil tank and off-loading PDP*
*** Onboard 3-inch diaphram diesel decanting pump*

TOTAL STAFF 5-7

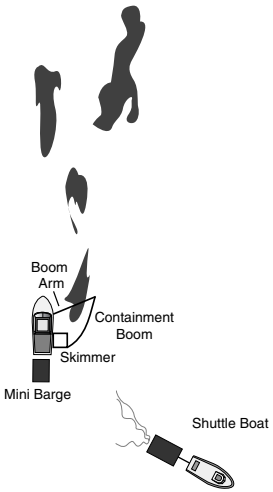
SUPPORT

- A trained aerial observer in a fixed-wing aircraft or helicopter tracks the oil location and movement from above and coordinates the on-water task force recovery effort.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Approval to decant is needed from the State On-Scene Coordinator. Appropriate agencies will be consulted to determine site-specific stipulations.
- The amount of oil recovered will be estimated based on gauging by appropriate means (e.g., ullage tape). Emulsion samples will be collected and analyzed for oil content.

R-32A Single Boom-Arm Skimming (Pg 1 of 2)



A skimmer vessel (tug-pushed tank barge, OSRB, OSRV or workboat) deploys a skimmer off one side in a boom-arm configuration. The skimmer vessel can advance at a maximum speed of 3 knots, giving an increased encounter rate and maneuverability in recovery operations.

Skimmed liquids are pumped into towed mini-barges or floating storage bladders. Free water from the bottom of the mini-barge tank is decanted during the skimming and loading. The discharge hose, fastened upcurrent of the skimmer, directs the free water into the boomed area. The operator turns off the pump when the discharge water becomes black with oil. Mini-barges and floating storage bladders laden with recovered oil are towed to an intermediate storage platform for off-loading.

EQUIPMENT AND PERSONNEL

- Select vessels, booms, and skimmers according to area, water depth restrictions, and function (see Tactic L-6).

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	OSRV	Shell	Skimmer and pump platform; storage	1	12	1 hr	1 hr
or	OSRB	Shell	Skimmer and pump platform; storage	1	6	1 hr	1 hr
and	Tug	Shell	Tow OSRB	1	5	1 hr	1 hr
or	Work Boat	West Dock	Deploy boom, tow mini-barge, operate skimmer and pump	1	3	1 hr	2 hr
	Skimmer	West Dock	On-water recovery	1		1 hr	
	Boom	All	On-water collection	21 ft		1 hr	
	Work Boat	West Dock	Shuttle storage platforms	1	2	1 hr	
	249-bbl Mini-Barge (237-bbl available storage)	West Dock, Oliktok	Intermediate storage	2	—	1 hr	
or	Floating Storage Bladder*	Shell	Intermediate storage	2	—	0.5 hr	0.5 hr

* *Onboard 3-inch diaphram diesel decanting pump*

TOTAL STAFF 5-14

DECANTING

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Trash Pump (3-inch)	All	Decanting	1	1	1 hr	2 hr
Suction Hose (3-inch)	All	Decanting	≥20 ft	2 for setup	2 hr	
Discharge Hose (3-inch)	All	Decanting	>50 ft	2 for setup	2 hr	

SUPPORT

- A trained aerial observer in a fixed-wing aircraft or helicopter tracks the oil location and movement from above and coordinates the on-water task force recovery effort.

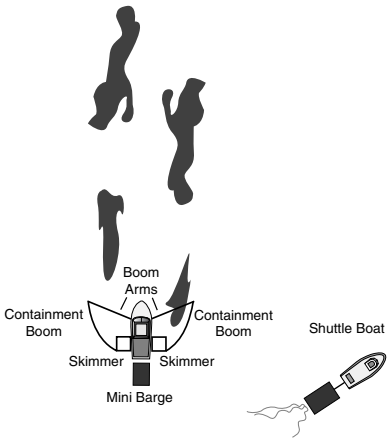
CAPACITIES FOR PLANNING

- 1 hr to load mini-barge; 1.5 hr to unload.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

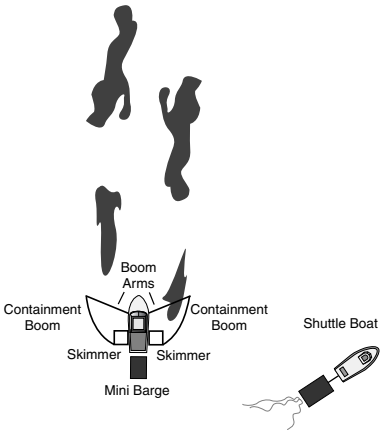
- The oil recovery rate and number of mini-barges required (fill to 95% capacity) vary with the oil encounter rate.
- Approval to decant is needed from the State On-Scene Coordinator. Appropriate agencies will be consulted to determine site-specific stipulations.
- The amount of oil recovered will be estimated based on gauging by appropriate means (e.g., ullage tape) prior to offloading. Emulsion samples will be collected and analyzed for oil content.

R-32B Double Boom-Arm Skimming (Pg 1 of 2)



Deployable arms off both sides of the skimming vessel are configured with containment boom and skimmer. The skimmer vessel can advance at a maximum speed of 3 knots, giving an increased encounter rate and maneuverability in recovery operations.

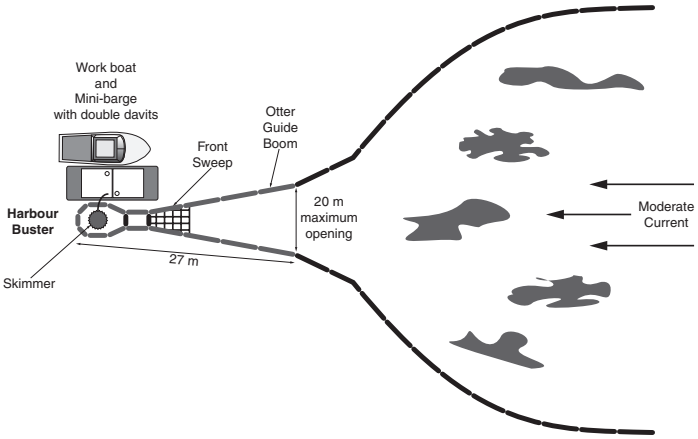
Skimmed liquids are pumped into towed mini-barges or floating storage bladders. Free water from the bottom of the mini-barge tank is decanted during the skimming and loading. The discharge hose, fastened upcurrent of the skimmer, directs the free water into the boomed area. The operator turns off the pump when the discharge water becomes black with oil. Mini-barges and floating storage bladders laden with recovered oil are towed to an intermediate storage platform for off-loading.



Deployable arms off both sides of the skimming vessel are configured with containment boom and skimmer. The skimmer vessel can advance at a maximum speed of 3 knots, giving an increased encounter rate and maneuverability in recovery operations.

Skimmed liquids are pumped into towed mini-barges or floating storage bladders. Free water from the bottom of the mini-barge tank is decanted during the skimming and loading. The discharge hose, fastened upcurrent of the skimmer, directs the free water into the boomed area. The operator turns off the pump when the discharge water becomes black with oil. Mini-barges and floating storage bladders laden with recovered oil are towed to an intermediate storage platform for off-loading.

R-33 Swift Water Recovery — Harbour Buster (Pg 1 of 2)



Option A – When used under a bridge, the boom is anchored to each shore. An anchor and long tow line connects the boom to shore.

Option B – For open water operations, boom is towed with work boats or used with anchor systems to create a funnel that will deflect oil into the Harbour Buster collection area.

For either option listed above, a skimmer or direct suction unit is placed in the Harbour Buster collection point. Power packs on the mini-barge power the skimmer (if used). Recovered liquids are pumped into mini-barge or shoreside storage, as appropriate.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Work Boat	West Dock	Tow mini-barge and operate skimmer and pump	1	4	1 hr.	2 hr.
	Skimmer	All	On-water recovery	1		1 hr.	
	Suction Hose (3-inch)	All	Skimmer recovery	≥20 ft.			
	249-bbl Mini-Barge (237-bbl available storage)	West Dock, Oliktok	Intermediate storage; skimmer power pack platform	1		1 hr.	
	Harbour Buster	Endicott	On-water containment	1		1 hr.	
	Boom	All	On-water containment	variable	4	1 hr.	
	Work Boat	West Dock	Tow boom	2		1 hr.	
or	Anchor System	All	Anchor boom	2	4 for setup	1 hr.	

TOTAL STAFF FOR SETUP **8**

TOTAL STAFF TO SUSTAIN OPERATIONS **4 (8 FOR OPTION B)**

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Fuel Truck	All	Provide diesel fuel for boats and pumps	1	Once per shift	1 hr	0.5 hr

RECOVERY CAPACITIES FOR PLANNING

- Mulitiple skimmers may be used with the Harbour Buster containment system. Type is limited by size of apex and mini-barge davit capacity.

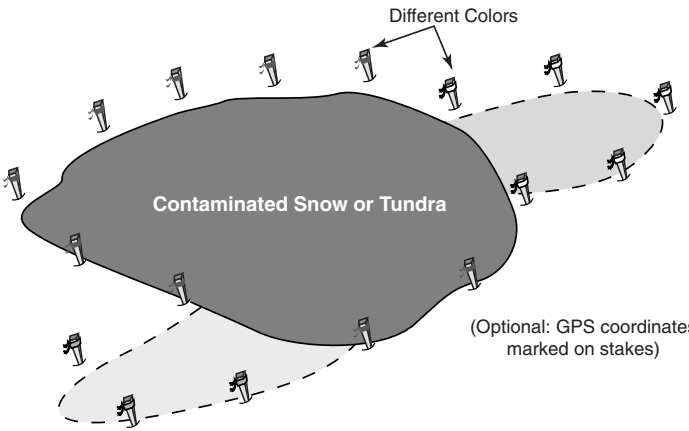
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Using a chaffing or protective mat during Harbour Buster deployment greatly reduces the risk of damage to the equipment's otter boom guide.
- Boom height should be considered when selecting the proper boom to avoid splashover in fast current.
- Under Option A, ensure the Harbour Buster is folded and secured before towing it into position. Tow with two lines; the first a long tow line and the second a pass-off line so the Harbour Buster remains secured to the vessel thus taking the strain off responders.
- Both pelican hooks and carabineers may be used to secure the Harbour Buster to a bridge or shore, but pelican hooks are superior since they are safer to cut loose while under pressure during demobilization operations.
- Long towlines facilitate easier tie-off when connecting the Harbour Buster boom system to shore. Consider a carabineer-type hookup to the shore.
- Tending vessels should carry an inflation pump onboard for re-inflating the Harbour Buster guide boom as needed.

R

TRACKING AND SURVEILLANCE TACTICS

T-1 Delineation of Oiled Snow or Tundra (Pg 1 of 2)



The extent of an oil spill on snow or tundra is delineated so that the oil can be found if subsequent snowfall or windblown snow covers the spill.

Two crews walk the perimeter of the spill in opposite directions from a common point, and meet on the opposite side of the spill. As they walk, they place wood laths in the ground/snow every 50 to 100 feet at the edge of the spill, depending on terrain and the spill detail. The crews then retrace their routes to confirm their delineation. The crews may be assisted by snow machine, ATV, pickup truck with Mattracks, or similar personal motorized vehicle. The crews are part of the SRT.

For a small spill, one crew is sufficient.

EQUIPMENT AND PERSONNEL

- Each staking crew has 2 SRT staff.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Wooden Lath Stakes	All	Delineation	One for every 100 ft of spill perimeter	2	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr
GPS Unit	All	Mapping	1 per crew	—	0.5 hr	0.5 hr
				TOTAL STAFF	**4**	

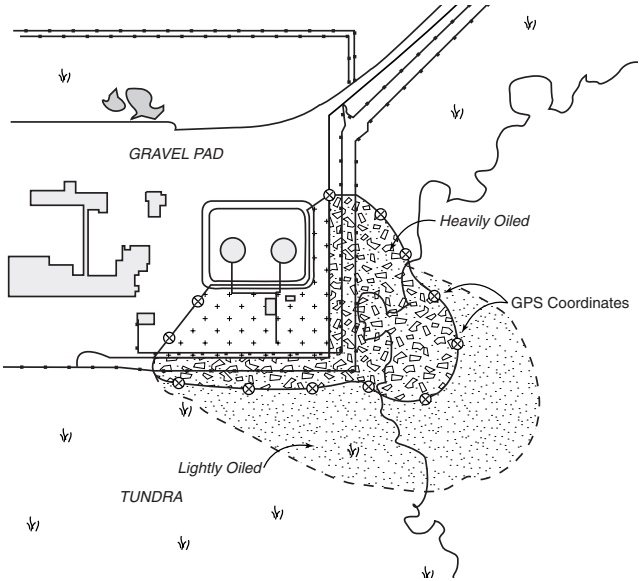
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
ATV	ACS, KRU, WOA	Support	2	4	1 hr	0.5 hr
Snow Machines	All	Support	2	2	1 hr	0.5 hr
Tracked Vehicle	KRU, WOA, Alpine	Support	1/crew	2 to 3	1 hr	0

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- If the wind is blowing contaminated snow outside the originally staked perimeter, make subsequent delineations as necessary.
- Use flagging on the new stakes to distinguish delineation events.
- Designate further staking with different colors of flagging.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.

T-2 Mapping and Surveillance of Spill on Land (Pg 1 of 2)



An initial hand-drawn map is delivered to other responders by the staff performing the initial surveillance. A more detailed and accurate map is then provided using one of the following options:

- The crews performing the delineation take GPS readings at each stake point. The point is recorded on the stake with a permanent marker, recorded in the GPS unit, and later entered into MapInfo® GIS software (available at all owner locations). A detailed map is drawn by one Situation Unit support staff using MapInfo®. The map is available within two hours after the information is provided to the SRT support staff.
- A survey crew is called out after the delineation crew has staked the area, and the contractor records the staked points with GPS or survey equipment. The contractor transfers the information to MapInfo®, and a detailed map is drawn from that information.
- A forward-looking infrared (FLIR) system-equipped aircraft flies over the spill-affected area, recording the fly-over with its FLIR. The infrared (IR) readings recorded by the fly-over are then overlain on a MapInfo® map of the area, and a detailed map of the spill is produced from that. This same task can be performed by a hand-held IR sensor available at Kuparuk.
- Ground-penetrating radar may also be used to detect oil in and under ice.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Aircraft with FLIR	KRU	Surveillance	1	3	1 hr	1 hr
Hand-Held FLIR	KRU	Mapping	1/crew	Part of delineation staff	0.5 hr	0.5 hr
MapInfo® Software	All	Mapping	1	Part of delineation staff	—	—
GPS Unit	All	Mapping	1/crew	Part of delineation staff	0.5 hr	0.5 hr

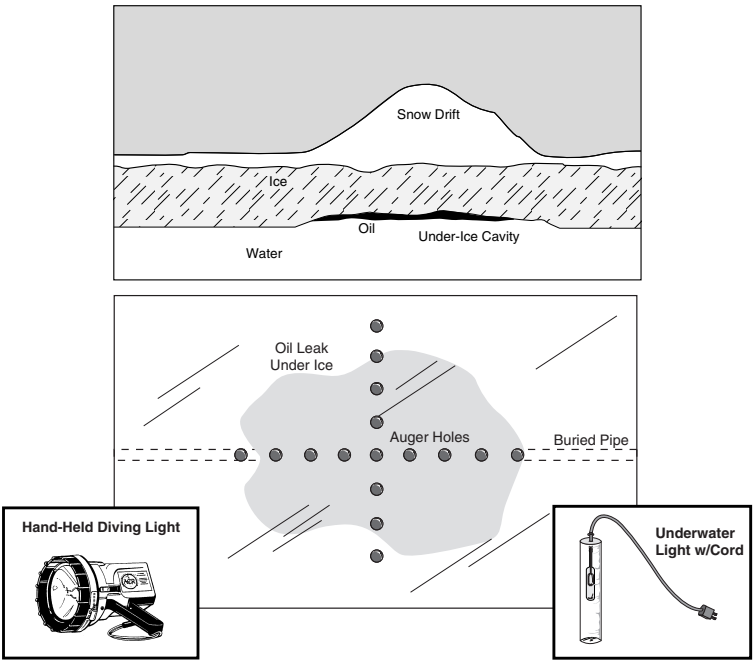
SUPPORT

- Support for this function is administrative.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- The choice of surveillance and mapping instruments is determined by the size of the spill, site access, available equipment, and weather.
- If the spill is re-delineated, update the maps.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.

T-3 Detection and Delineation of Under-Ice Oil (Pg 1 of 2)



Oil released under a solid sea-ice sheet or that finds its way under the ice through cracks and leads will spread under the ice and collect in under-ice pockets. The underside of sea ice contains many of these pockets that reflect snow drifts on the surface of the ice. Snow drifts insulate the ice, thereby reducing ice growth and forming pockets. Once in a pocket, oil will tend to stay in place, since it takes a current of approximately 0.7 feet/second to push the oil out. Oil in pockets will become encapsulated as the ice grows.

Use an ice auger to drill holes and place underwater lights to shine up through the ice (the snow must first be removed from surface). A series of auger holes can be drilled in a line from the source to delineate the extent of under-ice oil contamination.

Ground-penetrating radar may also be used to detect oil in and under ice.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Ice Auger	All	Detection	2	4	1 hr	0.5 hr
Underwater Light	All	Detection	2	1	1 hr	0.5 hr
Front-end Loader w/Bucket	All	Snow Removal	1	1	1 hr	0.5 hr
ATVs w/Plow	ACS, GPB, END, KRU, Alpine	Snow Removal	2	2	1 hr	0.5 hr
Snow Machine	All	Personnel Transportation	4	4	1 hr	0.5 hr
			TOTAL STAFF	**6**		

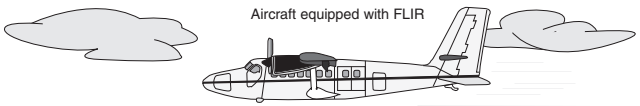
SUPPORT

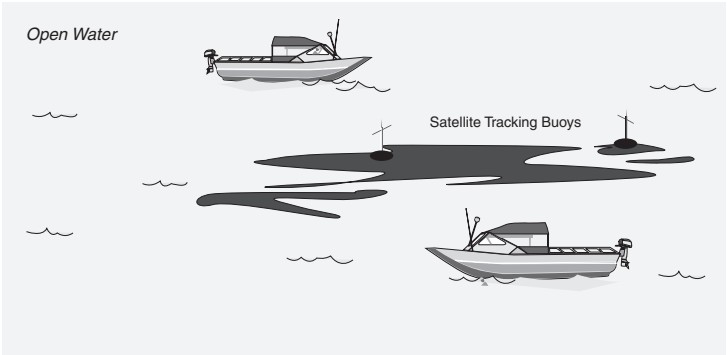
EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Generator	All	Electricity	2	2 for setup	1 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally	1 hr	0.5 hr
Mechanic Truck	All, except Badami	Support equipment	1	1	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Check ice thickness before moving heavy equipment onto ice (see Tactic L-7).
- A loader with tundra tires or possibly a rubber-tracked, wide-track dozer may have to move snowdrifts.
- Winds will affect water movement even under ice.
- During the ice-growth period from December to April, oil films up to several inches thick can be completely encapsulated by new ice within 36 hours.
- In some situations, it may be most effective to cut a hole in the ice and have divers conduct an underwater survey for oil.

T-4 Discharge Tracking in Open Water (Pg 1 of 2)





The oil slick is tracked by visual observation from a forward-looking infrared (FLIR) system-equipped aircraft. The aircraft provides radio reports and FLIR video images. The thicker areas of oil within an oil slick emit more thermal radiation than the surrounding water and show up in the image as white or hot spots. The FLIR system works day or night.

Boat operators deploy satellite tracking buoys into the slick from response vessels. The buoys transmit collected position information and other pertinent data to overhead satellites for retransmission to authorized oil spill response personnel end users.

EQUIPMENT AND PERSONNEL

- Each aircraft carries two observation personnel: the FLIR operator and an additional oil observer. The response vessel crew deploys the satellite tracking buoys.

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Aircraft with FLIR	KRU	Aerial tracking and response coordination	1	3	1 hr	1 hr
Satellite Tracking Buoys	ACS	Track the oil slick	24	—	2 hr	1 hr
Work Boat	All	Deploy tracking buoys	1	2	2 hr	0

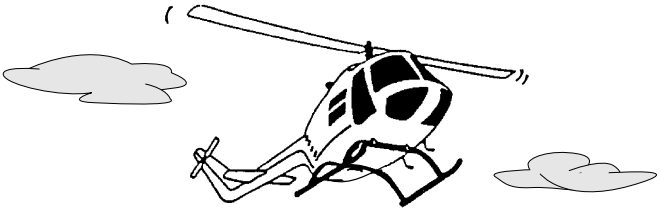
SUPPORT

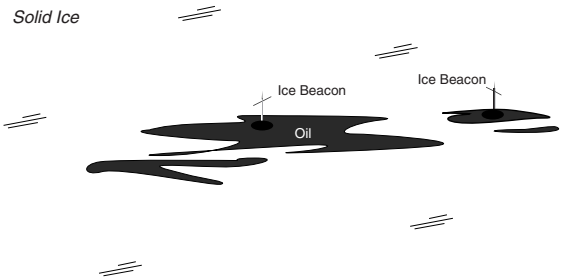
- A response vessel deploys the satellite tracking buoys into the slick during response operations.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Most skimming operations receive aerial observation reports to help them position for oil recovery. A helicopter can also help coordinate on-water operations.

T-4A Discharge Tracking in Ice (Pg 1 of 2)





Helicopter operators deploy ice beacons into the slick. The beacon system consists of a GPS receiver, antenna, and beacon equipped with a transmitter. Beacon positions are transmitted to the Command Center via e-mail.

EQUIPMENT AND PERSONNEL

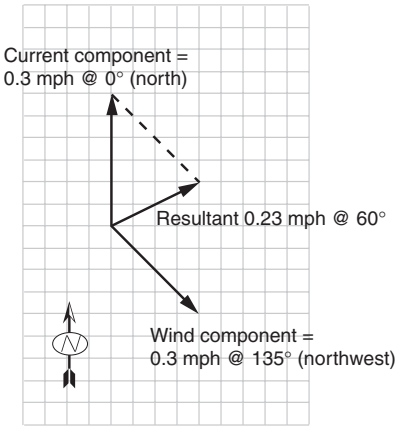
EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Helicopter		Deployment of beacons	1	2	1 hr	1 hr
Ice Beacons	ACS Base	Track oil in ice	6	—	2 hr	1 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- This tactic is used to track oil in ice that is not thick enough to support on-ice response tactics.

T-5 Trajectory Calculations (Pg 1 of 2)

SAMPLE VECTOR ADDITION



VECTOR ADDITION

Movement of oil on the open ocean is affected by two forces: water current and the wind. Oil is predicted to move at the same speed as the underlying water and at about 3% of the wind speed. The direction and speed of movement of oil on water can be predicted by vector addition. An example is provided above.

Reports of current wind and temperature and 24-hour weather forecasts are available from 659-5888 (recording) and 659-5251 (Prudhoe Bay airport tower). Surface water direction and speed may be estimated by three methods:

- Reports of observed water movement from field staff,
- The oceanography volumes of the Endicott Environmental Monitoring Program annual reports (e.g., U.S. Army Corps of Engineers, 1990), and
- *Alaska Clean Seas Technical Manual* Atlas.

Wind generally drives ocean surface currents in the vicinity of the North Slope oil production facilities. Wind shifts can reverse surface water currents within a few hours (Bryan Trimm, pers. comm., 1997). Coastal landforms affect the nearshore currents.

TRAJECTORY MODELING

The National Oceanic and Atmospheric Administration (NOAA) has the ability to provide computer-generated predictions of oil movement on water. NOAA provides the predicted trajectory based on data on the product released, its location, current and predicted weather.

ACS maintains an Internet account with NOAA for downloading trajectory predictions. NOAA requires approximately 3 hours to calculate the trajectory. The model can also be accessed by contacting Dr. John Whitney, Scientific Support Coordinator, USCG Marine Safety Office in Anchorage (phone 907-271-3593 and fax 907-271-3139) or NOAA Hazardous Materials Response and Assessment Division in Seattle (206-526-6317).

An example of the exact information required to run the trajectory analysis is provided below.

Gentlemen: In response to a release of oil, please provide spill trajectories for the next 24 hour period. Transmit the trajectories by Internet to Alaska Clean Seas NOAA account. Notify Alaska Clean Seas of the transfer at (907) 659-2405.

Incident Name _____ Release Location Lat. _____ Long. _____

Geographic Description: _____

Is release continuing? ☐ Yes ☐ No Time of Release _____ Volume Spill _____

If continuing release, what is rate? _____ bbl/hr

Material Spilled _____ Current Weather Air Temp. _____ °F

Wind Speed _____ kt Wind Direction _____ 24 hour Forecast Air Temp _____ °F

Wind Speed _____ kt Wind Direction _____

Current Slick Location Lat. _____ Long. _____
(Optional)

Time of Current Slick Location _____
(Optional)

FOR DRILLS ONLY

1. Is this a tabletop drill? ☐ Yes ☐ No
2. Is this an equipment deployment drill? ☐ Yes ☐ No
3. Are objects in water being used to simulate oil? ☐ Yes ☐ No
4. Are other trajectory models being used? ☐ Yes ☐ No

REFERENCES

Waldman, G. A., R. A. Johnson, and P. C. Smith. 1973. The spreading and transport of oil slicks on the ocean in the presence of wind, waves, and current. AVCO Systems Division. USCG Report CG-D-17-73.

Fay, J . A. 1969. The spread of oil slicks on a calm sea. Pages 53-63 in *Oil on the Sea*. D. P. Hoult (ed.). Plenum Press, New York.

McCourt, J. 1998. Interaction between oil and suspended particulate matter in the Yukon River. Prepared by S. L. Ross Environmental Research Ltd. for Alyeska Pipeline Service Company. 22 pages plus appendices.

National Research Council. 1989. *Using Oil Dispersants on the Sea*. Marine Board Commission on Engineering and Technical Systems. National Academy Press, Washington, D.C. 335 pages.

U.S. Army Corps of Engineers. 1990. *Endicott Environmental Monitoring Program Final Report*. Prepared by Science Applications International Corporation.

T-7 Spill Volume Estimation (Pg 1 of 2)

SPILL VOLUME ESTIMATION

OIL IN OR ON SOILS

- It is difficult to estimate the amount and extent of subsurface pollution from hydrocarbons spilled and trapped in soil.
- Hydrocarbons in soil may exist in three phases:
  - As vapors within the pore spaces
  - As residual liquid attached to or trapped between soil particles
  - As dissolved components of oil in moisture surrounding soil particles
- Generally, oil retention increases with decreasing grain size, poorer sorting of soils, and increasing oil viscosity.
- Oil retention of initially water-saturated soils is generally lower than for initially dry soils.
- The "retention capacity" factor for different types of soils provides an estimate of volume of liquid retained per unit pore volume. Following are rules of thumb for retention capacity of soil types:

	Silt	Sand	Gravel
Crude Oil	12% - 20%	4% - 13%	0% - 5%
Diesel	7% - 12%	2% - 8%	0%- 2%
Gasoline	3% - 7%	1% - 5%	0% - 1%

OIL ON ICE AND SNOW

- Field experience and data from actual spills indicate that oil-holding capacities of ice and snow range as high as 1,600 barrels per acre.
- Equations for estimates:
  - $V\ (bbl) = (4.14 \times 10^{5}) \times A\ (mi^2) \times t\ (in.)$
  - $V\ (bbl) = 647 \times A\ (acres) \times t\ (in)$
  - $V\ (bbl) = (1.48 \times 10^{-2}) \times A\ (ft^2) \times t\ (in.)$
  - $V\ (gal) = 42 \times V\ (bbl)$
  - V = Volume of oil spill
  - A = Area of oil slick or contaminated zone
  - t = Thickness of oil slick or contaminated zone (with snow, t = equivalent oil thickness)

OIL ON WATER

- Oil Color
  - Sheen (silver-gray): Use 10^{-6} inch as average thickness
  - Iridescent (blue green): Use 10^{-4} to 10^{-5} inch as average thickness
  - Blue-black (aged, wind-blown): Use 10^{-2} to 10^{-3} as average thickness
  - Blue-black (fresh/equilibrium conditions): Use 10^{-1} inch as average thickness
  - Emulsion (brown/ "chocolate mousse"): Use 10^{-1} inch as average "oil" thickness (actually 2 to 3 x 10^{-1} inch with 50% to 70% water).

- Equations for estimates:
  - $V\ (bbl) = 4.14 \times 10^{5}\ A\ (mi^2) \times t\ (inches)$
  - $V\ (bbl) = 647\ A\ (acres) \times t\ (inches)$
  - $V\ (bbl) = 1.48 \times 10^{-2}\ A\ (ft^2) \times t\ (inches)$
  - $V\ (gal) = 0.624\ A\ (ft^2) \times t\ (inches)$
  - V = Volume of oil spill
  - A = Area of slick at thickness t
  - t = Thickness of oil slick

ENCOUNTER RATE CALCULATIONS

- Calculations used to estimate the amount of oil moving past in a stream, entering a collection boom, or in a windrow/patch of oil.

  EnR (gpm) = 37 x W (ft) x V (ft/sec) x t (in)
  EnR (bbl/hr) = 53.33 x W (ft) x V (ft/sec) x t (in)
  EnR (bbl/day) = (1.28 x 10^3) x W (ft) x V (ft/sec) x t (in)
  W = Width of oil swath
  V = Velocity in feet per second (1 knot = 1.68 ft/sec)
  t = Thickness of oil slick

ESTIMATING SPILL SOURCE VOLUMES AND FLOW RATES

LEAK RATE CALCULATIONS

One drop/second	=	1 gallon per day
Thin stream breaking to drops	=	24 gallons per day
Small stream (about 1/8 inch)	=	84 gallons per day
Large stream (about 1/4 inch)	=	936 gallons per day

A simple rule of thumb is to divide 10,000 by the number of seconds it takes to fill a five-gallon pail.

ESTIMATES FOR CAPACITY

- Pipeline per linear foot
  - For volume in gallons per foot: square the inside diameter (in inches) and multiply by 4 percent (0.04)
  - For volume in barrels per foot: square the inside diameter (in inches) and divide by 1,000
  - To find the volume of a pipeline in barrels per mile: square the inside diameter (in inches) and multiply by 5.13

- For vertical cylindrical tanks:

  V (gal) = 0.0034 d (in.) x d (in.) x h (in.)
  V (gal) = 5.88 D (ft) x D (ft) x H (ft)
  d = diameter in inches
  D = diameter in feet
  h = height of liquid in inches
  H = height of liquid in feet

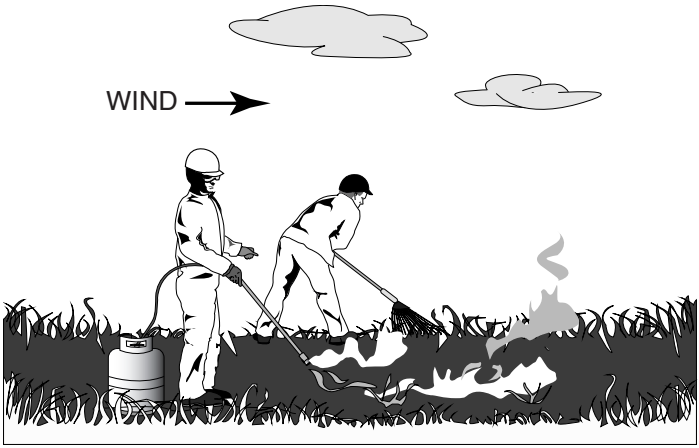
NOTE:

The National Oceanic and Atmospheric Administration publishes an observer's guide that contains more information on estimating oil spill volumes.

T

BURNING TACTICS

B-2 Burning Oily Vegetation (Pg 1 of 2)



A response worker rakes oiled vegetation with a metal rake so that grass stems are oriented more or less vertically. A second response worker uses a weed burner, which consists of a flame nozzle, hosing, and a propane tank. The weed burner is held just above the oiled vegetation until the vegetation is burned down to a stubble. Care is taken not to burn vegetation down to soil, which would damage the root system. Work is started on the upwind edge of the oiled area and proceeds downwind so that response workers are not exposed to smoke.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Weed Burner, with Propane Tank	All	Surface oil removal	1	1	1 hr	0.5 hr
Rake (metal)	All	Rake vegetation upright	≥1	1	1 hr	0
Fire Extinguisher	All	Suppression of unwanted fires	≥2	—	0.5 hr	0
			TOTAL STAFF	**2**		

SUPPORT

- Pickup trucks and four-wheelers transport personnel and equipment.
- Sorbent may be used in conjunction with the weed burners.

CAPACITIES

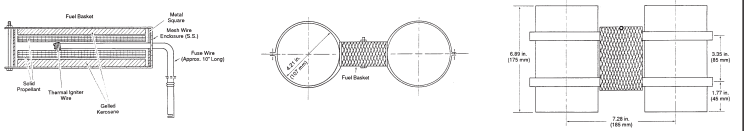
- One weed burner can cover approximately 50 sq. ft in an hour, depending on terrain and degree of oiling.

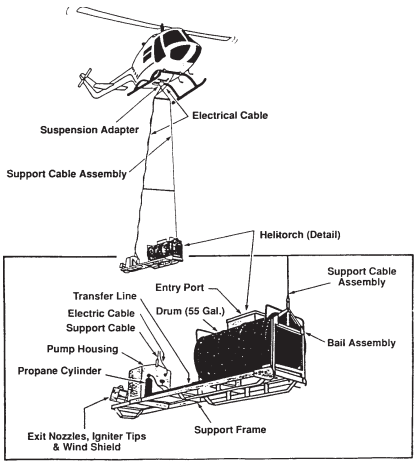
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Proper safety procedures must be followed, and the necessary personal protective equipment (PPE) must be used.
- Do not walk on oiled vegetation. Snowshoes can be used to protect unoiled tundra.
- Burning of oiled vegetation is conducted as a non-emergency project and has the objective of reducing re-oiling of adjacent areas. Burning proceeds downwind from its starting point. Care is taken to avoid contaminating unaffected areas. Burning is most effective immediately after the spill, before evaporation of volatile components.
- Take care to avoid secondary fires. If there is access to water, the oiled area and the surrounding vegetation can be saturated with water. Wet vegetation will still burn under the direct flame of a weed burner.
- Fire suppression must be on hand, with staff in direct control of it.
- Burned tundra can regenerate itself, as long as the root structure is left intact. Sedges and grasses recover more quickly than mosses and lichens, which do not have much of an underground structure. It is normally preferable to burn the oil in the tundra rather than to leave oiled vegetation. Tundra vegetation cannot survive under heavy oiling, but it can survive if the oil and vegetation are burned, leaving a healthy root structure.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- An ADEC open-burn permit is required.

B-3 In-Situ Burning w/Heli-Torch and Other Ignitors (Pg 1 of 2)

BASIC DESIGN AND INTERNAL COMPONENTS OF THE DOME IGNITER





Numerous methods are available for the ignition of floating oil. Hand-held pyrotechnic devices such as ACS's Dome igniters can be armed and tossed by hand from a helicopter or vessel. If such devices are unavailable, one can often make a simple though effective igniter on location using oil-soaked rags, sorbents, or even a roll of toilet paper. When it is unsafe to use such igniters, and particularly when a large, intense ignition area is needed, a Heli-torch may be used.

The Simplex Model 5400 Heli-torch owned by ACS is a helicopter-slung device for delivering measured amounts of burning gelled fuel to an oil slick for purposes of igniting the slick.

The Heli-torch can be used to ignite inaccessible oil pockets collected in quiet-water areas or on ice melt pools.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Heli-torch (55-gal)	ACS/KRU	Ignition	2	3	1 hr	2 hr
Helicopter with FAR Part 137 Approved Pilot	Alyeska	Sling-load Heli-torch	1		2 hr	
Hand-held Igniters	ACS, Northstar, Alpine	Ignition	≥6	2	1 hr	
Gelled Fuel	ACS	Firestarter Material	≥5 lb.	—	1 hr	
Batch Mixer (300 gal)	ACS/KRU	Mix gel	1	2	1 hr	
Fire Extinguisher	All	Suppress accidental fires	≥2	—	0.5 hr	
			TOTAL STAFF	**≥4**		

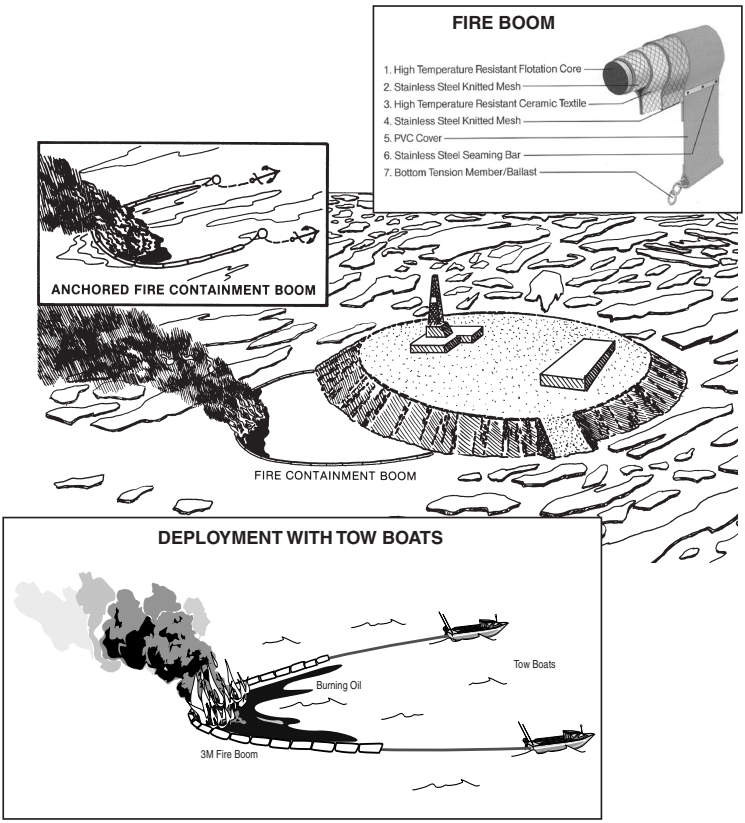
CAPACITIES

- Burning on water reduces the volume of a crude oil spill by 75% or more.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Proper safety procedures must be followed, and the necessary personal protective equipment (PPE) must be used.
- Follow all manufacturer's instructions carefully. Designated personnel on the surface and in the air maintain a constant watch of the fire and smoke plume, the condition of the boom, the speed and positions of the towing vessels, and the proximity of the burn operations to other vessels, oil slicks, the shoreline, etc. In addition, each vessel should maintain constant contact with the supervisor. The supervisor of the burn operation must be in direct radio contact with all elements of the burn team, including aircraft and the mixing/loading crew.
- It is critical that communications be available to ensure coordination between the burn operations supervisor and all elements of the response. All personnel involved in the operation must be in constant contact with the burn operations supervisor. The following communications are necessary for a burn on water:
  - Dedicated radio links and equipment with specific frequencies for air-to-air and air-to-ground communications
  - Dedicated radio links and equipment with specific frequencies for vessel-to-vessel and vessel-to-command communications
  - Repeater stations as appropriate for distant or blocked communications paths
  - Emergency manual signal (e.g., light or siren)
- Take care when filling, mixing, and dispensing raw or gelled fuel. Always connect a ground wire to an earth ground. Use a non-sparking pump in a well-ventilated area. When mixing by hand, use wooden or aluminum paddles. Have at least two 20-lb dry-chemical fire extinguishers in both the fuel mixing and Heli-torch filling areas. Personnel mixing and dispensing fuel must wear antistatic protective clothing.
- The charter company supplying the helicopter for the Heli-torch must be FAA-certified to sling-load petroleum. In addition, the pilot must have FAR Part 137 certification.
- Burning gelled fuel may sometimes fall off the Heli-torch while in transit to or from the burn site. Pilots should plan their flight path to minimize the risk of starting unwanted fires.
- Certain environmental limitations restrict the feasibility of in-situ burning. Optimal environmental conditions are:
  - Winds less than 20 kt
  - Waves less than 2 to 3 ft
  - Currents less than 3/4 kt relative velocity between boom and water
- The following oil thicknesses are required to support combustion:
  - 2 to 3 mm (0.08 to 0.12 inch) for fresh crude oil
  - 3 to 5 mm (0.12 to 0.2 inch) for diesel and weathered crude
  - 5 to 10 mm (0.2 to 0.4 inch) for emulsions and Bunker C
- Emulsification can affect ignitability. Most oils are readily combustible if water content is less than 25%. For water contents greater than 25% it may be necessary to apply an emulsion breaker to obtain ignition.

B-4 Deployment and Use of Fire Containment Boom (Pg 1 of 4)



Fire containment boom can be deployed in a stationary mode either anchored to a shore or on the water. In addition, it can be towed like a standard containment boom in a U-configuration to collect oil on water and concentrate it for burning within the boom.

To use the full holding capacity of the boom, oil should fill the lower one-third of the boom's apex while the boom is being towed. During a burn, the oiled area may be expanded by slowing down. This increases the size of the burn and the oil elimination rate.

In-situ burning, without boom, may be used in ice conditions. The ice would act as the containment mechanism.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Fire Boom	ACS, KRU, WOA, Endicott	Contain oil for burning on water	≥500 ft	4 to unload conex	1 hr	2 hr
Work Boat	All	Tow boom	2 per configuration	2 per boat	1 hr	
Tow Line (with bridles and anchors)	All	Tow boom	500 to 800 ft per towboat	—	—	
Hand-held Igniters	ACS, Northstar, Alpine	Ignite oil	10 per platform	1	1 hr	

TOTAL STAFF FOR SETUP **8**
TOTAL STAFF TO SUSTAIN OPERATIONS **7 (including personnel to pick up burn residue)**

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Work Boat	All	Recovery and storage of burn residue	1 per configuration	3 per boat	2 hr	1 hr
Fire Extinguishers	All	Fire suppression	≥2 per configuration	—	0.5 hr	—
Fire Boom Repair Kit	ACS	Boom repair	2	—	—	—

CAPACITIES

- Burning on water reduces the volume of a crude oil spill by 75% or more.
- For layers of oil 0.5 inch thick or greater, the removal rate is 4.2 gal of oil per hour for every sq. ft of burning oil.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Proper safety procedures must be followed, and the necessary personal protective equipment (PPE) must be used.
- Follow all manufacturer's instructions carefully. Designated personnel on the surface and in the air maintain a constant watch of the fire and smoke plume, the condition of the boom, the speed and positions of the towing vessels, and the proximity of the burn operations to other vessels, oil slicks, the shoreline, etc. In addition, each vessel should maintain constant contact with the supervisor. The supervisor of the burn operation must be in direct radio contact with all elements of the burn team, including aircraft and vessels.
- It is critical that communications be available to ensure coordination between the burn operation supervisor and all elements of the response. All personnel involved in the operation must be in constant contact with the burning operations supervisor.

(Continued on next page)

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS (CONT'D)

(Continued from previous page)

- The following communications are necessary for a burn on water:
  - Dedicated radio links and equipment with specific frequencies for air-to-air and air-to-ground communications
  - Dedicated radio links and equipment with specific frequencies for vessel-to-vessel and vessel-to-command communications
  - Repeater stations as appropriate for distant or blocked communications paths
  - Emergency manual signal (e.g., light or siren)
- The following oil thicknesses are required to support combustion:
  - 2 to 3 mm (0.08 to 0.12 inch) for fresh crude oil
  - 3 to 5 mm (0.12 to 0.2 inch) for diesel and weathered crude
  - 5 to 10 mm (0.2 to 0.4 inch) for emulsions and Bunker C
- Certain environmental limitations restrict the feasibility of in-situ burning. Optimal environmental conditions are:
  - Winds less than 20 kt
  - Waves less than 2 to 3 ft
  - Currents less than 3/4 kt relative velocity between boom and water
- Note that Fire Boom is very heavy, and proper lifting techniques must be used during deployment.
- Towing vessels should be positioned to avoid any direct contact with floating oil that could accidentally be ignited.
- Keep the operation out of the smoke plume.
- One towing vessel should be designated as the lead vessel for determining course and speed.
- Tow at speeds of 1/2 to 3/4 kt or less and avoid sudden speed changes.
- All personnel and equipment should remain at least 2 to 3 fire diameters away from the pool of burning oil.
- As conditions allow, the rate at which oil can be eliminated may be increased by a factor of 2 to 3 by slowing the boom-towing vessels and permitting the contained burn to spread forward within the boom. Oil should not be allowed to spread within 50 ft or less of the leading (upstream) ends of the boom.
- Boom-towing personnel should be familiar with procedures to terminate the burn.
- Beware of flashback! After the fire appears to be extinguished, unexpected re-ignition can occur.
- As the burn begins to die down, keep the tow at just enough forward speed to let the remaining oil burn as completely as possible.
- Select size and length of boom based on expected wind and sea conditions, staging and logistics constraints, and the volume of oil to be burned.
- Use conventional boom-deployment practices to avoid snags, twists, and fouling with other equipment.
- Select tow line size based on a safety factor of 7. Use long tow lines for each tow vessel (typically 500 to 800 ft) to reduce oil entrainment from prop wash, to position tow vessels safely away from the burn, and to provide additional reaction time in an emergency.
- As necessary, increase oil encounter rate by connecting sections of conventional boom to the leading ends of the fire containment boom. (Maintain a gap ratio of 0.3).

(Continued on next page)

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS (CONT'D)

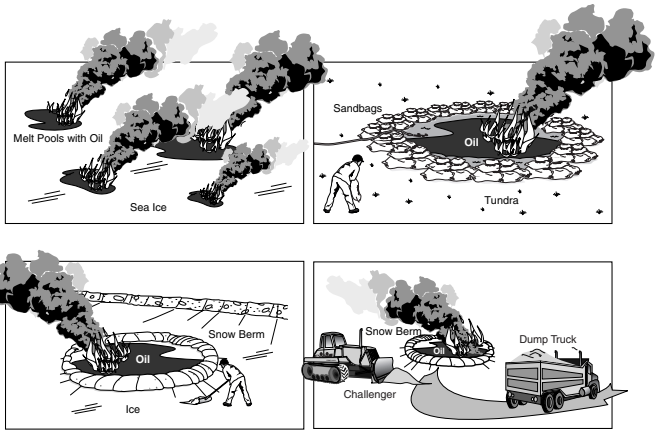
(Continued from previous page)

- Be careful if burning while towing to avoid smoke blowing directly into the vessels.
- Ensure that spotter aircraft are available to direct the boom-towing vessels to the heaviest oil concentration or the highest-priority slick.
- If a U-configuration with collected oil is to be moved before ignition, don't locate it directly upstream or downstream of the source or other ignitable slicks. About 1/4 to 1/2 mile side-wind is adequate.
- Inspect boom after each burn before using again; repair or replace damaged sections.
- Below are boom towing limitations for airboats during overflood conditions in the nearshore Beaufort Sea (based on 2005 ACS seasonal recovery testing):

ICE CONDITIONS	FIRE BOOM (20 lb/linear ft)	FIRE BOOM (7 lb/linear ft)	FIRE BOOM (6 lb/linear ft)	DELTA BOOM
Groundfast or Shorefast Ice (with overflood)	100 ft	300 ft	350 ft	750 ft
Broken Ice: Large, Dense, First-Year, Afloat	100 ft	300 ft	350 ft	750 ft
Broken Ice: Smaller, Less Dense, Rotted	200 ft	600 ft	700 ft	1,000 ft

- In extreme shallow water conditions, sheet metal may be used in lieu of boom in the apex. Use 36 pieces of metal and 37 stakes per 100 ft.

B-5 Burning Oil Pools on any Solid Surface (Pg 1 of 2)



Oil can be burned on any solid surface provided the oil is thick enough to support combustion. This includes tundra, ice, snow, or gravel.

In-situ burning on land should be considered only if there is a layer of ice covering underlying vegetation to protect it from heat damage. If this is the case, the oil should be pooled into one area and a buffer zone created around this area. Pooling of oil can be accomplished by digging a pit for oil to flow into.

Oil on land can be ignited with torches, igniters, propane weed burners, or a Heli-torch.

If the spill is on tundra, some sort of dike should be built around the oil using sandbags. The diked area should never cover more than 4,000 square feet. Once the dike is in place, flood the diked area with water until the tundra root mass is covered with one-half to one inch of water.

In the case of oil initially spilled on the surface and mixed with snow, burning of oiled snow piles can be successfully achieved even in midwinter conditions. Depending on the initial oil spill volume per unit area of ice, the technique of plowing oiled snow into concentrated piles may be the only way of achieving successful ignition and burning. In many cases, waiting for the snow to melt could result in thin oil films incapable of supporting combustion and spread over a large ice area.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Heli-torch (55-gal)	ACS/KRU	Ignition	2	3	1 hr	2 hr
Helicopter with FAR Part 137 Approved Pilot	Alyeska	Sling-load Heli-torch	1		2 hr	
Gelled Fuel	ACS	Firestarter Material	≥5 lb.	—	1 hr	
Batch Mixer (300 gal)	ACS/KRU	Mix gel	1	2	1 hr	2 hr
Sand Bags	ACS, GPB, KRU, Alpine	Containment	≥100	>6 for setup* 2 to maintain	2 hr	1 hr
Propane Weed Burner	All	Ignition	2	2	1 hr	
or Hand-held Igniters	ACS, Northstar, Alpine	Ignition	≥6	1	1 hr	

Number of personnel depends on number of sandbags needed.* **TOTAL STAFF ≥3

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Front-End Loader	All	Unload sandbags	1	1	1 hr	0.5 hr
Water Truck	All	Flooding	1	2	2 hr	0.5 hr
Light Plant	All	Illumination	≥1	2 for initial setup and 1 to check and fuel occasionally	1 hr	0.5 hr
Fire Extinguisher	All	Suppress unwanted fires	≥2	—	0.5 hr	—
ATV	All	Transfer	3	3	1 hr	0.5 hr
Rolligon	CATCO, Peak	Transportation to site	1	1	6 hr	2 hrs
Sno-Cat	KRU, APSC	Transportation to site	1	1	1 hr	0.5 hr
Sno-Cat with Blade	KRU, APSC	Move snow	1	1	1 hr	0.5 hr
Amphibious Personnel Carrier (e.g., Haaglund)	AIC	Transportation to site	1	1	2 hr	0.5 hr

**Marsh buggies may be used in rotting ice conditions.*

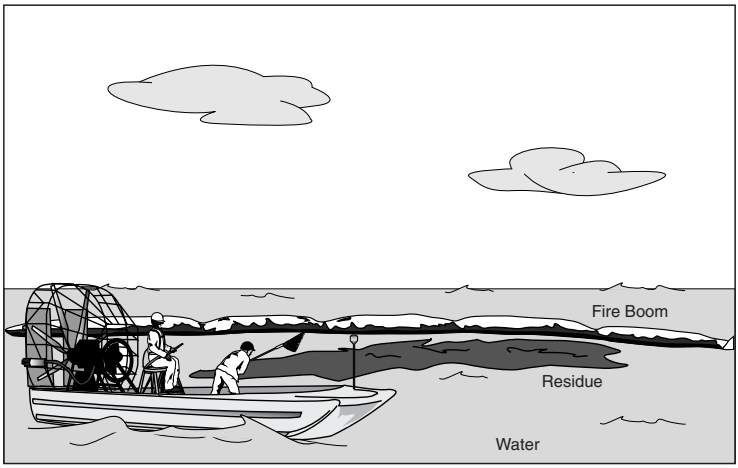
CAPACITIES

- For layers of oil 0.5 inch thick or greater, the removal rate is 4.2 gal of oil per hour for every sq. ft of burning oil.
- A backhoe on a tracked, amphibious marsh buggy is capable of gathering snow at the rate of 9 cubic yards per minute and of transiting natural sea ice at 1.2 miles per hour.
- A Tucker Sno-Cat with blade is capable of moving snow into berms at the rate of 2 acres per day, assuming 10 hours of operation in each of two, 12-hour shifts per day at 70 sq. ft. per minute.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Proper safety procedures must be followed, and the necessary personal protective equipment (PPE) must be used. Designated personnel on the surface and in the air should maintain a constant watch of the fire and smoke plume.
- The following oil thicknesses are required to support combustion:
  - 2 to 3 mm (0.08 to 0.12 inch) for fresh crude oil
  - 3 to 5 mm (0.12 to 0.2 inch) for diesel and weathered crude
  - 5 to 10 mm (0.2 to 0.4 inch) for emulsions and Bunker C
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.

B-6 Burn Residue Recovery (Pg 1 of 2)



The type and amount of residue from an in-situ burn of oil on water depend on the starting oil type and condition, as well as the way in which the oil is contained and/or herded throughout the burn. If wind or currents are available to push burning oil against a barrier (boom, ice, steel structure, etc.), adequate combustion thicknesses will be maintained for a much more efficient burn. The residue may be an inch or more thick.

The residue may continue to pile up on itself and reach an average thickness of several inches. Most burns result in taffy-like layers of weathered, viscous material that is relatively buoyant. Some residues, however, may quickly become negatively or neutrally buoyant because of combustion and/or sediment uptake.

If the residue is sufficiently buoyant, it may be possible to leave it in the apex of the U-boom configuration. By combining the residue with newly collected oil, a major portion of the residue can be eliminated during subsequent burns.

If the burn residue remains buoyant, and it is practical to recover it before collecting and burning additional oil, the residue can be released to secondary collection booms or nets. Whether recovered from secondary booms or the fire containment boom, the burn residue can normally be picked up with large strainers or handtools, with viscous-oil sorbents, or with standard viscous-oil skimmers.

If not recovered, burn residue will normally break up and be dispersed as highly weathered tar balls.

Residue from burning oil on ice will be manually recovered from the surface of the ice.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Handtools	All	Recovery	Varies	Varies	1 hr	1 hr
Large Strainers	All	Recovery	Varies	Varies	1 hr	
Viscous-Oil Sorbent	All	Recovery	Varies	Varies	1 hr	
Viscous-Oil Skimmers	All	Recovery	1	2	2 hr	
Work Boat	All	Recovery	≥1	3	2 hr	
Fire Extinguisher	All	Suppress unwanted fires	>2	—	0.5 hr	
			TOTAL STAFF	**3**		

CAPACITIES

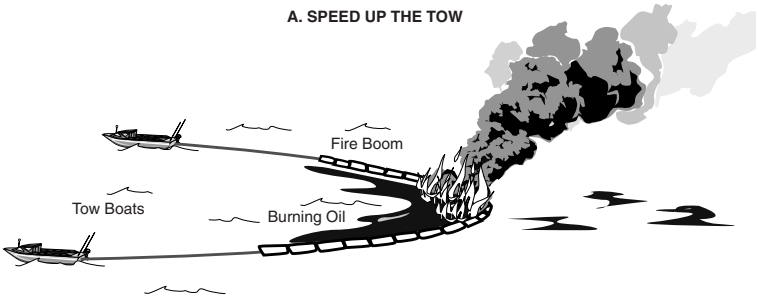
- Burning on water reduces the volume of a crude oil spill by 75% or more.
- For layers of oil 0.5 inch thick or greater, the removal rate is 4.2 gal of oil per hour for every sq. ft of burning oil.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

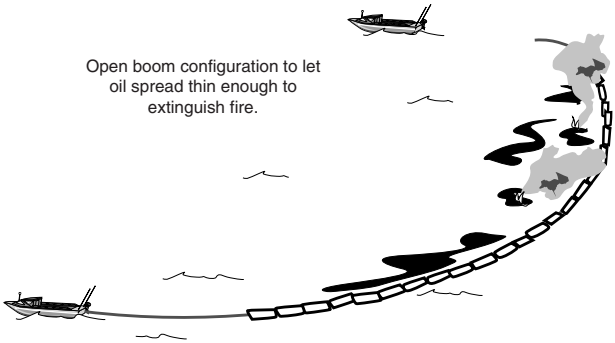
- Proper safety procedures must be followed, and the necessary personal protective equipment (PPE) must be used.
- Beware of flashback! After the fire appears to be extinguished, unexpected re-ignition can occur. Wait until the residue cools before approaching.
- Shortly after it cools, the burn residue becomes viscous and continues to cool to a thick, tarry substance best removed with handtools or nets.
- Initially, the residue floats, but eventually (several hours to several days), it may sink.
- Containers such as drums or plastic bags can be used for temporary storage.
- Handle the residue in the same manner as recovered oil. Testing is necessary to ensure that the residue is not hazardous. A State of Alaska permit is needed for final disposal.

B-7 Burn Extinguishment on Water (Pg 1 of 2)

A. SPEED UP THE TOW



B. RELEASE THE BOOM



It may be necessary to terminate in-situ burning for a variety of reasons:

- Personnel safety
- Adverse weather
- Darkness, especially for aircraft (vessels may still be able to operate with limited light)
- Downwind effects of smoke plume
- Completion of burning

Boom-towing personnel should be familiar with procedures to terminate the burn.

- The oil can be released from the boom and allowed to spread until it is too thin to burn (The potential spread area is possibly as large as ten contained fire diameters).
- The tow speed can be quickly increased to force the oil under the boom. This is less likely to involve down-stream combustion; however, anticipate the potential for a tenfold increase in burn diameter.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

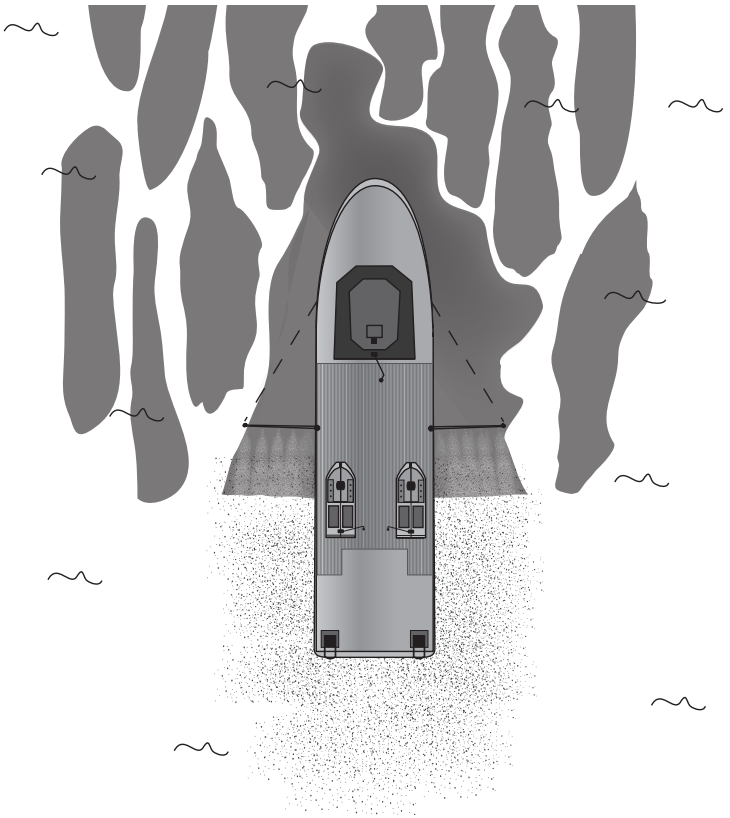
- Proper safety procedures must be followed, and the necessary personal protective equipment (PPE) must be used.
- Ensure released burning oil will not start unwanted fires.
- Ensure good communications between both vessels prior to initiating extinguishment procedure.

B

DISPERSANT TACTICS

DT-1 Dispersant Application via Vessel (Pg 1 of 2)

NOTE: Permission to use dispersants MUST be requested in advance, and approval received, in accordance with Alaska Regional Response Team (ARRT) Unified Plan, Annex F.



Chemical dispersants, once authorized for use, may be applied from spray arms off one or both sides of a vessel. Large vessels offer unique advantages over aerial systems involving the potential for large payloads of dispersant, continuous spraying for long periods, higher dosages (avoiding the need for multiple passes), and relatively simple, on-site application systems. Working with spotter aircraft, the vessel can be guided to the heaviest concentrations of oil where it can apply dispersants over swaths of typically 60 to 100 feet, depending upon the beam of the spray vessel and the length of the spray arms. With application speeds of approximately 3 to 8 knots, dispersants can be sprayed undiluted (neat) or diluted. Neat application, yielding higher efficiencies, is usually preferred.

Spray systems are designed and positioned on the vessel to give slightly overlapping spray patterns at the surface, yielding droplet-sizes that are typically 250 to 750 microns (1/4 to 3/4 mm), and making initial contact directly with the oil, thereby avoiding any wasteful treatment of oil that has been mixed into the water column by the vessel's bow wave and wake. With dosages of typically 5 to 15 gallons of dispersant per acre, pump rates are controlled to operate within that range based on the vessel's spray swath and speed. NOAA's Open Water Oil Identification Job Aid (characterizing oil slicks at various thicknesses) and its Dispersant Mission Planner 2 are helpful in determining appropriate slicks for chemical treatment and system operating parameters for both vessel and aerial spray systems.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
OSRV	Shell	Dispersant Application	12	6	0.5 hr	0.5 hr
Dispersant Spray Arm	Shell	Dispersant Application	2	1	0.5 hr	0.5 hr
CorExit 9500	Shell	Dispersant	≥100 bbls			
			TOTAL STAFF	**7**		

SUPPORT

- An aircraft, either fixed-wing or helicopter with a trained observer, is important in guiding spray vessels to the heaviest oil concentrations as well as the leading edges of slicks that could threaten sensitive resources.
- In the event of a fixed point-source spill (e.g., a blowout or sub-sea pipeline rupture), the need for aerial support may be reduced by spraying directly downstream of the source.
- Operations will normally involve strong support from the USCG and/or trained contractors to monitor and document the results of dispersant use following Special Monitoring of Applied Response Technologies (SMART) protocols.

CAPACITIES

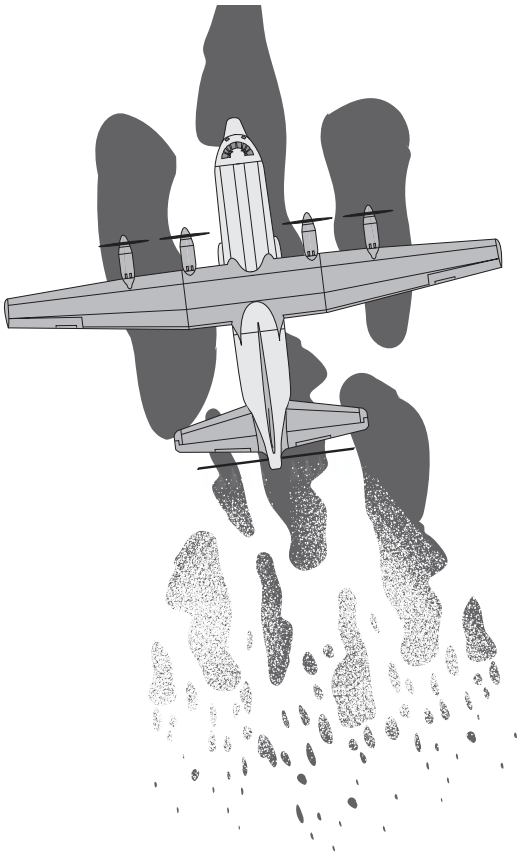
- With good visibility (especially with a fixed, continuous spill source), the equipment has the potential to operate 24 hours per day.
- For each 1,000 gallons of dispersant carried onboard, the vessel could treat as much as 20,000 gallons of oil (based on a dispersant-to-oil ratio of 1:20).
- Typical areal coverage rates for vessels with swaths of 60 to 100 feet, spraying at 5 knots, run between 0.7 and 1.2 acres/min. (i.e., ~0.06 to 0.11 mi^2/hr).
- Reference NOAA's Dispersant Mission Planner to determine incident-specific operating and application parameters.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Spray arms provide relatively low areal coverage rates.
- It can be difficult to observe oil on the water surface from the vessel's wheelhouse.

DT-2 Dispersant Application via Aircraft (Pg 1 of 2)

NOTE: Permission to use dispersants MUST be requested in advance, and approval received, in accordance with Alaska Regional Response Team (ARRT) Unified Plan, Annex F.



The aerial application of dispersants can be conducted as a primary response option when wind/sea conditions preclude the safe and effective use of booms for containment and recovery or burning operations. Dispersants may also be used strategically to treat oil that has escaped recovery and/or burning operations.

Once authorized for use, dispersants may be applied from a large fixed-wing aircraft, with the important advantage being speed of application with a relatively wide swath. MSRC's dedicated C-130 Hercules has a built-in tank and spray system with a dispersant carrying capacity of 3,250 gallons. Dependent upon the aircraft type and dispersant spray system storage capacity, a C-130 Hercules may be flown with up to 5,000 gallons per sortie and can operate effectively with a 100 ft altitude and application speeds of typically 145 to 150 knots. Since higher speeds and altitudes can be used for transit to the spill site and observation of the spill, the aircraft provides an opportunity to select the optimum direction and pattern for delivery of the dispersant. The large payload of this system, combined with its long-range capabilities and high areal coverage rates, typically many tens of acres/minute, make the Hercules one of the most effective options for treating large areas and volumes of oil far from shore (100 miles or more).

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
C-130 Hercules aircraft	Anchorage	Dispersant Application	1	2	24 hrs	0.5 hr
CorExit 9500	Anchorage	Dispersant	25,000 gals	4	4 hrs	1 hr
			TOTAL STAFF	**6**		

SUPPORT

- Whenever possible, a second spotter aircraft (fixed-wing or helicopter) would be used to help align the Hercules with each pass over the oil, giving "start" and "stop" instructions for spraying as the aircraft enters and leaves the desired spray zone. The spotter aircraft can provide important information to the pilot of the spray plane regarding wind effects on targeting of the dispersant, proper overlap with previous spray paths, effectiveness of dispersion, and any other adjustments that may be needed for the flight path.
- Flight crews manning aerial dispersant C-130 and spotter planes should be trained to work in tandem.
- The spotter aircraft can also be of help to those conducting the Special Monitoring of Applied Response Technologies (SMART) protocols by directing those boats to the regions where dispersants had been applied.
- Additional support is required back at the staging location for refueling of the aircraft and for the rapid loading of dispersant between sorties.
- Reloading dispersant pack requires two staff in PPE.

CAPACITIES

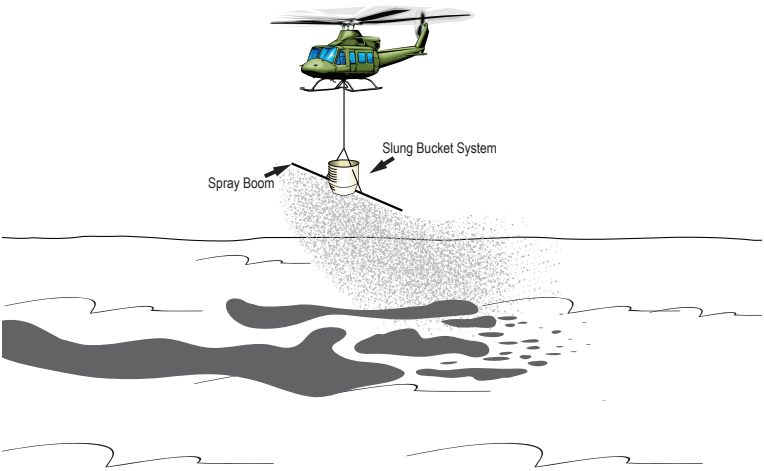
- The MSRC dispersant application platform consists of a built-in tank with removable spray arms that are positioned just forward of the tail. The booms, 15 ft on each side, deliver a swath width of 150 ft at altitudes of 50 to 100 ft.
- The Hercules' MSRC Dispersant system can deliver up to 4 payloads, depending upon the actual transit distance from staging to spill location, over a 12 to 18-hour period resulting in treatment of up to 10,000 bbl of oil (using a dispersant-to-oil ratio of 1:20).
- With good visibility there is the potential for dispersant application 24 hours per day during periods of extended daylight in the summer months.
- See NOAA's Dispersant Mission Planner to determine incident-specific operating and application parameters.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Distance of sortie from staging location to application site.
- High wind and rough sea conditions may degrade application effedtiveness.
- Oil type, thickness, emulsification, and weather are other factors determining effectiveness.
- SMART protocols require a test application to evaluate effectiveness.

DT-3 Dispersant Application via Helicopter (Pg 1 of 2)

NOTE: Permission to use dispersants MUST be requested in advance, and approval received, in accordance with Alaska Regional Response Team (ARRT) Unified Plan, Annex F.



Dispersant application from a "bucket" slung beneath a helicopter provides the capability for "surgical" spraying over oil that has escaped containment during recovery or burning operations. Helicopters can also access relatively large areas (typically 10 acres/min or more), maneuver well to hit the highest concentrations of oil, and make quick altitude adjustments locating oil from 500 feet or more, and then dropping to a 50-ft altitude or less for spraying.

Helicopter spray buckets will vary in size from approximately 150 to 300 gallons of dispersant. For example, a 240-gallon bucket can spray with a swath width of 75 to 100 feet at speeds of typically 50 to 85 knots. Depending upon the payload/range capabilities of the helicopter, such spray systems are somewhat restricted to waters that are typically less than 20 n mi from shore or offshore staging.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Helicopter	Shell	Dispersant Application	1	2	1 hr	1 hr
Spray Bucket (mobilized with aircraft)	Shell	Dispersant Application	1	2	1 hr	1 hr
CorExit 9500	Shell	Dispersant	1			
			TOTAL STAFF	4		

SUPPORT

- A spotter aircraft (fixed-wing or helicopter), if available, can greatly enhance the operation by locating slicks, guiding the spray helicopter to those regions, and documenting the effectiveness of dispersion.

CAPACITIES

- With good visibility there is the potential for dispersant application 24 hours a day during periods of extended daylight in the summer months.
- Depending upon the distance from shore and the availability of backup dispersant supplies and ground support, a helicopter spray system could deliver well over a dozen sorties in a single day. If 200 gallons of dispersant are sprayed during each of 12 sorties, the system could treat nearly 1,200 bbls of oil (assuming a dispersant-to-oil ratio of 1:20).
- Each staging location may store at least 2,000 gallons of dispersant for each helo-bucket system to be serviced for each day of operation.
- Reference NOAA's Dispersant Mission Planner to determine incident-specific operating and application parameters.
- AES spray bucket has a capacity of 200 gallons.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

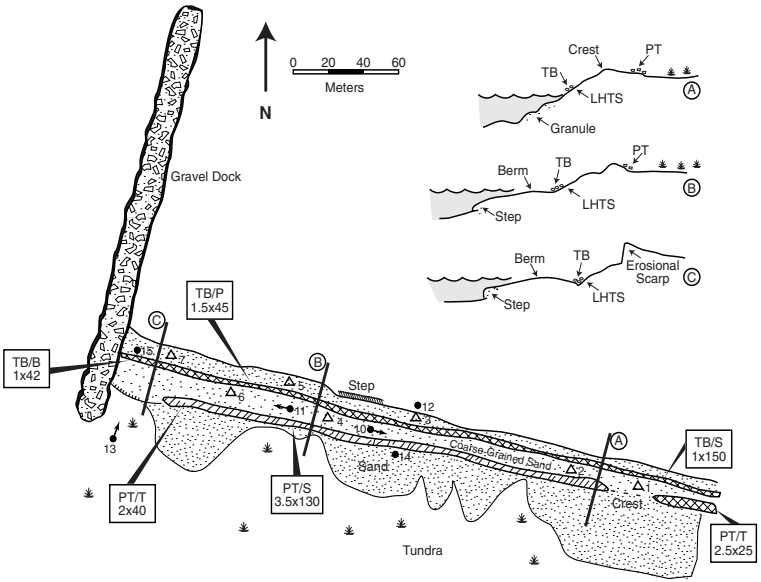
- Due to the limited range of most small helicopters and the added risks of flying over water, helicopter spraying operations should be conducted from staging locations relatively close to the spill.
- Remote locations, far offshore, would need to be supported by vessels or a platform with heli-pad, refueling facilities and dispersant for reloading the bucket between sorties.

DT

SHORELINE CLEANUP TACTICS

SH-1 Assessment (Pg 1 of 2)

SAMPLE SHORELINE ASSESSMENT SKETCH MAP



PURPOSE OF SHORELINE ASSESSMENT

If a spill impacts the shoreline, it is important to have a clear and accurate understanding of the nature and extent of the oiling, particularly before cleanup commences. The Shoreline Cleanup Assessment Team (SCAT) approach is used to collect data on shoreline oiling conditions and support decision-making for cleanup. The objectives are to:

- Systematically collect data on shoreline oiling conditions
- Identify and describe human use, ecological and cultural resource effects and the constraints that they impose on cleanup operations
- Cross-check pre-existing information on environmental sensitivities or clarify observations from aerial surveys
- Identify any constraints that may limit operations
- Provide decision support for onshore response operations

Priorities for shoreline assessment surveys may be determined using information from aerial surveys and pre-existing sensitivity atlases and databases. Priority setting criteria include:

- Degree of oiling
- Environmental resources
- Projected tide and wind conditions
- Available transportation and logistics

Information collected from the SCAT process is the basis for development of the shoreline treatment or cleanup operation.

SCAT may involve:

- An aerial reconnaissance survey to identify areas of current or potential impact
- An aerial video survey to document shoreline oil conditions and geomorphology and to establish locations and priorities for ground surveys
- A ground survey to document shoreline oil conditions, geology, ecology, cultural resources, and identify constraints

SHORELINE SEGMENTATION

Shoreline segmentation provides a systematic and uniform framework for documentation, planning and response consideration.

- The shoreline is divided into working units, called "segments", within which the shoreline character is relatively homogeneous in terms of physical features and sediment type.
- Each segment is given a unique location identifier and is surveyed.
- Segment boundaries can be either prominent geological features (headlands, streams, etc.), changes in shore/substrate types, or changes in oil conditions.
- Segment lengths are small enough to obtain adequate resolution and detail on the distribution of oil, but not so small that too much data is generated. Most segments in oiled areas would be in the range of 0.2 to 2.0 km.
- Segments are identified on an alphanumeric scheme with an alphabetical prefix, keyed to a geographic place name (e.g., MP = Milne Point), followed by a number based on an alongshore sequence (MP-4).

Segmentation for the North Slope region has already been accomplished as part of the pre-planning exercise (see the *ACS Technical Manual Map Atlas*). It should be reviewed for suitability at the time of a spill, since the segment boundaries may need to be adapted to existing spill conditions. Predesignated segments can be subdivided if oiling conditions vary significantly within the segment; segment subdivision can be identified by a suffix (e.g., MP-4-A).

SCAT SURVEY TEAM AND RESPONSIBILITIES

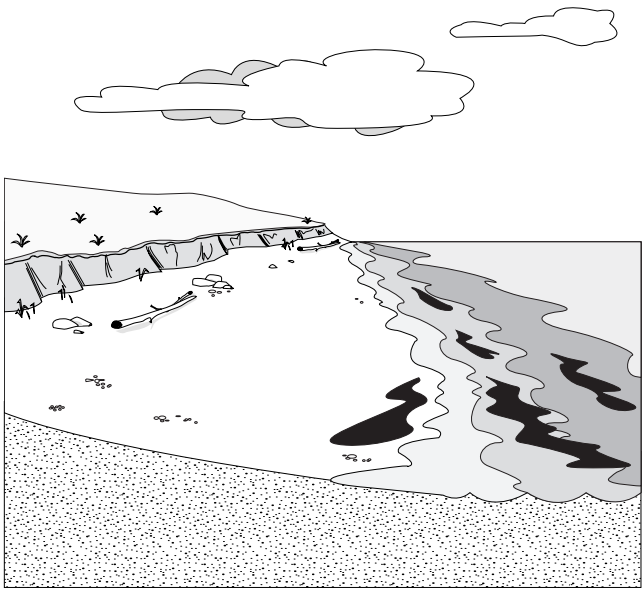
Primary team members for the surveys and their responsibilities are outlined below. Assignments can be modified according to survey objectives and the composition of the team. Government or landowner representatives will participate and may assist in the data collection.

TEAM MEMBER	RESPONSIBILITIES
Oil Spill Geomorphologist	• Logistical direction and management of the survey team • Review of existing data, maps and photos • Reviewing and verifying existing shoreline segmentation and adapting it as necessary • Photographic/video documentation • Collection and documentation of any sediment/oil samples that may be required • Consultation with the spill response operations representative and other team members concerning appropriate response options and constraints for a given site • Post-survey mapping, documentation, and categorization of the severity of oiling based on on-site observations
Ecologist	• Cross-checking information from existing sensitivity atlases and databases with actual conditions • Describing the abundance and location of different coastal ecosystems in the segment • Tabulating information on the general character and health of indicator species along the shoreline • Providing information on nearshore, shallow areas and wildlife observations • Recommending ecological constraints on operations or cleanup activities • Providing photo documentation and a sketch map of the surveyed area
Archaeologist	• Evaluate the foreshore areas to identify likely site locations • Update known site by recording additional information on site location, size, depth, presence of surface features and conditions • Document newly discovered sites • Complete forms as required (Cultural Resource Evaluation Form and Human Use Summary Form) • Apply constrains as necessary on operations or cleanup activities • Provide photo documentation and draw a sketch map

Detailed information on the SCAT process is provided in the two following documents:

- Owens Coastal Consultants. 1994. *North Slope Shoreline Oil Spill Countermeasures Manual.* Prepared for Alaska Clean Seas, Prudhoe Bay, Alaska.
- Michel, J. and I. Byron. 1997. *Shoreline Assessment Manual.* Hazardous Materials Response and Assessment Division, National Ocean Service, National Oceanic and Atmospheric Administration, Report No. HAZMAT 97-4.

SH-2 Natural Recovery of Oiled Shoreline (Pg 1 of 2)



Natural recovery allows the shoreline to recover without intervention. This option requires field observations of the oiling conditions and of the resources at risk to assess the effects of allowing the oil to weather naturally. In some cases, monitoring the location may be necessary to ensure that the assessment is correct.

Natural recovery can be applicable on any spill incident and for any shoreline type, but requires a decision that:

- To treat or clean stranded oil may cause more damage than leaving the site to recovery naturally, or
- Response techniques cannot accelerate natural recovery, or
- Safety considerations could place response personnel in danger either from the oil (itself) or from environmental conditions (weather, access, etc.).

Other factors include an analysis of the:

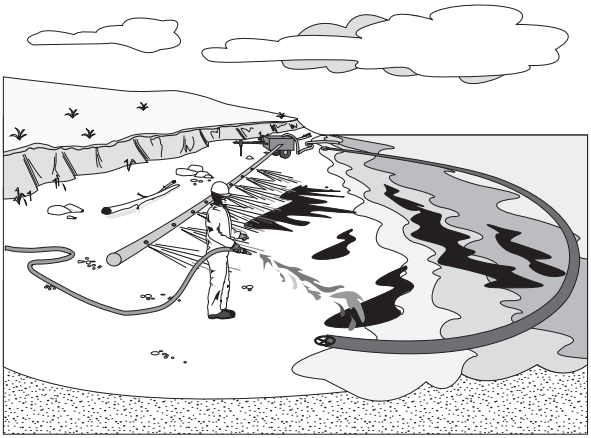
- Resources at risk,
- The type and amount of oil, and
- The location of the site.

For example, a decision could be made that a small amount of nonpersistent oil on an exposed shore at a remote location may weather and degrade without any active or potential future threat to the local environment.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Unified Command approval is required for any shoreline cleanup tactic.
- Natural recovery of oiled shorelines is more applicable for:
  - Small than large amounts of oil,
  - Nonpersistent than persistent oil, and
  - Exposed shorelines than sheltered or low wave-energy environments.
- Natural recovery may not be appropriate if important ecological resources or human activities/resources are threatened.
- Natural recovery should always be considered as the preferred option, particularly for small amounts of oil. The trade-off analysis involves (1) natural recovery, (2) the possible benefits of a response to accelerate recovery, and (3) any possible delays to recovery that may be caused by response activities.

SH-3 Cleanup Using Flooding and Flushing (Pg 1 of 2)



Physical removal involves a variety of washing or flushing tactics to move oil from the shore zone to a location for collection and removal. The variables that distinguish each tactic are pressure and temperature. For all these tactics, booms or other methods of trapping and containment are used to collect the oil for removal.

FLOODING ("DELUGE")

A high-volume (50 to 250 gpm), low-pressure supply of seawater at ambient temperature is pumped using large-diameter (3- to 6-inch) pipe and/or hose ("header") to the upper section of the oiled area. Water can be pumped either directly from a hose without a nozzle, or the pipe or hose can be perforated (0.1- to 0.2-inch holes) at intervals and placed along the shoreline parallel to the water line. Output pressures are less than 20 psi.

The high volume of water floods the surface area (in the case of impermeable man-made shorelines) or the beach sediments. Mobile or non-sticky oil is transported with the water as it flows downslope. Flooding can be used in combination with trenches or sumps and vacuum systems to float and collect oil for recovery.

LOW-PRESSURE, COLD-WATER FLUSHING

Hand-operated or remote-controlled hoses use ambient temperature seawater to flush, wash, and herd oil to a collection point for removal. Output pressures are controlled, usually by a nozzle, and are low (less than 50 psi). The tactic can be used with flooding to prevent redeposition of the oil.

LOW-PRESSURE, WARM/HOT-WATER FLUSHING

Hand-operated or remote-controlled hoses use heated (80°F to 212°F) seawater to flush, wash, and herd oil to a collection point. This tactic is used primarily to dislodge and flush oil that cannot be washed using low-pressure, ambient-temperature water. Output pressures are controlled, usually by a nozzle, and are low (less than 50 psi). This tactic can be used with flooding to prevent redeposition of the oil.

HIGH-PRESSURE, COLD-WATER FLUSHING

Hand-operated or remote-controlled hoses use ambient temperature seawater jets to flush, wash, and herd oil to a collection point. The higher water pressures dislodge and flush oil that cannot be washed or mobilized using lower pressure, ambient temperature water. Output pressures are controlled and are in the range of 100 psi or greater. On sloping outcrops or structures this technique can be used with flooding to prevent redeposition of the oil.

HIGH-PRESSURE, WARM/HOT-WATER FLUSHING

Hand-operated or remote-controlled hoses use high-pressure, heated (80°F to 212°F) seawater to flush, wash, and herd oil to a collection point. Output pressures may be fixed or controlled by a nozzle and are in the range of 100 psi or greater. The higher pressure and warm water dislodge and flush oil that cannot be washed by lower pressure and temperature water. On sloping structures, this technique can be used with flooding or low-pressure flushing to prevent redeposition of the oil.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Trash Pump (2-inch)	All	Deluge	≥1	2	1 hr	2 hr
Suction Hose (2-inch)	All	Suction	≥20 ft	2 for setup	2 hr	
Discharge Hose (3-inch)	All	Deluge	≥50 ft	—	2 hr	
Perforated Header Hose	ACS, KRU	Deluge	>100 ft	2 for setup	1 hr	
Water Heating Plant*	EOA	Heat water	—	—	—	
Water Truck*	All	Transport heated water	1	1	2 hr	
				TOTAL STAFF	**2 (3 if water truck is used)**	

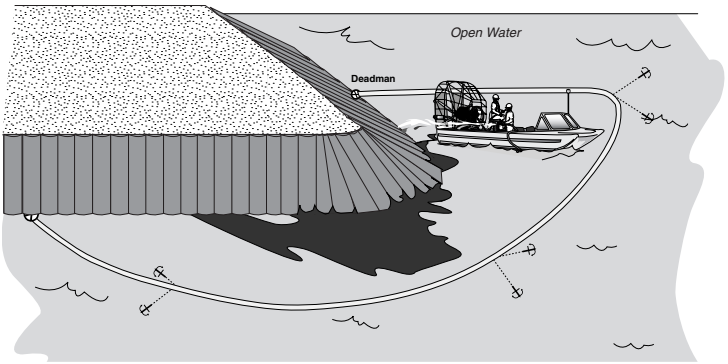
**Warm/hot-water flushing would be used only where road access is available to truck heated water to the site.*

- See tactics on booming and skimming for additional equipment and personnel needs for recovery of free oil generated by these tactics.
- Ambient sea water for flooding and flushing operations may also be supplied via pumps located aboard off-shore response vessels.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Unified Command approval is required for any shoreline cleanup tactic. Additional permits may be required for beach or upland access, and to anchor boom to the beach (e.g., ADF&G, ADNR, SHPO, etc.).
- Washing oil and/or sediments downslope to lower intertidal zones that may have plant or animal communities should be avoided, particularly if these were not initially oiled. This can be avoided by working at only mid-tide or higher water levels so that these communities are below the water line. This oil and oiled sediment should be contained and collected as part of the treatment process. If it cannot be recovered, the technique only disperses oil rather than cleans the shoreline.
- *Flooding* is effective on most shoreline types, but it may have limited application only on sand or mud flats and on steep man-made solid structures. Generally, flooding is not a very intrusive technique.
- *Low-pressure, cold-water flushing* is effective on most impermeable shoreline types and on some permeable shores or marshes. It may have limited application only on sand beaches, sand-gravel beaches, or sand flats, and is probably not appropriate on mud flats. Generally, this is not an intrusive technique and leaves most organisms in place.
- *Low-pressure, warm/hot water flushing* is effective on most impermeable shoreline types, but may have limited application only on sand beaches, sand-gravel beaches, and sand flats and is probably not appropriate on mud flats. Generally, this is not a highly intrusive technique if used carefully in conjunction with high-volume flooding, which minimizes the potential adverse effects on shoreline organisms of using heated water.
- The effectiveness of flooding and low-pressure flushing decreases as oil viscosity increases and as depth of penetration increases on cobble beaches.
- *High-pressure, cold-water flushing* has limited application only for oiled bedrock or solid man-made shorelines. High-pressure water can dislodge attached organisms and may damage others.
- *High-pressure, warm/hot-water flushing* usually has only limited application for solid man-made structures. The heated water or the pressures may dislodge attached organisms or damage others.

SH-4 Cleanup Using Steam or Sand Blasting (Pg 1 of 2)



STEAM CLEANING

Hand-operated or remote-controlled units are used to dislodge, wash, and herd oil to a collection point. Output pressures from the unit are generally over 100 psi and may be as high as 1,000 psi with steam temperatures over 200°F. This tactic can be used with flooding to prevent redeposition of the oil.

SAND BLASTING

Hand-operated or remote-operated units are used to dislodge oil or abrade stains and thin weathered films of oil from a hard surface. Output pressures from the hose are usually less than 100 psi. Spent sand and dislodged oil can be collected by a drop-cloth arrangement below the working area.

EQUIPMENT AND PERSONNEL

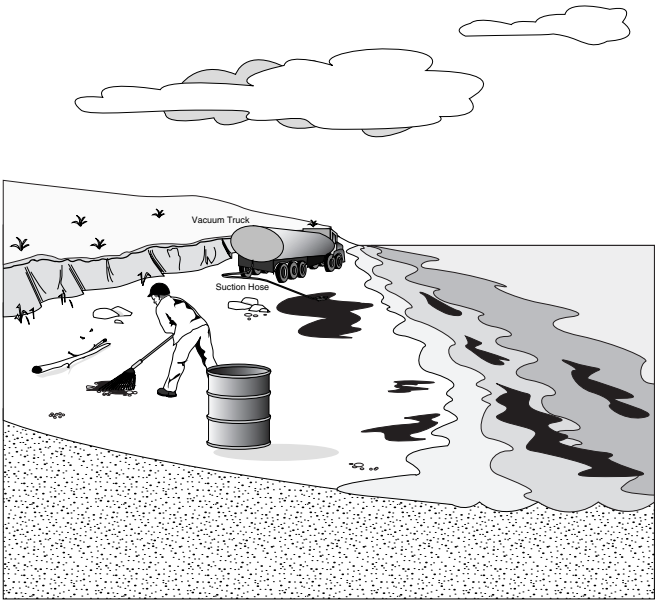
- See tactics on booming and skimming for additional equipment and personnel needs for recovery of free oil generated by these tactics.

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Small Sand Blaster	ACS	Sand blasting	1	2	2 hr	2 hr
	Air Compressor	All	Air for sand blaster	1	—	1 hr	
or	Spillbuster Van	EOA, KRU	Steam cleaning	1	2	1 hr	2 hr
or	Steam Cleaner	ACS	Steam cleaning	1	2	2 hr	
	1000-Gal Water Tank	ACS	Water	1	—	2 hr	
				TOTAL STAFF	**2**		

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Unified Command approval is required for any shoreline cleanup tactic.
- Washing oil and/or sediments downslope to lower intertidal zones that may have plant or animal communities should be avoided, particularly if these were not initially oiled. This can be avoided by working at only mid-tide or higher water levels so that these communities are below the water line. This oil and oiled sediment should be contained and collected as part of the treatment process. If it cannot be recovered, the technique only disperses oil rather than cleans the shoreline.
- *Steam cleaning* has limited application and is used only on impermeable man-made surfaces. Generally, this is a very intrusive technique. Steam cleaning will kill most organisms.
- *Sand blasting* has limited application and is used only on impermeable man-made surfaces. Generally, this is a very intrusive technique. Sand blasting will remove all organisms and leave a clean and pristine, but barren, surface.
- Sand blasting systems use up to 1,000 lb. of sand per hour so that a considerable amount of waste material is generated. The movement of sand and oiled sand to lower intertidal zones that have attached plant or animal communities should be avoided.

SH-5 Cleanup Using Manual and Vacuum Methods (Pg 1 of 2)



This group of physical methods involves removal of the oil or oiled materials (sediments, debris, vegetation etc.) from the shore zone to a location where it can be disposed of.

MANUAL REMOVAL

The technique involves picking up oil, oiled sediments, or oily debris using gloved hands, rakes, pitchforks with screens, trowels, shovels, sorbent materials, buckets, etc. It may include scraping or wiping with sorbent materials or sieving if the oil has come ashore as tar balls. Collected material can be placed directly in plastic bags, drums, etc., for transfer. If the containers are to be carried to a temporary storage area they should not weigh more than can be easily and safely carried by one person. This tactic can be used practically and effectively in any location or on any shoreline type or oil type where access to the shore zone is possible and safe.

VACUUM

Truck-mounted vacuum systems may be used; the suction end usually is deployed manually to collect oil and/or oily water. These vacuum systems are primarily used where oil is pooled in natural depressions or hollows, or has been herded into collection areas. Vacuums can be used in combination with flooding or deluge techniques to float and collect oil. Vacuum trucks can be used to remove oil that is collected in sumps. A dual-head wash-vacuum system can be used in locations that are hard to access, such as between boulders and logs.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Rakes	All	Recovery	≥1	1	1 hr	0.5 hr
Pitch Forks w/Screen	All	Recovery	≥1	1	1 hr	1 hr
Shovels	All	Recovery	≥1	1	0.5 hr	0.5 hr
Sorbents	All	Recovery	≥1 Pkg.	1	1 hr	1 hr
Vacuum Truck	All	Recovery	1	2	1 hr	0.5 hr
Oily Waste Bags	All	Disposal	>1 Box	—	0.5 hr	0.5 hr
			TOTAL STAFF	**2**		

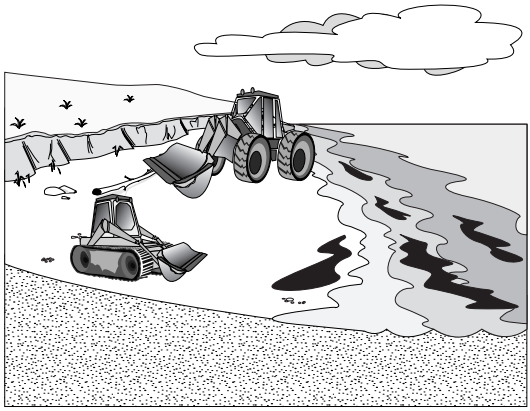
CAPACITIES FOR PLANNING

- The typical suction rate for liquids by a vacuum truck is 200 bbl/hr in the summer and 150 bbl/hr in the winter. The typical suction rate for pooled diesel remains at 200 bbl/hr year round. (Vacuum truck recovery rate is reduced to 34 bbl/hr if if a Manta Ray skimmer is used.)

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Unified Command approval is required for any shoreline cleanup tactic.
- *Manual removal* is most applicable for:
  - Small amounts of viscous oil (e.g., asphalt pavement removal),
  - Surface or near-surface oil, and
  - Areas inaccessible to vehicles.
- Manual removal is labor intensive and slow for large oiled areas; although slower than mechanical removal, it generates less waste and the waste materials can be segregated easily at the source.
- Foot traffic should avoid the oiled zone to prevent carrying oil from there into previously clean locations. Foot traffic can have an adverse impact on marshes or in tidal flat areas. Excessive foot traffic can impact vegetated areas, such as backshore tundra, or can disturb adjacent resources, such as nesting birds.

SH-6 Cleanup Using Mechanical Removal (Pg 1 of 2)



Mechanical removal is more rapid than manual removal but generates larger quantities of waste. The method of operation varies considerably depending on the type of equipment that may be available and on the ability of that equipment to operate on a section of shore. The cleaning efficiency for each type of equipment is expressed in terms of the rate of cleaning that can be achieved and the amounts of waste that are generated.

Some equipment (e.g., Bobcats, front-end loaders, or vacuum trucks) can remove and transfer material directly to a truck or temporary storage area in a single step. Other types (graders and bulldozers) are less efficient and require two steps to move or side cast material that must then be picked up by other equipment (Bobcats, front-end loaders or backhoes) for transfer.

Several mobile beach cleaners have been developed specifically for oil spill cleanup; however, these are not locally available on the North Slope but may be brought in for medium- or large-scale response operations, if appropriate. Other beach cleaners designed for cleaning of debris can be adapted to pick up oiled tarballs. A commonly-used example is a mobile sieving unit drawn by a tractor.

Off-site beach cleaning machines that treat or wash and replace oiled materials are included in this part as they involve a waste management program of transfer, temporary storage and treatment, even if replaced on the shore. These off-site cleaners involve a multistep process as oiled material is removed from a beach and subsequently replaced by one or more types of earth-moving equipment.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Bobcat	ACS, KRU, EOA, Alpine	Recovery	1	1	1 hr	0.5 hr
or	Front-End Loaders	All	Recovery	1	1	1 hr	0.5 hr
or	Backhoe	All, Peak, AIC	Recovery	1	1	2 hr	0.5 hr
	Wide-Track Dozer	All	Sediment Reworking	1	1	1 hr	0.5 hr
or	Grader	All	Recovery	1	1	1 hr	0.5 hr
	Vacuum Trucks	All	Recovery	1	1	1 hr	0.5 hr
or	Dump Trucks	All	Disposal	2	2	1 hr	0
				TOTAL STAFF	**≥3**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr
Semi and Trailer	GPB, KRU, Alpine	Haul equipment	1	1 driver	1 hr	0

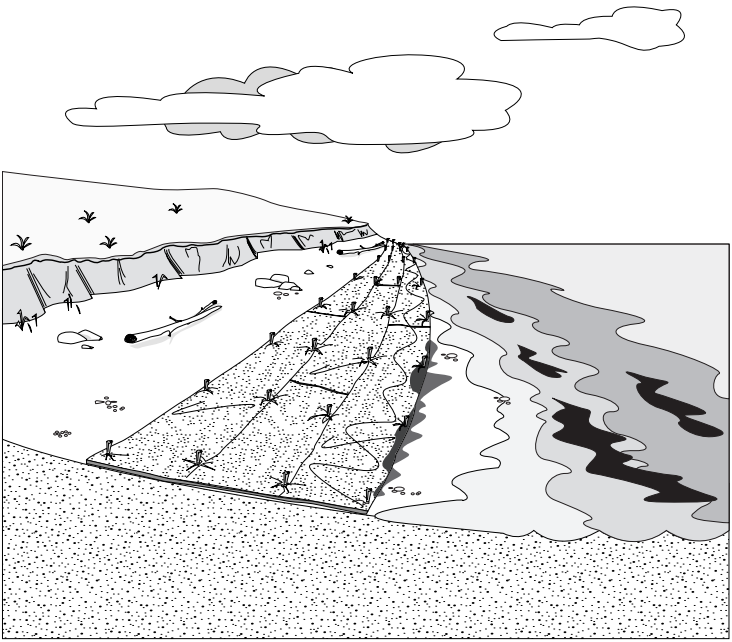
CAPACITIES FOR PLANNING

- The typical suction rate for liquids by a vacuum truck is 200 bbl/hr in the summer and 150 bbl/hr in the winter. The typical suction rate for pooled diesel remains at 200 bbl/hr year round. (Vacuum truck recovery rate is reduced to 34 bbl/hr if a Manta Ray skimmer is used.)

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Unified Command approval is required for any shoreline cleanup tactic.
- Mechanical removal can be used on all but solid, man-made shoreline types, although it has limited applicability for tidal flats, due to poor bearing capacity. The bearing capacity of the sediments and the slope of the shore zone, as well as the performance characteristics of the individual equipment, control the applicability of different types of machines.
- The various types of commercially-available earth-moving equipment have different operational requirements and different applications. The most important variable is the ability of a piece of equipment to travel on a beach type without becoming immobilized. Traction for wheeled equipment on soft sediments (low bearing capacity) can be improved by reducing tire pressures. Tracked equipment may be able to operate where wheeled vehicles cannot, but is not a preferred option as tracks disturb sediments or tundra surfaces to a much greater degree than tires. Each type of equipment has a particular application:
  - **Graders:** Can operate on only hard and relatively flat surfaces and are capable of moving only a thin cut (<3 inches) of surface material.
  - **Loaders, bulldozers and backhoes:** Can operate in a wider range of conditions and are designed to move large volumes of material and can dig as well as move material.
  - **Backhoes:** Use an extending arm or crane so that they may be operated from a backshore area and can reach to pick up material.
  - **Beach cleaning machines:** Operate in a number of different ways: mobile equipment cleans or treats on a beach whereas other equipment operates off-site (adjacent) to treat sediment so that cleaned material may be replaced on the beach.
  - **Vacuum trucks:** Remove pooled oil or oil collected in lined sumps.
- Use of mechanical techniques on tidal flats or marshes can cause significant adverse impacts, either by mixing oil with clean and/or subsurface sediments or by damaging plant stems and root systems.
- All earth-moving equipment is designed to move large volumes of material in a rapid and efficient manner, which is not always an appropriate approach for shoreline cleanup. Frequently the objective of a cleanup program is to use the equipment in such a way that only a thin cut of oiled sediment is removed. Usually the operator can advise on which piece of equipment is the most appropriate or practical to achieve a particular goal.
- Repeated handling or transfer of oiled sediments during mechanical removal should be avoided as much as possible as this increases the potential for spillage and decreases efficiency.

SH-7 Cleanup Using Sorbents and Vegetation Cutting (Pg 1 of 2)



SORBENTS

Sorbent materials such as rolls or snares are placed in the shore zone to collect oil as it comes ashore (protection mode) or in the oiled area after it has been stranded (cleanup mode).

Usually the sorbents are deployed in fixed position, by stakes and/or anchors, as a line or parallel lines in the form of a floating boom or rope so that they are lifted and can move at the water's edge. Alternately, individual sorbents may be staked to swing over a fixed area as the water rises and falls.

In both the protection and cleanup modes, the sorbent material is left in place to collect oil for subsequent removal and disposal.

This technique is distinguished from the use of sorbent materials to manually remove oil. That technique is described under manual removal.

VEGETATION CUTTING

Vegetation cutting removes oiled plants to prevent remobilization of the oil and contact by wildlife or to accelerate the recovery of the plants. Usually, this is a manual operation involving knives, powered weed cutters, and/or rakes.

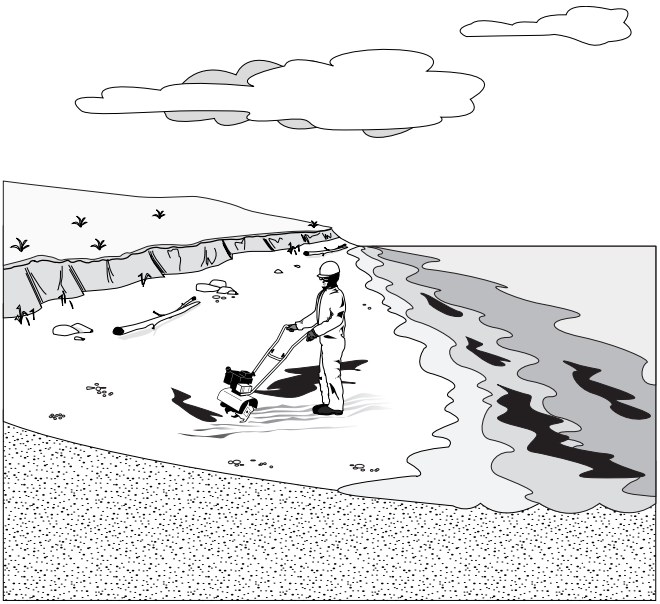
EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Knives	All	Vegetation removal	≥1	1	0.5 hr	0.5 hr
Weed Eater	EOA, KRU	Vegetation removal	≥1	1	1 hr	0.5 hr
Rakes	All	Vegetation removal	>1	1	1 hr	0.5 hr
Sorbents	All	Recovery	> 1 pkg.	1	1 hr	0.5 hr
			TOTAL STAFF	**≥2**		

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Unified Command approval is required for any shoreline cleanup tactic.
- *Vegetation cutting* is a labor-intensive technique that is used in marshes or on attached plants, such as seaweed, where there is concern that the oil may be released later to affect other resources, particularly wildlife. Also applicable where the continued presence of oil may pose a contact threat to animals and birds that use the area or to adjacent healthy organisms.
- Foot traffic from vegetation cutting can cause considerable damage in low-lying, drowned tundra, or marsh areas. Loss of plants or of stems and leaves can delay natural recovery rates and remove habitat for some species.
- *Sorbents* can be used on any shoreline type and for most oil types. Less applicable for very viscous, volatile oil types and for semisolid oils.
- Sorbents can quickly reach their capacity when in contact with large amounts of oil. When frequent replacement is necessary, which can occur even for relatively small amounts of oil, this is a labor-intensive activity that can generate large amounts of waste on a daily basis.
- Sorbents can be run through a sorbent wringer and reused.
- Sections of sorbent boom can be placed at the water level and secured with fence posts every 10 feet to catch any oil that may be going back out into the water.

SH-8 Cleanup Using Mechanical Tilling/Aeration (Pg 1 of 2)



Mechanical tilling/aeration exposes or breaks up surface and/or subsurface oil to accelerate evaporation and other natural degradation processes.

Heavy equipment is used to break up surface oil layers or to expose subsurface oil to natural weathering processes. This tactic may involve the use of farm-type equipment such as a disc system, harrow, plough, rakes or tines, or earth-moving equipment such as front-end loaders, graders, or bulldozers.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Aerator	KRU	Aeration	1	1	2 hr	1 hr
or	Roto-tiller	EOA	Aeration	1	1	2 hr	1 hr
or	Front-End Loader	All	Aeration	1	1	1 hr	0.5 hr
or	Grader w/Scarifying Teeth	All	Aeration	1	1	2 hr	0.5 hr
or	Dozer w/Ripper Teeth	GPB, KRU, Peak	Aeration	1	1	1 hr	0.5 hr
or	Tractor w/Tilling Attachment	Peak	Aeration	1	1	1 hr	0.5 hr
or	Skid-Steer w/Trimmer	All	Aeration	1	1	1 hr	0.5 hr
				TOTAL STAFF	**≥2**		

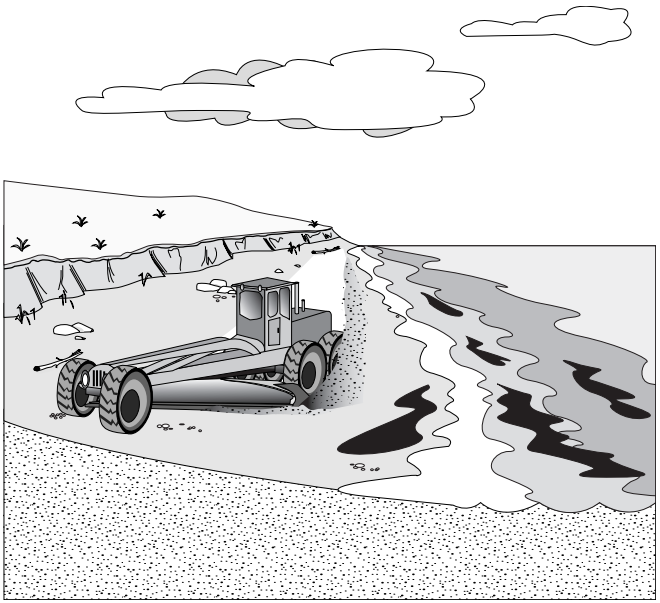
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Haul equipment	1	1 driver	1 hr	0
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Lube Truck	All	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Unified Command approval is required for any shoreline cleanup tactic.
- Mechanical tilling/aeration can be used on coarse sediment (pebble/cobble) or sand beaches and is particularly useful in promoting evaporation (safety evaluations are crucial to ensuring that volatile fractions are not present). This method may be used in conjunction with manual removal (to pick up patches of oil that are exposed) or bioremediation.
- If oil or oiled sediments have been buried by a clean layer of material, it may be appropriate to remove that clean layer to a temporary storage location, replacing it after tilling or aeration and after the exposed oiled materials have been allowed to weather.
- Care should be taken to not alter the shoreline such that erosion/accretion occur. This method may affect biological populations.

SH-9 Cleanup Using Sediment Reworking & Surf Washing (Pg 1 of 2)



Sediment reworking/surf washing accelerate natural degradation by exposing oil and oiled materials to higher levels of physical (wave) energy.

Earth-moving equipment is used to move oil or oiled sediments to a location where these processes are more active — from surface or subsurface areas where they are protected from natural physical abrasion and weathering processes or where these processes occur at relatively slower rates.

Farm-type machinery (such as a disc system, harrow, plough, rakes or tines) or earth-moving equipment (such as front-end loaders, graders, or bulldozers) can be used.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Front-End Loader	All	Sediment reworking	1	1	1 hr	0.5 hr
or	Grader	All	Sediment reworking	1	1	2 hr	0.5 hr
or	Wide-Track Dozer	All	Sediment reworking	1	1	1 hr	0.5 hr
or	Tractor w/Tilling Attachment	Peak	Aeration	1	1	1 hr	0.5 hr
				TOTAL STAFF	**≥2**		

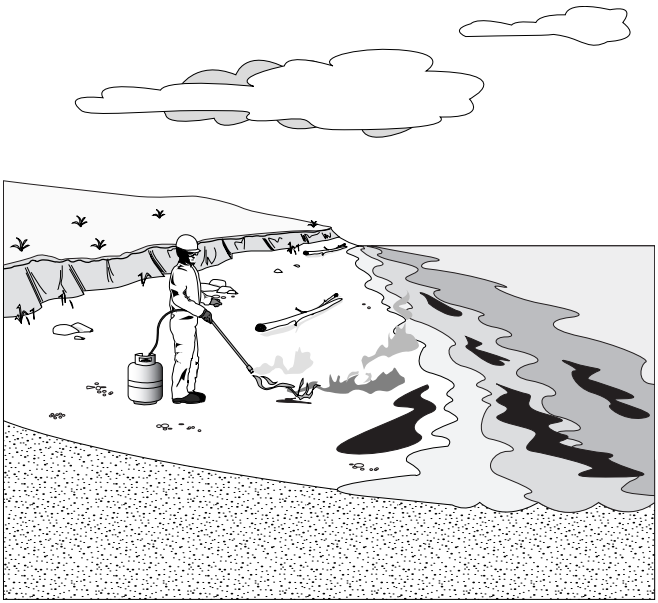
SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Haul equipment	1	1 driver	1 hr	0

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Unified Command approval is required for any shoreline cleanup tactic.
- If oil or oiled sediments have been buried by a clean layer of material, it may be appropriate to remove that clean layer to a temporary storage location, replacing it after reworking or washing the exposed oiled materials and after they have been redistributed by wave action.
- Sediment reworking/surf washing can be used on coarse sediment (pebble-cobble) or sand beaches, and is particularly useful:
  - In promoting evaporation and physical abrasion;
  - Where sediment removal may cause beach instability (i.e., potential erosion);
  - Where oiled sediments are located above the limit of normal wave action;
  - Where oil or oiled sediments have been buried or oil has penetrated to a level below the normal or seasonal wave-action zone; and
  - Where other cleanup or treatment activities have removed most of the oil or oiled sediment and only light oiling (i.e., stains) remains.
- Degradation requires wave action, so that the applicability of the technique decreases in sheltered or low wave-energy environments.
- Sediment reworking/surf washing is not appropriate if large amounts of oil might be released that could threaten to re-oil the beach or adjacent locations. Oiled materials should not be moved into shoreline areas where the oil and/or the sediments could damage other resources.

SH-10 Cleanup Using Burning (Pg 1 of 2)



Oil on a beach will not sustain combustion by itself unless it is pooled or has been concentrated in sumps, trenches, or other types of containers. This technique is used primarily where combustible materials, such as logs or debris, have been oiled and can be collected and burned, or where vegetation, such as a marsh, has been heavily oiled.

Torches can be used to burn oil from hard substrates, but this is a labor-intensive method that uses large amounts of energy to remove small amounts of oil.

EQUIPMENT AND PERSONNEL

	EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
	Propane Weed Burner	All	In-situ burning	1	1	1 hr	0.5 hr
or	Hand-Held Igniter	ACS	In-situ burning	≥1	1	1 hr	0.5 hr
				TOTAL STAFF	**≥2**		

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Proper safety procedures must be followed, and the necessary personal protective equipment (PPE) must be used.
- Unified Command approval is required for any shoreline cleanup tactic.
- Responders should work from upwind edge of spill to downwind edge.
- Burning is applicable primarily for oiled peat, logs or debris, or where oil has been collected and can be ignited with sustained combustion in sumps or drums.
- Burning has been used effectively for oil spills on ice.
- Burning of heavily oiled marsh vegetation has a major impact on the ecosystem if the marsh soils are dry, as the root systems can be destroyed. Wet soils protect the root systems from heat damage so that recovery from burning is more rapid.
- Generation of smoke may be an undesirable side effect, although this is not a health or safety issue provided that standard precautions are observed.
- Burning requires that appropriate permit(s) be obtained (see Tactic B-1).

SH-11 Cleanup Using Biological/Chemical Response (Pg 1 of 2)

This technique involves chemical agents or nutrients that alter the character of the stranded oil either to facilitate removal of the oil from the shore zone or to accelerate in-situ weathering. Nutrient enrichment and bio-remediation can use products that have been developed for other applications. The other techniques in this group involve agents or materials that are designed specifically for oil spill response and that are available commercially from manufacturers and/or suppliers. Only bioremediation is a stand-alone technique; the remaining methods require an additional removal component.

SHORELINE CLEANERS

Shoreline cleaning (or surface washing) agents contain a surfactant that alters the surface tension of the oil, by a mechanism often referred to as detergency, so that the oil does not stick to substrate materials. The oil is lifted by rising tidal water levels and can be transported away from the shore. Cleaners may also be used to pretreat shore-lines to prevent oil from becoming stranded.

Cleaning agents can be applied directly to an oiled area with a hand spray or hose system. It may be used directly or as a presoak that is left for some time prior to flooding or flushing. The soak time varies depending on temperature and on the character of the oil. The preferred application is to use the agent on a rising tide so that the oil is im-mediately lifted from the shore, particularly on coarse-sediment beaches, as this minimizes the amount of oil that can be carried into the subsurface.

SOLIDIFIERS AND VISCO-ELASTIC AGENTS

Visco-elastic agents increase the viscosity of oil to enhance recovery and collection. Solidifiers alter the oil from a liquid to a solid in order to make recovery easier or to prevent remobilization or spreading of the oil. Agents may be available in a powder form that can either be applied directly or mixed with water prior to application. The agent is spread over and mixed with the oil. These agents are used in conjunction with removal techniques.

NUTRIENT ENRICHMENT/BIOREMEDIATION

Naturally-occurring microorganisms (bacteria) use oxygen to convert hydrocarbons into water and carbon dioxide. This process usually occurs at the water interface and is limited by oxygen and nutrient availability and by the exposed surface area of the oil. If these three factors can be increased, then the rate of biodegradation can be accelerated.

Fertilizers can be obtained in solid or liquid form. Solid fertilizers can be broadcast using seed spreaders. On contact with water, the fertilizer slowly dissolves and releases water-soluble nutrients over time. Liquid fertilizers can be sprayed onto a shoreline using a number of commercially available types of equipment, such as paint sprayers.

EQUIPMENT AND PERSONNEL

Equipment for biological/chemical shoreline response tactics must be obtained from out of region.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Unified Command approval is required for any shoreline cleanup tactic.
- The use of chemicals to control oil discharges or treat oiled shorelines is controlled by state and federal regulations; appropriate approvals and permits are required.
- *Shoreline cleaners* can be used on fresh or salt water, and the technique is applicable for all types of oil. Shoreline cleaners are usually used in conjunction with collection techniques, such as sorbents and skimmers, to contain and recover the oil as is it released.
- The effectiveness of shoreline cleaners is a function of oil type, and decreases as the specific gravity of the oil increases. The success of the method is dependent, to a degree, on the ability to contain and collect the oil that is released.
- *Solidifiers and visco-elastic agents* can be used in either fresh or salt water conditions. These agents are not applicable where large pore spaces (cobble or boulders) might result in loss of the oil in the subsurface sediments or where there is oiled vegetation, as it may incorporate or smother healthy plants and animals. The dose increases as the viscosity of the oil decreases so that for some agents, approximately 10 to 20 times more agent is required to alter the viscosity of a light fuel oil than for a heavy fuel oil.
- *Bioremediation* can be used on all shoreline types without affecting plants or animals. Bioremediation is best for use on residual oil after other techniques have been used to remove mobile or bulk oil from the shoreline. Applications may be repeated periodically to continue the supply of nutrients. Bioremediation may require tillers for mixing treatment agents with contaminated material.
- *Fertilizers* may be used alone on a shore to degrade residual surface and/or subsurface oil, but the process is more effective if combined with tilling or other methods of breaking the oil into smaller particles, thereby significantly increasing the surface area for the microorganisms to affect.
- *Nutrient enrichment/bioremediation* is relatively slow compared to other response options. Since the rate of biodegradation decreases with lower temperatures, nutrient enrichment is more effective during warmer summer months.

SH-12 Summary of Cleanup Technique Impact Potentials (Pg 1 of 2)

SUMMARY OF RELATIVE POTENTIAL IMPACT OF RESPONSE TECHNIQUES IN THE ABSENCE OF OIL

	SOLID MAN-MADE	PEBBLE COBBLE	MIXED SAND-GRAVEL	SAND BEACH	SAND FLAT	MUD FLAT	MARSH	PEAT	LOW-LYING TUNDRA	TUNDRA CLIFF
1) Natural Recovery	L	L	L	L	L	L	L	L	L	L
Physical Cleaning — Washing										
2) Flooding	L	L	M	L	L	L	L	L	L	L
3) Low-Presure Cold-Flush	L	M	M	M	M	H	L	L	L	L
4) Low-Pressure Hot/Warm Flush	L	M	M	H	H	H	H	M	H	L
5) High-Pressure Cold Flush	L	H	H	H	H	H	H	H	H	M
6) High Pressure Warm/Hot Flush	M	H	H	H	H	H	H	H	H	H
7) Steam Cleaning	L	H	H	H	H	H	H	H	H	H
8) Sand Blasting	H	H	H	-	-	-	-	-	-	H
Physical Cleaning — Removal/Disposal										
9) Manual Removal	L	L	L	L	M	H	H	L	M	L
10) Vacuums	L	L	L	L	M	H	M	L	M	L
11) Mechanical Removal	-	M	M	M	M	H	H	M	H	L
12) Vegetation Cutting	M	-	-	-	-	H	H	-	H	-
13) Passive Sorbents	L	L	L	L	L	M	L	L	L	L
Physical Cleaning — *In Situ*										
14) Tilling	-	M	M	M	M	H	H	H	H	-
15) Surf Washing	-	M	M	M	H	H	H	M	H	L
16) Burning	M	H	H	H	M	M	H	H	H	-
Treatment — Chemical/Biological										
17) Shore Cleaners	L	L	L	L	-	-	M	-	M	L
18) Solidifiers	-	L	L	L	M	M	M	L	M	L
19) Bioremediation	L	L	L	L	L	L	L	L	L	L

H = High
M = Moderate
L = Low

SUMMARY OF WASHING OR FLUSHING TECHNIQUE RANGES

TECHNIQUE	PRESSURE RANGE (psi)	TEMPERATURE RANGE (°F)
(2) Flooding ("deluge")	< 20	Ambient seawater
(3) Low-pressure, cold flushing	< 50	Ambient seawater
(4) Low-pressure, warm/hot flushing	< 50	80 - 212
(5) High-pressure, cold flushing	50 - 1,000	Ambient seawater
(5) *"Pressure washing"*	> 1,000	Ambient seawater
(6) High-pressure, warm/hot flushing	50 - 1,000	80 - 212
(7) Steam cleaning	50 - 1,000	212
(8) Sand blasting	~ 50	n/a

SUMMARY OF RESOURCE REQUIREMENTS, RELATIVE RATES, AND WASTE GENERATION FOR REMOVAL TECHNIQUES

TECHNIQUE	RESOURCE REQUIREMENTS	CLEANUP RATE	WASTE GENERATION
(9) Manual removal	Labor intensive	Slow	Minimal
(10) Vacuums (manual)	Labor intensive	Slow	Moderate
(11) Mechanical removal			
Grader/scraper	Minimal labor support	Very rapid	Moderate
Front-end loader	Minimal labor support	Rapid	High
Bulldozer	Minimal labor support	Rapid	Very high
Backhoe	Minimal labor support	Medium	High
Dragline/clamshell	Minimal labor support	Medium	High
Beach cleaners	Minimal labor support	Slow	Low
Vacuum trucks	Minimal labor support	Rapid	Low
(12) Vegetation cutting	Labor intensive	Slow	Can be high
(13) Passive sorbents	Labor intensive if used extensively with large amounts of oil	Slow	Can be high if frequent change-outs required

SH

WILDLIFE AND SENSITIVE AREA TACTICS

W-2A Mammal Hazing (Pg 1 of 2)

12-GAUGE SHOTGUN

Terrestrial mammals that may be present on the North Slope include caribou, muskoxen, moose, brown (grizzly) bear, and foxes. Techniques for hazing mammals involve visual methods, auditory methods, pain (use of rubber bullets), or exclusion by fencing, netting, or gridding. The choice of appropriate method depends on the species involved, the local environment, the spill situation, and the time of year. The table on the next page summarizes available methods.

ACS's permit (ADF&G Permit No. FG94 - III - 02H) allows trained personnel to haze mammals. ADF&G is responsible for overseeing and providing guidance for ACS hazing personnel and may assist ACS with hazing. The minimum amount of hazing required to move animals away from a spill site will be used. The animals should not be unduly stressed during hazing.

Hazing of moose, muskoxen, and caribou would involve either surface or aerial methods. The ACS hazing kits can be used for individual animals and for small groups of animals, including small muskox herds that should be prevented from forming protective circles and encouraged to move away from the spill. According to the permit, prior to initiation, ACS must seek guidance and help from ADF&G on the most appropriate hazing technique for bears.

In addition, scare eye balloons, snow fences, or electric fences may be installed around isolated spill areas, field camps, staging areas, waste disposal sites, or other spill-related areas.

The distance from the spill site, staging area, etc. at which hazing of mammals would begin and end must be determined on a case-by-case basis. In some cases, it may be advantageous to haze animals at a considerable distance from a spill site. For example, a large moving herd of caribou a considerable distance away may be deflected on its course with minimal effort, while it may be nearly impossible to deflect the same herd once it is a few hundred yards from the spill site.

To protect mammals from oil:

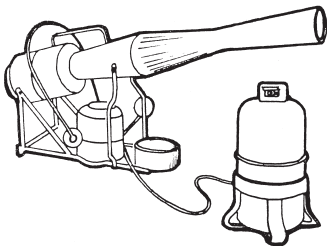
- Contain the oil before it reaches the mammals.
- Haze them (scare them away) from oiled areas.
- Collect dead, oiled wildlife to prevent contamination through scavenging.
- Selected capture and stabilization of mammals on case-by-case basis.

MAMMAL HAZING TACTICS

SPECIES	TECHNIQUE(S)	COMMENTS
Bear	Pyrotechnics Propane exploder cannons Helicopters Airboats Ground vehicles (snow machines, ATVs, trucks) Rubber bullets	The preferred option is the use of pyrotechnics, if spill conditions allow. Helicopters, airboats, and ground vehicles are also effective tools, with helicopters being the most versatile of this group.
	Fences (electrified)	Effective for isolating small spill areas, field camps, etc.
Caribou	Pyrotechnics Propane exploder cannons	Most effective on individual animals or small groups.
	Helicopters Airboats Ground vehicles (snow machines, ATVs, trucks)	Most effective on herds. Helicopters are the most versatile and can be used on a herd while it is still far away from the spill.
	Fences	Effective for isolating small spill areas, field camps, etc.
Moose	Pyrotechnics Propane exploder cannons Air horns Helicopters Airboats Ground vehicles (snow machines, ATVs, trucks)	Helicopters and ground vehicles are the best tools to use on moose. Pyrotechnics can be used individually or with hazing equipment.
	Fences	Effective for isolating small spill areas, field camps, etc.
Muskoxen	Pyrotechnics Propane exploder cannons Helicopters Airboats Ground vehicles (snow machines, ATVs, trucks)	Ensure that animals are not hazed to the point that they form a defensive ring. Drive them slowly with a ground vehicle (ATV or truck).
	Fences	Effective for isolating small spill areas, field camps, etc.

W-2B Bird Hazing (Pg 1 of 2)

PROPANE EXPLODER CANNON



Birds can be deterred from entering a spill area or hazed from an area by either visual or auditory methods, or both. The choice depends on the species involved, the local environment, and the spill situation. The table on the next page summarizes the available techniques.

The primary method for protecting birds from an oil spill is to prevent oil from reaching areas where birds are concentrated, including migration staging areas, seabird colonies, major feeding areas, nesting colonies, and wintering areas of marine birds.

The secondary response is to deter birds from an oil slick or contaminated shoreline. A deterrent may be used to discourage birds from landing in or near an oil slick or oiled area.

ACS uses the following guidelines for selecting the primary hazing method:

- Use propane exploder cannons to disperse birds where waterfowl, shorebirds, and raptors are dominant. This should include frequent human attendance at the site and supplemental use of shotgun cracker shells or pistol-launched noisemakers to ensure the highest effectiveness and to reduce habituation.
- Visual methods (Mylar tape, balloons) can be used to disperse birds in close proximity to the spill. This is most effective for waterfowl.
- Flightless birds may need to be herded with boats and/or helicopters (aircraft should not be used to disperse birds in any other circumstances). Flightless birds include young birds and molting birds. (“Molting” refers to the annual loss of feathers. Birds that are molting cannot fly.)

Capture and relocation is a tertiary method for dealing with flightless birds that will not leave an area. This could be used for small populations of birds of critical sensitivity. However, it is very labor-intensive and usually not practical.

BIRD HAZING TACTICS

CATEGORY	TECHNIQUE	GENERAL APPLICABILITY	NORTH SLOPE APPLICABILITY
Visual Methods	Floating or Stationary Figures	Human effigy (e.g., a scarecrow) has been shown to be effective in daylight	Scare eye balloons are available from ACS inventory. Preferred response. This is an authorized activity.
	Helium-Filled Balloons	Can prevent birds from landing	Not available on the North Slope, but available from Alyeska.
	Mylar Tape	Can prevent birds from landing	Mylar tape is available from ACS inventory.
Auditory Methods	Propane Cannons and Alarms	• Bird density reduction ranges from 50% to 100% depending on species and amount of human attendance • Works for 2 to 3 days • May not be effective in rough, open sea	Propane exploder cannons and pyrotechnics are available from ACS inventory.
Visual and Auditory Methods	Herding or Hazing with Aircraft	• Used for flying waterfowl or waterfowl on the ground that fly in response to disturbances • Aircraft may cause diving birds to dive into contaminated area • Helicopters can be used to herd flightless birds (e.g., young or molting birds)	Use of aircraft is not approved in ACS permits; aircraft will not be used unless specifically authorized by agency personnel for a specific spill.
	Herding with Boats or by Personnel on Foot	• Slow and labor-intensive • May be effective with flightless waterfowl • Ineffective for diving birds	Small boats available for summer use.
	BRECO Bird Scare Buoys	Floating scare devices	Available from ACS inventory.
Other Methods	Capture and Relocation	• For small populations of birds of critical sensitivity • Labor-intensive and not practical in most cases	Will be used only if visual and auditory methods fail, and only with specific authorization by agency personnel for a specific spill.

BRECO Bird Scare Buoy

W-3 Wildlife Capture and Rehabilitation (Pg 1 of 2)

Tertiary response strategy for wildlife on the North Slope involves the capture and initial stabilization of oiled wildlife. When birds are captured, they will receive initial treatment at the ACS North Slope Wildlife Stabilization Center. Once the birds are stabilized, they will be transported to Anchorage for long-term care and rehabilitation.

ADF&G will be responsible for the capture of brown bear, caribou, muskoxen, and moose. ACS, under the supervision of a veterinarian or in consultation with or with assistance from ADF&G, will be responsible for stabilization, transport, and disposition of these species. ACS will use the table below as a guide for activities. A Data Sheet for Collected Live, Oiled Wildlife will be completed for each animal.

Any mammal or bird with serious injuries which would require extensive treatment or which may be unable to survive in the wild will be euthanized. All decisions to euthanize will be reviewed and approved by a licensed veterinarian or an individual with veterinary and rehabilitation experience. Agency approval is required before euthanasia is utilized. Euthanasia drugs are not maintained on the Slope because of North Slope drug restrictions. Licensed veterinarians assisting with wildlife response will be required to bring sufficient quantities of euthanasia drugs.

CAPTURE, STABILIZATION, AND TRANSPORT OF LARGE MAMMALS

ACTIVITY	BROWN BEARS	POLAR BEARS	CARIBOU (collared only)	MUSKOX	MOOSE (collared only)
Personnel - Capture	ADF&G personnel only	USFWS	ADF&G personnel only	ADF&G personnel only	ADF&G personnel only
Personnel- Stabilization, Transport, and Disposition	ADF&G or ACS under supervision of DVM	USFWS	ADF&G or ACS under supervision of DVM	ADF&G or ACS under supervision of DVM	ADF&G or ACS under supervision of DVM
Capture Methods	Culvert traps or tranquilizer	Culvert traps or tranquilizer	Tranquilizer	Tranquilizer	Tranquilizer
Stabilization	ACS facility (5 bears maximum)	ACS facility (5 bears maximum)	Field cleaning only	Field cleaning only	Field cleaning only
Transportation	By truck or helicopter	By truck or helicopter	N/A	N/A	N/A
Disposition	Released back into wild unless can't survive. Then look into a facility that might want a bear (zoo). Last resort would be euthanasia.	Released back into wild unless can't survive. Then look into a facility that might want a bear (zoo). Last resort would be euthanasia.	Field released	Field released	Field released

DATA SHEET FOR COLLECTED LIVE, OILED WILDLIFE
(Adapted from Alaska RRT *Wildlife Protection Guidelines for Alaska*)

Date:	**ID Number:**
Oil Spill Incident:	
Capture Location (Specific):	
Latitude:	**Longitude:**
Common Name:	
Genus:	**Species:**
Was Specimen Obviously Oiled? (circle one):	**Yes** **No**
Extent of Oiling (circle one): **1. Completely Covered** **2. Ventral or Dorsal Surface Only**	**3. Discrete Spots** **4. No Obvious Oil**
Field Treatment: **1. Mouth & Nostrils cleaned of oil** **2. Excess oil removed from body** **3. Gavaged** **4. Eyes irrigated**	**yes____ no____ not applicable____** **yes____ no____ not applicable____** **yes____ no____ Quantity____Liters** **yes____ no____ not applicable____**
Collected by: **Printed Name:** _____ **Signature:** _____ **Date:** _____ **Telephone Number:** _____ **Affiliation:** _____	
Relinquished to: **Printed Name:** _____ **Signature:** _____ **Date:** _____ **Telephone Number:** _____ **Affiliation:** _____	

PURPOSE OF SALVAGING DEAD WILDLIFE

Birds and mammals killed by an oil spill must be collected as quickly as possible to prevent secondary poisoning of scavengers due to hydrocarbon ingestion.

"Salvage" is the collection of oiled carcasses by certified personnel. This activity requires:

- Notification and approval of state and federal agencies
- Proper recordkeeping
- Temporary storage
- Ultimate storage and disposal

Only persons certified in bird hazing or bird collection and stabilization may salvage dead, oiled birds and mammals.

Trustee agencies listed in the ACS Plan of Operations for Salvage (see ACS permit book) must be notified. If the agencies cannot be reached, proceed with salvage, but continue and log attempts to reach agencies.

SALVAGE PROCEDURE

The following list of salvage procedures will be included in an incident-specific plan for retrieving dead oiled wildlife. The plan will be reviewed and approved by the appropriate wildlife resource agency(ies), and implemented by the responsible party.

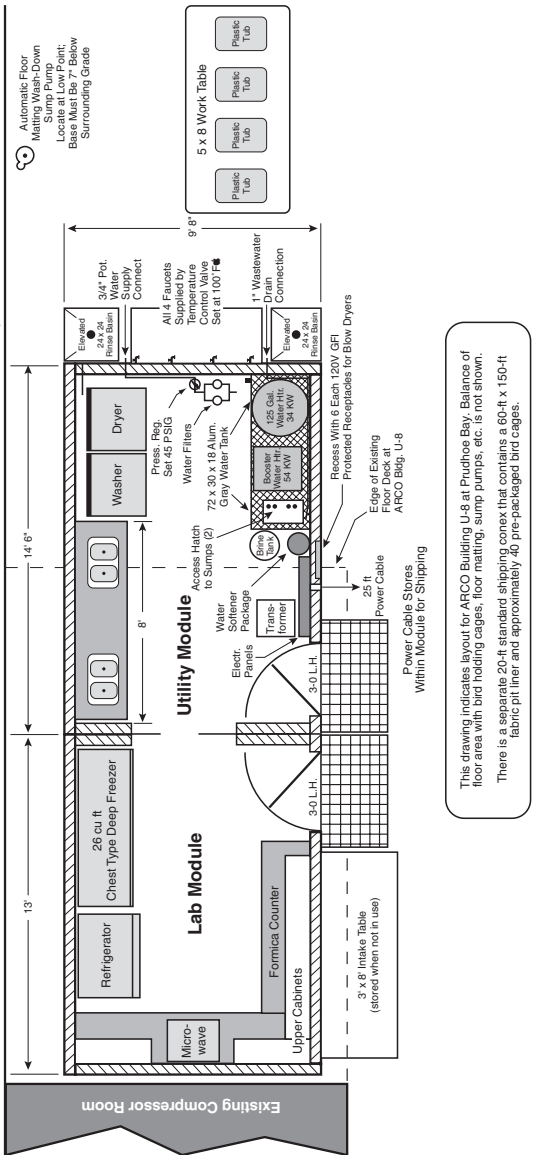
1. Place each animal in a plastic bag, with a copy of the record form filled out and inserted into the bag. Ensure the form is protected from oiling.
2. Take the plastic bags to the Wildlife Stabilization Center in BP EOA Building U-8 to be logged in and placed in refrigerated trailer for holding.
3. Response Center personnel will copy or record the information in the bag, assign a control number, complete any missing information, and file the form. Leave the original collection tag or form in the bag with the carcass.
4. Agency personnel will inspect and catalogue all collected carcasses.
5. Following inspection, carcasses are transferred to the freezer trailer for storage, until plans are made for final disposition.
6. The responsible party will coordinate plans for final disposition with appropriate agencies.

DATA SHEET FOR COLLECTED DEAD, OILED WILDLIFE
(Adapted from Alaska RRT *Wildlife Protection Guidelines for Alaska*)

Fill out one of these data sheets for each oiled carcass collected.

Date:	**Control Number:**	
Oil Spill Incident:		
Location Animal Found (Specific): **Latitude/Longitude:**		
Species Found:		
Is Specimen Obviously Oiled? (circle one):	**Yes**	**No**
Was Specimen Scavenged? (circle one):	**Yes**	**No**
Collected by: **Printed Name:** _____ **Signature:** _____ **Date:** _____ **Telephone Number:** _____ **Affiliation:** _____		
Relinquished to: **Printed Name:** _____ **Signature:** _____ **Date:** _____ **Telephone Number:** _____ **Affiliation:** _____		
Remarks:		

W-5 Mobile Wildlife Stabilization Center Deployment (Pg 1 of 2)



NOTE: All values given on these pages are for planning purposes only.

ACS maintains an initial stabilization facility consisting of air-transportable modules stored at Prudhoe Bay.

FACILITY CAPABILITIES

DESIGN CONSIDERATIONS

- Initial stabilization of up to 500 ducks *or* 250 geese
- Long-term treatment of up to 10 birds

FACILITY CAPABILITIES

- Gross oil decontamination
- Take vital statistics
- Blood work
- Rehydration
- Stabilization

MOBILIZATION TIME

- 4 to 6 hours (longer if facility needs to be transported to remote site)
- 2 personnel are required for shipping or setup

DEPLOYMENT CONSIDERATIONS

TRANSPORTATION MODES:

– Truck
– Hercules C-130 or C-141 aircraft
– Modules have fork pockets for lifting

- Modules will be placed on a lowboy trailer for loading into the aircraft.

MODULE DIMENSIONS AND WEIGHTS

	WIDTH	LENGTH	HEIGHT	WEIGHT
Lab Module	9 ft 8 in.	13 ft	8 ft 7 in.	2,500 lbs
Utility Module	9 ft 8 in.	15 ft	8 ft 7 in.	3,800 lbs
Accessories Conex	8 ft	20 ft	8 ft	5,100 lbs

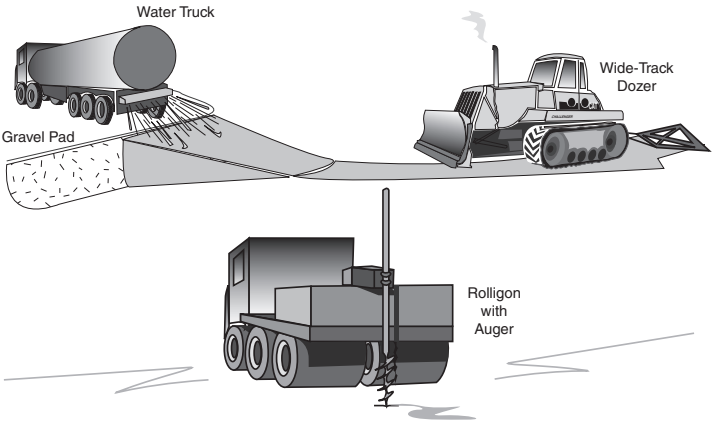
SETUP CONSIDERATIONS/REQUIREMENTS

Electrical:	480 volt, 3 phase, 125 Kw or 208 volt, single phase, 20 Kw.
Water:	Potable water is required. Center has its own pressure system.
Wastewater:	Facility has a 2,000-gallon portable holding tank.
Flooring:	Concrete floors or liner that can be washed down to prevent the spread of disease.
Heating:	Must be capable of maintaining an air temperature of 68°F to 70°F.
Building Size:	A warehouse with minimum of 7,000 sq. ft.
Ventilation:	A minimum of six air exchanges per hour, while maintaining 68°F to 70°F inside air temperature.

W

LOGISTICS AND EQUIPMENT TACTICS

L-1 Ice Road Construction to Access Winter Tundra Spill (Pg 1 of 2)



An ice road is built by spraying water from a water truck onto the surface of a lake, the tundra, or the sea. The water is allowed to freeze in place, while layers are continually added. Thickness of the ice road depends on equipment that will be traveling over it and on the terrain. The water truck tank is insulated to keep the water from freezing, and truck exhaust is normally routed through the box containing the pump to keep the pump from freezing. An ice ramp is constructed to gain access off the pad or road, and requires a greater thickness than the road itself. An alternate source of water is accessed by drilling holes into the sea ice or a lake.

Methods of building ice roads include the following:

- Water trucks in conjunction with either a loader pulling a drag, a wide-track dozer pulling a drag, or a grader smoothing out the surface. All of these combine lifts of snow with the water.
- Rolligons may be used on sea ice for flooding purposes.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Water Truck	All	Ice road construction	≥2	≥2	2 hr	0.5 hr
Wide-Track Dozer with Drag	All	Ice road construction	1 (3 are available on the Slope)	1	1 hr	0.5 hr
or						
Rolligon with Auger	CATCO, AIC	Ice road construction	6	6	6 hr	2 hr
Rotary Trimmer	KRU, GPB	Ice mining and ice road thickening	1	1	1 hr	0.5 hr
Grader	All	Smoothing ice road	1	1	2 hr	0.5 hr
Dump Truck	KRU, GPB, Peak, AIC, Alpine	Work with roto trimmer	>2	>2	1 hr	0.5 hr
Front-End Loader	All	Load dump truck	1	1	1 hr	0.5 hr
			TOTAL STAFF	**≥7**		

SUPPORT

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Semi and Trailer	GPB, KRU, Alpine	Transport Wide-Track Dozer	1	1 driver	1 hr	0
Hose	All	Spraying water	1	1	1 hr	0
Pump	All	Transferring water	≥1	1	1 hr	1 hr
Light Plant	All	Illumination	≥1	2 for initial setup, and 1 to check and fuel occasionally.	1 hr	0.5 hr
Fuel Truck	All	Fuel heavy equipment	1	Once per shift	1 hr	0.5 hr
Lube Truck	All, except Badami	Provide fluids to heavy equipment	1	Once per shift	1 hr	0.5 hr
Mechanic Truck	All, except Badami	Support equipment	1	1	1 hr	0.5 hr

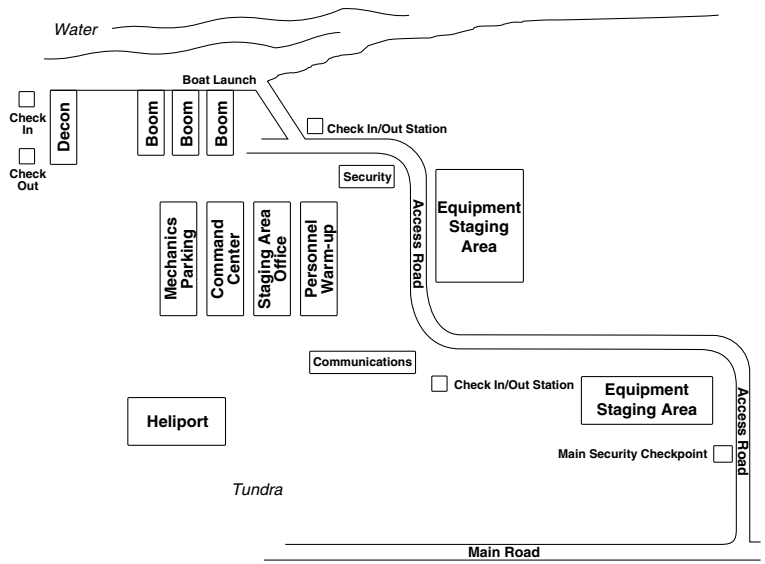
CAPACITIES FOR PLANNING

- Ice road construction around the largest tank spill on the Slope would use two 12-hr shifts, while ice ramp construction would use three 12-hr shifts, for usable ice road.
- One lift = 6 inches of ice on ice road (4 inches on sea ice).
- One lift is made in one 12-hr shift.
- It takes 48 hr to build a serviceable ice road with fresh water and air temperatures less than 0°F.
- Distance of 6-inch-lift a water truck can lay: ≤1,760 ft in 12 hr (for 1 water truck and 1 loader with drag).
- Distance of 4-inch-lift a Rolligon can lay: ≤3,000 ft in 12 hr.

DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- When working with equipment around or near flowlines, add a spotter to each front-end loader and wide-track dozer.
- Ice road construction around the spill allows heavy equipment, including end dumps, to access the spill, and protects the underlying tundra.
- An ice road provides containment of any oil melting out during breakup.
- Ice-road construction rates are temperature-dependent.
- A water withdrawal permit may be needed.

L-2 Staging Areas (Pg 1 of 4)



Example of a staging area

A staging area is a location where personnel and equipment are temporarily placed for tactical deployment during an oil spill response. The staging area provides a system for receiving, tracking and documenting all personnel, equipment, and supplies coming into and out of the staging area from North Slope and out-of-region locations.

The staging area provides a security checkpoint, a field command post, portable toilets, break room, decontamination, communications, and a safety officer. The staging area may also include a heliport and wildlife trailer.

EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Staging Area Manager's Office	GPB, KRU	Office duties	1	4 for setup	1 hr	0.5 hr
SRT Command Center	ACS, GPB, KRU	SRT Lead	1	—	1 hr	0.5 hr
Generator	All	Power	2	—	1 hr	0.5 hr
Loader	All	Misc. support	2	2	1 hr	0.5 hr
Skid-Steer Loader	All	Staging area organization	1	1	1 hr	0.5 hr
Semi and Trailer	All	Transfer of equipment and supplies	1	1 driver	1 hr	0.5 hr
Pickup Truck	All	Expediting & misc. support	6	6	0.5 hr	0.5 hr
Envirovac	ACS, GPB	Staff needs	1	—	1 hr	1 hr
Communications Center	ACS	Communications	1	2 for setup	1 hr	1 hr
Portable Shelter	All	Staging area shelter/working area	2	—	1 hr	1 hr
Port-a-Potty*	ACS, GPB, KRU	Staff needs	2	—	1 hr	0.5 hr
Breakroom	ACS, GPB, KRU	Staff needs	1	—	1 hr	1 hr
Wet or Dry Decon Unit	ACS, GPB, KRU	Decontamination	1	See Tactic S-6	1 hr	1 hr
Mechanic Support	All	Support equipment	1	1	1 hr	0.5 hr

TOTAL STAFF FOR OFFSHORE STAGING AREA 24

TOTAL STAFF FOR ONSHORE STAGING AREA 20

**1 portable toilet for every 10 people*

- Additional personnel may be required: Staging Area Manager, Documentation Coordinator, Communications Coordinator, and Resource Coordinator.

OPTIONAL EQUIPMENT AND PERSONNEL

EQUIPMENT	BASE LOCATION	FUNCTION	PIECES	# STAFF PER SHIFT	MOBE TIME	DEPLOY TIME
Heliport	GPB, KRU,	Helicopter support	1	2 for setup	1 hr	1 hr
Light Plant	All	Illumination	≥1	2 for inital setup, and 1 to check and fuel occasionally	1 hr	0.5 hr
Wildlife Trailer	EOA, KRU	Wildlife support	1	2	1 hr	1 hr
Portable Heater	All	Heat	>1	1 for intial setup	1 hr	0.5 hr
Freighter Air Boat	ACS, Alpine	Equipment and personnel transport	2	8	1 hr	0

- Additional personnel may be required: Beach Master, Heliport Manager, and Check In / Check Out Coordinator.

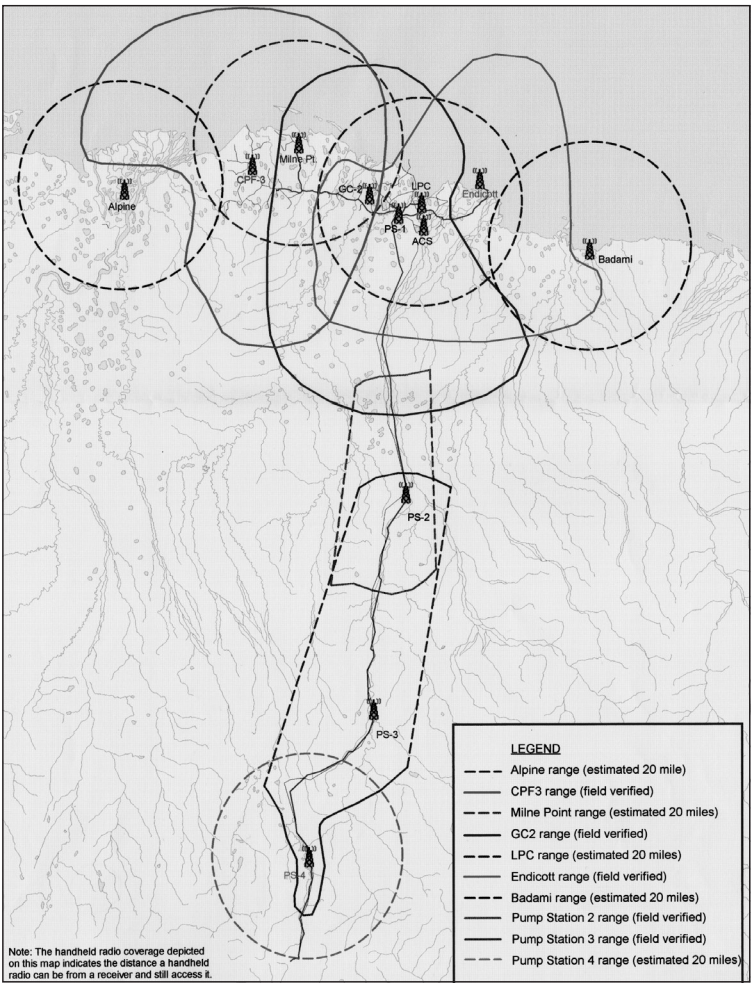
DEPLOYMENT CONSIDERATIONS AND LIMITATIONS

- Several existing gravel pads across the North Slope may be available as staging areas for major cleanup operations. Permission may be obtained from ConocoPhillips, BPXA, their contractors and/or others for use of the gravel pad space.
- For remote areas more than 1 mile off the road/pad system, rolligons may be utilized for transport and as work platforms.
- Approval from the Operations Section Chief is required for any vehicle tundra travel (off-road or off-pad), which must be in accordance with ACS' emergency tundra travel permit (See Tactic A-3). Any excavations in tundra or any tundra damage must be reported to the Operations Section Chief. All on-tundra activity must be documented and reported to the Planning Section for reporting to ensure permit compliance. Avoid archeological sites and biologically sensitive habitats. Travel across tundra with tracked vehicles, heavy equipment, and even foot traffic can seriously damage the vegetative mat, induce thermokarst, and cause structure disturbance. Using sheets of plywood as a traveling surface and minimizing trips with equipment greatly reduce disturbance of the tundra.
- Mobimat material may be used on mud flats to create a work platform.

CHECKLIST FOR STAGING AREAS

- **Purposes for Staging Areas:**
  - Location where incident personnel and equipment are available for tactical deployment
  - Can serve as a check-in location for equipment and personnel reporting to the incident
- **Guidelines for Staging Areas:**
  - Designated by Operations Section Chief
  - Qualified staging area manager assigned to each staging area
  - Resources in staging area must be ready for assignment within time specified by Operations Section Chief
  - Should be in easily accessible locations within reasonable distance of incident site
- **Logistical Needs for Staging Areas:**
  - Open area for maneuverability of equipment
  - Electric power, phone and fax service
  - Radio communication with Operations Section Chief and ICP Communications Center
  - Office trailer or building on site or nearby
  - Supplies and consumables for personnel and equipment (food, fuel, water, sanitation)
  - Medical plan and appropriate emergency medical supplies for personnel
  - Security needs, depending upon location and other available security control
- **Number and Type of Resources Assembled at a Staging Area:**
  - Determined by Operations Section Chief based on what is considered an appropriate reserve to meet expected contingencies
  - Can change based on existing or changing operational or other conditions
  - Must be evaluated based on comparison of cost and operational benefits of maintaining equipment at staging area versus at more central warehousing facility
  - May depend upon main purpose of staging area (i.e., whether to serve as *resource pool* for available equipment or as *check-in area* for incoming resources)
- **Staging Area Manager Should be Assigned Whenever a Staging Area is Established, Especially When:**
  - Staging area becomes “permanent” for duration of incident response
  - Staging area is large, with numerous equipment items assigned
- **Staging Area Manager’s Duties Include:**
  - Obtain a briefing from Operations Section Chief
  - Proceed to staging area and establish staging area layout
  - Determine support needs for equipment, feeding, sanitation and security
  - Establish check-in process as appropriate, including communications to ICP
  - Post areas for identification and traffic control
  - Request maintenance service for equipment at staging area as appropriate
  - Respond to requests for resource assignments
  - Obtain and issue receipts for supplies distributed and received
  - Report resource status changes as required
  - Maintain staging area in an orderly condition
  - Demobilize staging area in accordance with incident demobilization plan
  - Maintain Unit Log

NORTH SLOPE HAND-HELD RADIO COVERAGE



NORTH SLOPE RADIO CHANNEL ASSIGNMENTS

CHANNEL DESIGNATOR	LOCATION / AREA	USE	TRANSMIT (MHZ)	RECEIVE (MHZ)
Tactical Channels Statewide				
OS-29		Tactical Net	173.225	173.225
OS-30		Tactical Net	173.275	173.275
OS-31		Tactical Net	173.325	173.325
OS-32		Tactical Net	173.375	173.375
ACS Fixed VHF Repeater/Talk Around Channels North Slope				
OS-33	ConocoPhillips/Alpine	Oil Spill Repeater	159.585	161.235
OS-34	Talk Around (33)	Tactical	159.585	159.585
OS-35	ConocoPhillips/Kuparuk	Oil Spill Repeater	154.585	150.980
OS-36	Talk Around (35)	Tactical	150.980	150.980
OS-37	BP/WOA	Oil Spill Repeater	158.445	159.480
OS-38	Talk Around (37)	Tactical	159.480	159.480
OS-39	ConocoPhillips/Lisburne	Oil Spill Repeater	158.325	153.485
OS-40	Talk Around (39)	Tactical	153.185	153.185
OS-41	BP/Endicott	Oil Spill Repeater	161.235	159.586
OS-42	Talk Around (41)	Tactical	159.585	159.585
OS-43	BP/Badami	Oil Spill Repeater	154.585	15.980
OS-44	Talk Around (43)	Tactical	150.983	150.980
OS-45	Point Thomson	Oil Spill Repeater	161.325	159.705
OS-46	Talk Around (45)	Tactical	159.705	159.705
OS-47	Pump #2 Alyeska	Oil Spill Repeater	161.325	159.705
OS-48	Talk Around (47)	Tactical	159.705	159.705
OS-49	Pump #3 Alyeska	Oil Spill Repeater	161.235	159.585
OS-50	Talk Around (49)	Tactical	159.585	159.585
OS-51	Pump #4 Alyeska	Oil Spill Repeater	154.585	150.980
OS-52	Talk Around (51)	Tactical	150.980	150.980
Portable VHF Repeater/Talk Around Channels Statewide				
OS-53	Portable # 1	Oil Spill Repeater	160.530	150.815
OS-54	Talk Around (53)	Tactical	150.815	150.815
OS-55	Portable # 2	Oil Spill Repeater	160.590	150.830
OS-56	Talk Around (55)	Tactical	150.830	150.830
OS-57	Portable # 3	Oil Spill Repeater	160.650	150.950
OS-58	Talk Around (57)	Tactical	150.950	150.950
OS-59	Portable # 4	Oil Spill Repeater	160.725	150.965
OS-60	Talk Around (59)	Tactical	150.965	150.965
OS-61	Portable # 5	Oil Spill Repeater	160.785	159.525
OS-62	Talk Around (61)	Tactical	159.525	159.525
OS-63	Portable # 6	Oil Spill Repeater	160.860	159.795
OS-64	Talk Around (63)	Tactical	159.795	159.795
ACS Logistics VHF Repeater/Talk Around Channels North Slope				
OS-65	(ACS) DH Spill Response Ctr	Logistics Repeater (DH)	161.160	159.630
OS-66	Talk Around (65)	Tactical	159.630	159.630
OS-67	ConocoPhillips/Kuparuk (CPF3)	Logistics Repeater (Kuparuk)	161.160	159.750
OS-68	Talk Around (67)	Tactical	159.750	159.750
Emergency Chanel Statewide				
OS-69	North Slope Emergency	Tactical	152.420	152.420
Marine Channels Statewide				
OS-70	BP (GC2) (Gwydyr Bay)	Coast Station - Ch 09	156.450	156.450
OS-71	BP/Endicott	Coast Station - Ch 10	156.500	156.500
OS-72	(ACS) DH Spill Response Ctr	Coast Station - Ch 11	156.550	156.550
OS-73	Calling and Safety	Coast Station - Ch 16	156.800	156.800
OS-74	ConocoPhillips/KRU (Harrison Bay)	Coast Station - Ch 18	156.900	156.900
OS-75	Spare Coast Station	Coast Station - Ch 80A	157.025	157.025
OS-76	Portable	Coast Stn Repeater - Ch 85	157.275	161.875

NOTE: All values given on these pages are for planning purposes only.

TABLE 2

THRESHOLD LIMIT VALUES FOR WORK AND WARM-UP SCHEDULE FOR FOUR-HOUR SHIFT

Wind chill limits workers' outdoor efforts. Workers in wind chill temperatures between -25°F and -40°F take more break time indoors. When wind chill is colder than -45°F, non-emergency work ceases. See Table 2.

AIR TEMPERATURE - SUNNY SKY		NO NOTICEABLE WIND		5 MPH WIND		10 MPH WIND		15 MPH WIND		20 MPH WIND	
°C	°F	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	Normal	1	Normal	1	75 min.	2	55 min.	3	40 min.	4
-29° to -31°	-20° to -24°	Normal	1	75 min.	2	55 min.	3	40 min.	4	30 min.	5
-32° to -34°	-25° to -29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease			
-38° to -39°	-35° to -39°	40 min.	4	30 min.	5	Non-emergency work should cease					
-40° to -42°	-40° to -44°	30 min.	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

Source: American Conference of Governmental Industrial Hygienists, Inc. 1994-1995. *Threshold Limit Values, Chemical Substances and Physical Agents and Biological Exposure Indices.*

Note: Schedule applies to 4-hour work period with moderate to heavy work activity, with warm-up periods of ten minutes in a warm location and with an extended break (e.g., lunch) at the end of the 4-hour work period in a warm location.

GUIDE FOR ESTIMATING WIND VELOCITY

5 mph - Light flag moves

10 mph - Light flag fully extended

15 mph - Raises newspaper sheet

20 mph - Blowing and drifting snow

PHASE 1, 2, OR 3 WEATHER CONDITIONS

Phase 1: **Caution - Reduced Visibility.** Travel on the field is permitted using extreme caution. Reduce speed and be certain all equipment (radio, lights, etc.) is operating properly. Arctic gear is required.

Phase 2: **Restricted - Convoy Only Travel in the Field.** Travel is permitted in convoys of two or more vehicles only. Radio communication between vehicles in the convoy is required.

Phase 3: **Closed - Critical or Emergency Travel Only.** Travel will be by heavy equipment convoy only.

OFFICIAL TEMPERATURE INFORMATION SOURCES

- Prudhoe Bay Operations Center airport tower weather recording 5:30 am to 5:30 pm (Phone 5888)
- ConocoPhillips' Channel 5, 5:30 am to 5:30 pm
- Prudhoe Bay WOA - BPXA's Channel 5
- Kuparuk Operation NSK's Security (Phone 7997)

SEA ICE BEARING CAPACITY

Loads borne on sea ice sheets generally are a simple function of the square of the ice thickness (e.g., Gold, 1971). Vaudrey (1977) calculated the thickness of sea ice to support a load based on additional factors, including ice temperature, time of load application, and the physical properties of ice as an engineering material.

Figure 1 shows curves of recommended sea ice thicknesses vs. load. If an abnormally warm period intervenes winter, the spring load curve applies temporarily if internal ice temperatures rise above 23°F. Ice temperatures are measured with a thermistor drilled into an ice core between one and two feet below the solid ice surface.

Figure 1 applies to operations on a continuous free-floating ice sheet with no free edges, working cracks or man-made trenches and slots. Random small surface cracks commonly occur due to thermal stresses, and are particularly noticeable whenever the snow cover is removed. These features usually have a negligible effect on ice strength. Exceptions are wet "active" cracks where they join to form a wedge and the risk of breaking through becomes acute. Doubts about the character or influence of cracks or slots cut in the sheet on bearing capacity means suspension of vehicle operations until the integrity of the ice is determined. Travel over unprepared sea ice incurs risks due to the nature of the material and unpredictable environmental factors (e.g., unusually warm temperatures, currents under the ice, hidden cracks). Vehicles have gone through the ice with little or no warning, even when operating within conservative guidelines. An experienced field ice technician accompanies vehicles traveling over unprepared sea ice.

Figure 1 applies to moving loads and/or short term parking up to about four hours. Thicknesses shown in Figure 1 are not adequate for extended storage of heavy loads. Curves are based on recommended bearing capacities developed for wheeled vehicles and aircraft. Tracked and terra-tired vehicles may be able to operate safely over thinner ice sheets early in the winter by distributing the load over a greater area. See Table 3 for examples of heavy vehicles and aircraft borne by winter sea ice in the Prudhoe Bay area. Table 4 provides guidelines for the minimum sea ice thickness for various weights of moving vehicles. Table 5 lists vehicle travel speeds to minimize dynamic effects associated with resonant waves on the sea ice.

Approximately 20 inches of sea ice is recommended as a starting thickness to begin conventional vehicle operations with wheeled vehicles such as small trucks. Lighter equipment such as Ditchwitches and snowmachines can operate on ice 12 to 20 inches thick, as long as the sheet is continuous and stable and operators accept the increased risk. Workers should not be sent out on the ice until it reaches 12 inches in thickness.

Early season operations involve strict safety measures, continuous ice monitoring and evacuation plans. Strong winds can lead to rapid breakup of young sea ice. Heavy equipment operations on ice less than 20 inches thick is limited to areas inside the barrier islands with shallow water less than four feet in depth.

Late-season ice can support a variety of vehicles without an ice road. Figure 2 shows the relative durations that equipment can work on the sea ice before breakup.

Freshwater ice supports heavier loads than sea ice. See Figure 3.

IMPORTANT NOTE

- **When working on ice, make sure the thickness is known.**
- **Be conservative in using the graphics in this tactic.**

FIGURE 1
RECOMMENDED SEA ICE THICKNESSES VS. LOAD

20 inches is starting thickness in early winter. Curves are for moving vehicles or short term parking. Wheeled vehicle operations halt when the internal ice temperature at 1 to 2 ft depth rises above 26.6 'F.

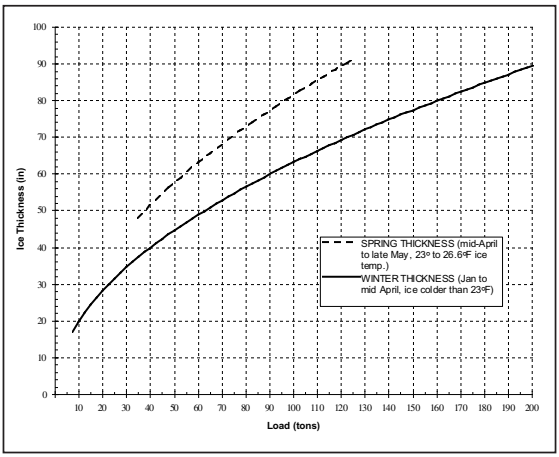


FIGURE 2
MINIMUM THICKNESS TO SUPPORT LOADS ON FRESHWATER ICE

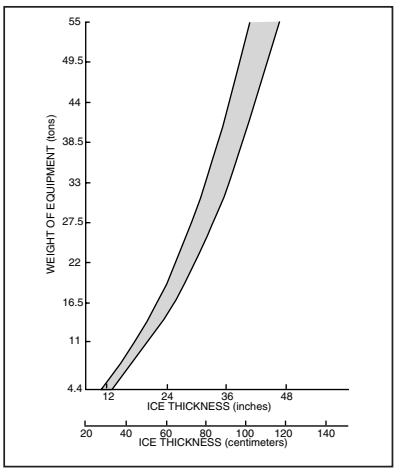


TABLE 3
WEIGHTS FOR SELECTED VEHICLES AND HEAVY EQUIPMENT

	GROSS WEIGHT INCLUDING PAYLOAD (LB)	ESTIMATED PAYLOAD (LB)
Cat D-8	71,000	N/A
CATCO RD-85	56,000	30,000
Kenworth 953A	121,000	60,000
Grader 12G	29,000	N/A
DHC Twin Otter	12,500	4,500
C130H Hercules	155,000	51,000
Bell 212	11,000	5,000
Bell 214	17,500	8,000
Boeing Chinook	51,000	28,000
B-70	156,000	65,000
BV-107	19,000	11,500
Bobcat w/Trimmer	8,900	N/A
Bobcat w/Auger	7,900	N/A
Crew Cab Pickup	7,500	400
Ditch Witch R-100	9,500	N/A
Snowmachine w/Sled	545	200
966 Loader	47,000	10,000
Vac Truck	75,000	40,000
Max Haul	74,000	32,000
Tandem Trailer	52,000	22,000
Wide-Track Dozer	35,000	N/A

NOTE: Actual weights may vary with different options and model numbers.

TABLE 4
MINIMUM ICE THICKNESS AND SPACING BETWEEN VEHICLES OR LOADS ON SEA ICE
(for uncracked ice)

Minimum Ice Thickness	Load (pounds)				Short-Term Load Separation[4]
	Parked on 9x9 Area[1]		With Resonant Wave		
Feet	4 hours to 4 days	4 days to 4 months	Single load area[2]	Multiple load area[3]	Feet
1.5	Not reported	10,000[5]	10,000	Not reported	42
2	Not reported	15,000	18,000	25,000	54
2.5	27,000	17,000	25,000	30,000	64
3	43,000	27,000	40,000	50,000	72
4	88,000	56,000	70,000	80,000	90
5	156,000	92,000	Not reported	125,000	106
6	Not reported	131,000	Not reported	170,000	122
7	Not reported	178,000	Not reported	240,000	140

Adapted from Sandwell. 2001.

[1] Sandwell, 2001, Tables 7-1 and 7-2.

[2] Sandwell, 2001, Figure 3-2

[3] Sandwell, 2001, Figure 3-3

[4] Sandwell, 2001, Table 3-8

[5] Alaska Clean Seas. 1999. Tactic L-7, Table 4.

IMPORTANT NOTES:

(1) Near wet cracks, use half the weights indicated.
(2) If these are intersecting wet cracks, suspend operations until cracks are repaired.
(3) Use extreme care if weather is extremely cold after warm period or warm after cold period.
(4) Control speed in shallow water to avoid flexural waves.

TABLE 5
VEHICLE SPEED ASSOCIATED WITH
DYNAMIC EFFECTS ON SEA ICE

	Water Depth	
	10 Feet	40 Feet
Max. Speed (mph) for Dynamic Effect	12	24
Speed (mph) to Avoid Dynamic Effect	8	17

Adapted from Sandwell, 2001, Figure 3-1.

TECHNICAL LIMITATIONS

- When working on ice, make sure the thickness is known.
- Be conservative in using the graphics in this tactic.

REFERENCES

Alaska Clean Seas. 1999. Alaska Clean Seas Technical Manual, Volume 1, Tactics Descriptions.

Alaska Clean Seas Winter Spill Operations - Module 1.

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Vaudrey, K.D. 1977. Ice Engineering - Study of Related Properties of Floating Sea Ice Sheets and Summary of Elastic and Viscoelastic Analyses. Navy Civil Engineering Lab. Technical Report R860.

L

ADMINISTRATION TACTICS

A-X SpellOutHere (Pg 1 of 2)

INITIAL ACTIONS

SITE SAFETY AND CONTROL

- ❑ **Health Hazards**: Respiratory/dermal/ingestion/exposure levels/PPE
- ❑ **Fire/Explosion:** LEL's/explosion proof equipment
- ❑ **Air Monitoring:** Suggested priority action that should continue as required throughout the response
- ❑ **Biological Hazards:** Environmental and chemical
- ❑ **Unsafe Conditions:** Weather, heavy equipment, adequate lighting, etc.
- ❑ **Medical Emergency:** Medical plan and on-site first-aid capability

NOTIFICATIONS

- ❑ **Corporate:** Have the appropriate corporate notifications been made?
- ❑ **Local:** Has North Slope Borough and/or local communities been notified?
- ❑ **State:** Have the proper State of Alaska notifications been made?
- ❑ **Federal:** Have the proper Federal notifications been made?

SPILL ASSESSMENT

- ❑ **Characterization:** Access control/hazard evaluation/PPE requirements/site description

SOURCE CONTROL

- ❑ **Salvage**
- ❑ **Relief Well**
- ❑ **Flow Control/Mitigation**
- ❑ **Repair**

RESPONSE

STAGING AREAS

- ❑ **Location:** Best location to support remote operations in area outside contaminated areas
- ❑ **Control:** Establish check-in/check-out system for personnel and equipment
- ❑ **Space:** Make sure there's enough room

CONTAINMENT

- ❑ **Booming:** Ensure you're using right boom for the job
- ❑ **Earth/Snow Berms:** May be special permit requirements

MECHANICAL RECOVERY

- ❑ **Skimming:** Skimmer requirements will change as oil weathers and emulsifies
- ❑ **Heavy Equipment**

BURNING

- ❑ **Burn Plan:** Who, what, where, when, why?
- ❑ **Containment:** Oil needs to be >2mm to sustain combustion.
- ❑ **Ignition System:** Heli-torch, hand-held igniters, or igniter of opportunity
- ❑ **Permit:** FOSC and ADEC approval required to burn

DECONTAMINATION

- ❑ **Personnel:** Required immediately for first responders as well as longer term
- ❑ **Heavy Equipment:** What, when, how?
- ❑ **Boom:** What, when, how?
- ❑ **Skimmer:** What, when, how?
- ❑ **Vessel:** What, when, how?
- ❑ **Small Equipment/Tools:** What, when, how?

SURVEILLANCE/TRACKING

- ❑ **Modelling:** If offshore, use hand calculations supplemented with NOAA model
- ❑ **Aerial Surveillance:** Should be done at least daily to track oil and ground-truth model

❑ **Tactical Surveillance:** Critical to have aerial surveillance to position resources in the field
❑ **Mass Balance Calculations:** Be as accurate as possible before releasing information

SHORELINE PROTECTION

❑ **Sensitive Habitat Identification:** Identify sensitive habitat to prioritize protection
❑ **Prioritization Plan:** Develop plan

SHORELINE CLEANUP

❑ **Assessment:** Form Shoreline Cleanup Assessment Teams (SCAT)
❑ **Identify Beach Type:** Characterize and map beach types and oiled areas
❑ **Identify Cleanup Techniques:** Determine correct techniques for each beach type and implement cleanup

WASTE DISPOSAL

❑ **Liquid Oily Waste:** Where, when, how?
❑ **Solid Oily Waste:** Where, when, how?
❑ **Domestic Waste:** Where, when, how?
❑ **Hazardous:** Where, when, how?
❑ **Transport:** Where, when, how?
❑ **Storage:** Temporary or long-term/impermeable
❑ **Disposal:** Identify options
❑ **Permits:** Ensure permits are in place

COMMUNICATIONS

❑ **Radio (air-ground, etc.):** Need to establish as soon as possible and have ability to expand as needed

ENVIRONMENTAL

SENSITIVITY ID: Identify and prioritize: cultural, archaeological, environmental

❑ **Sensitive Wildlife Habitat:** Identify and prioritize
❑ **Cultural/Archaeological:** Identify; confidentiality issues may arise

WILDLIFE RESPONSE

❑ **Hazing:** Use only qualified personnel
❑ **Capture:** Capture of terrestrial animals to be done by ADF&G
❑ **Stabilization:** Ensure wildlife facility is operational
❑ **Treatment:** Use licensed DVM
❑ **Release:** Negotiate location and timing with trustee agencies

NRDA

❑ **Survey:** Initiate as soon as practical
❑ **Documentation**

ANCILLARY ACTIVITIES

PUBLIC RELATIONS: Initiate as soon as practical

SECURITY

LAND OWNERSHIP ISSUES: Ensure you have permission to enter native allotments

SPILL PROJECT CLOSURE

DEMOBILIZATION: Commence planning as soon as possible

SITE RESTORATION

❑ **Material removal:** Will cause a disposal problem
❑ **Revegetation:** Anticipate multi-year program
❑ **Bioremediation:** Anticipate multi-year program

CLAIMS

A

APPENDIX A

ICS FORMS

This appendix contains ICS Forms reprinted from the U.S.C.G. Incident Management Handbook, August 2006, along with related ACS materials.

Contents include (in the following order):

- ICS 201 -- Initial Incident Briefing
- ICS Map Display Symbology
- ICS 201-CG -- Incident Briefing
- ICS 209 -- Situation Status Summary
- ICS 209-CG -- Incident Status Summary
- ICS 211-CG -- Check-In List
- ICS 213-CG -- General Message
- ICS 213RR-CG -- Resource Request Message
- ICS 214-CG -- Unit Log
- ACS Field Organization Form
- ACS T-Card Color Coding
- USCG T-Card Color Coding

ICS 201 -- Initial Incident Briefing (Pg 1 of 5)

INITIAL INCIDENT BRIEFING - ICS 201-1 (page 1 of 5)
INCIDENT MAP

Incident Name:	Date Prepared:
Incident Location:	Time Prepared:

REQUIRED FORMS ATTACHED:

- ☐ Incident Map (ICS 201-1)
- ☐ Summary of Incident and Current Actions (ICS 201-2)
- ☐ TRT Organization (ICS 201-3)
- ☐ Resource Summary (ICS-201-4)
- ☐ Site Safety and Controls (ICS 201-5)

INCIDENT MAP:

0 1
SCALE

WEATHER: _____

Temperature: _____ Wind Chill: _____

Wind Speed: _____ Wind Direction: _____

Precipitation (rain, snow, etc.): _____

Sunrise: _____ Sunset: _____

High Tide: _____ Low Tide: _____

LEGEND:

☆	Incident Command Post		
○	Heliport	CS	Containment Sites
	Incident Area		Water (lakes, oceans)
D	Division		Rivers
G	Group		Roads
TF	Task Force		Above-ground Pipeline
ST(T)	Strike Team (Team)		Below-ground Pipeline
SA	Staging Area	X	Control Zones
DC	Decontamination	B	Boom

Prepared By: _____ **ICS Position:** _____ **Phone:** _____

ICS 201-1
11/24/04

(SEE FLOW CHART ON BACK OF FORM)

Page ____ of ____

INITIAL INCIDENT BRIEFING - ICS 201-2 (page 2 of 5)
SUMMARY OF INCIDENT AND CURRENT ACTIONS

Incident Name: _____ Date Prepared:
Incident Location: _____ Time Prepared:

DESCRIPTION OF INCIDENT:

Cause if Known: _____

_____

What Happened: ☐ Fire ☐ Gas leak ☐ Explosion ☐ Spill ☐ Medical ☐ HAZMAT ☐ Other

Extent of Involvement:

Source: _____ Name/Type: _____

DESCRIPTION OF SPILLED/EMITTED MATERIAL:

Type: _____ Quantity: _____

INCIDENT POTENTIAL:

☐ **Incident Under Control**
☐ Incident Currently Not Under Control, But Can Be Handled With Available Resources.
☐ Incident Will Require Additional Resources (e.g., contractors, mutual aid).
☐ Incident Will Likely Generate Significant Public Affairs/Community Relations Issues.

SAFETY CONSIDERATIONS:

Injuries: _____ Fatalities: _____ Unaccounted: _____
Chemical Hazards: _____
Physical Hazards: _____
Level of PPE: _____

RESPONSE OBJECTIVES:

IMPACTS: ☐ Land ☐ People ☐ Property ☐ Environment ☐ Operations ☐ Community ☐ Water

Sensitive Areas Impacted or Threatened: Yes ☐ No ☐

Location of Areas: _____

NOTIFICATIONS MADE:

_____
_____
_____
_____

HELP REQUESTED (EmOC):

Technical: _____ Human Resources: _____
Legal: _____ Environmental: _____
Safety: _____ Medical: _____
Information Officer: _____ Other: _____

Prepared By: _____ **ICS Position:** _____ **Phone:** _____

ICS 201-2
11/24/04

COMPLETE AND FORWARD TO THE ACC WITHIN 2 HOURS

Page____ of ____

INITIAL INCIDENT BRIEFING - ICS 201-3 (page 3 of 5)
TRT ORGANIZATION

Incident Name: _____ Date Prepared: _____

Incident Location: _____ Time Prepared: _____

LOCATED AT THE INCIDENT COMMAND POST (ICP)

On-Scene Commander
Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Field Aides
Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Site Safety Officer
Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Deputy On-Scene Commander
Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Staging Area Manager
Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Phone:_____
Fax:_____
Radio Channel:_____
Frequency:_____

Prepared By: _____ **ICS Position:** _____ **Phone:** _____

ICS 201-3 Page___of ___
11/24/04

INITIAL INCIDENT BRIEFING - ICS 201- 4 (page 4 of 5)
RESOURCE SUMMARY

Incident Name: _____ Date Prepared:

Incident Location: _____ Time Prepared:

Qty	Description of Resources	ETA Date/Time	On Scene (x)	Location/Assignment (Branch, Division, Task Force, Staging Area, etc.)

Prepared By: _____ **ICS Position:** _____ **Phone:** _____

ICS 201-4
11/24/04

Page ____ of ____

INITIAL INCIDENT BRIEFING - ICS 201- 5 (page 5 of 5)
SITE SAFETY AND CONTROLS

Incident Name:_____ Time Work Started:

Incident Location:_____ _____ AM _____ PM

SITE CONTROL:		
Has an Site Safety Officer Been Designated?	Yes ☐	No ☐
Has an Incident Command Post Been Established?	Yes ☐	No ☐
Have all Personnel Been Accounted for? Injuries:____Fatalities:____Unaccounted:____	Yes ☐	No ☐
Are People Injured or Trapped?(Attach Company Injury/Incident Report, as appropriate)	Yes ☐	No ☐
Are Untrained/Unorganized People On-Scene or Involved in Rescue Operations?	Yes ☐	No ☐
Has an Isolation Perimeter Been Established?	Yes ☐	No ☐
Has a Staging Area Been Established?	Yes ☐	No ☐
Has Site Access Control Been Established?	Yes ☐	No ☐
HAZARDS:		
Have You Determined the Need For:		
Air Monitoring	Yes ☐	No ☐
On-Site Characterization	Yes ☐	No ☐
Off-Site Characterization	Yes ☐	No ☐
Are There Immediate Signs of Potential Hazards:		
Markings, Colors, Placards, or Labels Indicating Hazards?	Yes ☐	No ☐
Unidentified Liquid or Solid Products Visible?	Yes ☐	No ☐
Vapors Visible? Color _____	Yes ☐	No ☐
Orders or Smells?	Yes ☐	No ☐
Spill Area Conditions?_____ Dry ☐	Wet ☐	Icy ☐
Electrical Lines Down?	Yes ☐	No ☐
Ignition Sources Nearby(Sparks, Flames, Vehicles)?	Yes ☐	No ☐
Physical Hazards(Holes, Caverns, Deep Ditches, Fast Moving Water) Nearby?	Yes ☐	No ☐
Is Local Traffic a Potential Problem?	Yes ☐	No ☐
As You Approach the Scene From the Upwind Side, Are There Changes in Status of Any of the Above?	Yes ☐	No ☐
HAZARDS MITIGATION:		
Are TRT Units Safely Positioned? Emergency Escape Route Provided(see below)?	Yes ☐	No ☐
Have You Established and Communicated the Location of Hazardous Control Zones?	Yes ☐	No ☐
Have You Identified PPE Requirements and Levels? A_____B_____C_____D_____	Yes ☐	No ☐
Have Your Identified Other Safety Equipment and Procedures(see below)?	Yes ☐	No ☐
Are All Entry Operations Following the "Two in/Two Out" Guidelines?	Yes ☐	No ☐
Have You Established EMS/Medical Stations?	Yes ☐	No ☐
Have You Defined Decontamination Requirements(see below)?	Yes ☐	No ☐
Have You Addressed Personnel Fatigue? Hours since starting work_____	Yes ☐	No ☐
Have You Established Decontamination Facilities?	Yes ☐	No ☐

REMARKS: (List Emergency Escape Routes, Decon Requirements, Equipment, etc., as appropriate):

_____ _____ Approved By:_____

Prepared By: Site Safety Officer Date/Time On-Scene Commander

ICS 201-5
11/24/04

Page____of____

ICS MAP/CHART DISPLAY SYMBOLOGY

MINIMUM RECOMMENDED

BLACK

- Proposed Boom
- Completed Boom
- XXX Absorbent Material

RED

- 10 Aug ⊗ 1430 Hazard Origin

BLUE

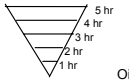
- Incident Command Post
- (B) Incident Base
- (C) HOLT Camp (Identify by Name)
- (S) REDFERN Staging Area (Identify by Name)
- (JIC) Joint Information Center
- Helispot (Location & Number)
- (H) Helibase
- (R) Mobile Relay

OPTIONAL

BLUE

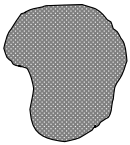
- (P) Police Station
- (T) Telephone
- (F) Fire Station
- (X) Mobile Weather Unit
- (EOC) Emergency Operations Center
- Fire Aid Section
- Hospital

ORANGE



Oil Spread Prediction

BLACK



Actual Oil or Chemical Plume

BLACK

- [I] [I I] Branches (Initially numbered clockwise from Incident origin)
- (A) (B) Divisions (Initially lettered clockwise from Incident origin)
- Division Boundary
- Branch Boundary
- W/10 1600 9/7 Wind Speed and Direction

1 Safety/Security Zone

Boat Ramp

All overlays must contain registration marks. These may consist of identified road intersections township/range coordinates, map corners etc.

TO BE USED ON INCIDENT BRIEFING AND ACTION PLAN MAPS/CHARTS

ICS 201-CG -- Incident Briefing (Pg 1 of 4)

1. Incident Name	2. Prepared by: (name) Date: Time:	INCIDENT BRIEFING ICS 201-CG

3. Map/Sketch (include sketch, showing the total area of operations, the incident site/area, overflight results, trajectories, impacted shorelines, or other graphics depicting situational and response status)

4. Current Situation

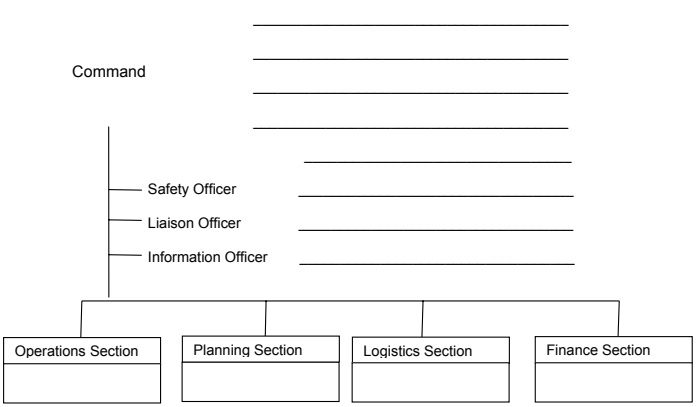
1. Incident Name	2. Prepared by: (name) Date: Time:	INCIDENT BRIEFING ICS 201-CG

5. Initial Response Objectives, Current Actions, Planned Actions, Potential

ICS 201-CG -- Incident Briefing (Pg 3 of 4)

1. Incident Name	2. Prepared by: (name) Date: Time:	INCIDENT BRIEFING ICS 201-CG

6. Current Organization (fill in additional appropriate organization)



ICS 201-CG -- Incident Briefing (Pg 4 of 4)

1. Incident Name	**2. Prepared by:** (name) Date: Time:	INCIDENT BRIEFING ICS 201-CG

7. Resources Summary

Resource	Resource Identifier	Date Time Ordered	ETA	On-Scene (X)	NOTES: (Location/Assignment/Status)

INCIDENT BRIEFING ICS 201-CG (pg 4 of 4) (Rev 08/04)

ICS 209 -- Situation Status Summary

SITUATION STATUS SUMMARY (IAP) - ICS 209			
Incident Name:	**Date Prepared:**	**Operational Period**	
		Date	**Time**
Incident Location:	**Start:**		
	End:		
(1) STATUS OF SOURCE CONTROL OPERATIONS:			
(2) STATUS OF RESPONSE OPERATIONS:			
(3) MAJOR SAFETY CONSIDERATIONS:			
(4) MAJOR ENVIRONMENTAL CONSIDERATIONS:			
(5) MAJOR PUBLIC INFORMATION/COMMUNITY CONSIDERATIONS:			
Prepared By:	**ICS Position:**	**Phone:**	

ICS 209
5/8/99

Page _____ of _____

1. Incident Name	2. Operational Period (Date / Time) From: To: Time of Report	INCIDENT STATUS SUMMARY ICS 209-CG (Revised 06/05)

3. Type of Incident

☐	Oil Spill	☐	HAZMAT	☐	AMIO
☐	SAR/Major SART	☐	SI/Terrorism	☐	Natural Disaster
☐	Marine Disaster	☐	Civil Disturbance	☐	Military Outload
☐	Planned Event	☐	Maritime HLS/Prevention	☐	

4. Situation Summary as of Time of Report:

5. Future Outlook/Goals/Needs/Issues:

6. Safety Status/Personnel Casualty Summary

	Since Last Report	Adjustments To Previous Op Period	Total
Responder Injury			
Responder Death			
Public Missing (Active Search)			
Public Missing (Presumed Lost)			
Public Uninjured			
Public Injured			
Public Dead			
Total Public Involved			

7. Property Damage Summary

Vessel	$
Cargo	$
Facility	$
Other	$

8. Attachments with clarifying information

☐	Oil/HAZMAT	☐	SAR/LE	☐	
☐		☐		☐	
☐	Marine Disaster	☐	Civil Disturbance	☐	Military Outload

ICS-209-CG INCIDENT STATUS SUMMARY Page 1 of __ (Rev 06/05)

ICS 209-CG -- Incident Status Summary (Pg 2 of 3)

9. Equipment Resources					
Kind	Notes	# Ordered	# Available	# Assigned	# Out of Service
USCG Assets					
Aircraft – Helo					
Aircraft – Fixed Wing					
Vessels – USCG Cutter					
Vessels – Boat					
Vehicles – Car					
Vehicles – Truck					
Pollution Equip – VOSS/SORS					
Pollution Equip – Portable Storage					
Pollution Equip – Boom					
Non-CG/Other Assets					
Aircraft – Helo					
Aircraft – Fixed Wing					
Vessels – SAR/LE Boat					
Vessels – Work/Crew Boat					
Vessels – Tug/Tow Boat					
Vessels – Pilot Boat					
Vessels – Deck Barge					
Vessels –					
Vehicles – Car					
Vehicles – Ambulance					
Vehicles – Truck					
Vehicles – Fire/Rescue/HAZMAT					
Vehicles – Vac/Tank Truck					
Vehicles –					
Pollution Equip – Skimmers					
Pollution Equip – Tank Vsl/ Barge					
Pollution Equip – Portable Storage					
Pollution Equip – OSRV					
Pollution Equip – Boom					
Pollution Equip –					

10. Personnel Resources	
Agency	**Total # of People**
USCG	
DHS (other than USCG)	
NOAA	
FBI	
DOD (USN Supsalv, CST, etc.)	
DOI (US Fish & Wildlife, Nat Parks, BLM, etc.)	
RP	
State	
Local	
Total Personnel Resources Used From all Organizations:	

11. Prepared by:	**Date/Time Prepared:**

ICS-209-CG INCIDENT STATUS SUMMARY Page 2 of __ (Rev 06/05)

1. Incident Name	2. Operational Period (Date / Time) From: To: Time of Report	ICS 209-CG OIL/HAZMAT ATTACHMENT (Revised 06/05)

3. HAZMAT/Oil Spill Status (Estimated, in gallons)

Common Name(s):

UN Number:	☐ Secured ☐ Unsecured
CAS Number:	Remaining Potential (bbl):
	Rate of Spillage (bbl/hr):

	Adjustments To Previous Operational Period	Since Last Report	Total
Volume Spilled/Released			
Mass Balance - HAZMAT/Oil Budget			
Recovered HAZMAT/Oil			
Evaporation/Airborne			
Natural Dispersion			
Chemical Dispersion			
Burned			
Floating, Contained			
Floating, Uncontained			
Onshore			
Total HAZMAT/Oil accounted for:	N/A	N/A	

Comments:

4. HAZMAT/Oil Waste Management (Estimated, Since Last Report)

	Recovered	Disposed	Stored
HAZMAT/Oil (bbl)			
Oily Liquids (bbl)			
Liquids (bbl)			
Oily Solids (tons)			
Solids (tons)			

Comments:

5. HAZMAT/Oil Shoreline Impacts (Estimated in miles)

Degree of Impact	Affected	Cleaned	To Be Cleaned
Light			
Medium			
Heavy			
Total			

Comments:

6. HAZMAT/Oil Wildlife Impacts (Since Last Report)

					Died in Facility	
Type of Wildlife	Captured	Cleaned	Released	DOA	Euthanized	Other
Birds						
Mammals						
Reptiles						
Fish						
Total						

Comments:

7. Prepared by:	Date/Time Prepared:

ICS-211-CG CHECK-IN LIST	1. INCIDENT NAME:	2. CHECK-IN LOCATION: ☐ BASE ☐ CAMP _____ ☐ STAGING AREA _____ ☐ ICP ☐ OTHER _____	3. DATE/TIME:

CHECK-IN INFORMATION

4. LIST PERSONNEL (OVERHEAD) BY AGENCY NAME OR LIST EQUIPEMENT BY THIS FORMAT:
AM=Ambulance B=Boom H=Helicopter O=Overhead
VL=Vessels LE=Law Enforcement Unit C=Crew A=Aircraft
E=Engine EQ=Equipment B=Boom

AGENCY	SINGLE ST/ TF	KIND	TYPE	ID NO. /NAME – RESOURCE ID	5. ORDER/ NUMBER	6. DATE/TIME CHECK-IN	7. LEADER'S NAME	8. TOTAL NO. PERSONNEL	9. INCIDENT CONTACT INFORMATION	10. INCIDENT LODGING INFO/CONTACT INFO	11. HOME UNIT	12. METHOD OF TRAVEL	13. INCIDENT ASSIGNMENT	14. OTHER QUALIFICATION	15. SENT TO RESTAT TIME/INT

16. ICS 211-CG PAGE _____ of _____	17. PREPARED BY (Name and Position) USE BACK FOR REMARKS OR COMMENTS

ICS 213-CG -- General Message

1. Incident Name	2. Date and Time of Message	GENERAL MESSAGE ICS 213-CG
3. TO:	ICS Position	
4. FROM:	ICS Position	
5. Subject:		
6. Message		
7 Reply		
8. Signature/Position (person replying)	Date/Time of reply	
GENERAL MESSAGE		ICS 213-CG (Rev 04/04)

Resource Request Message

Purpose: The 213RR CG is used by all incident personnel to request tactical and non-tactical resources.

ICS-213 RR CG (2/07)

Requestor

1. **Incident Name:** | 2. **Date/Time:** | 3. **Resource Request Number:**

4. ORDER Note: Use additional forms when requesting different resource sources of supply

a. Qty	b. Kind	c. Type	d. Priority U or R	e. Detailed item description (vital characteristics, brand, specs, experience, etc.) and, if applicable, purpose/use, diagrams, and other info.	f. Requested Reporting Location:	Date/Time:	g. Order # (LSC)	h. ETA (LSC)	i. Cost

5. Suggested source(s) of supply - POC phone number if known and suitable subtitutes:

6. Requestor Position and Signature: Date/Time:

7. Section Chief/Command Staff Approval: Date/Time:

Plans

8. RESL - check box (a) if request is for tactical or personnel resources. Then note availability in box 8.b or 8.c.

a. ☐ b. ☐ Resources available as noted in block 12

c. ☐ Resources not available

9. RESL Review/Signature: Date/Time:

Logistics

10. Requisition/Purchase Order #:

11. Supplier Name/Phone/Fax/Email:

12. Notes:

13. Logistics Section Signature: Data/Time:

14. Order placed by (check box): ☐SPUL ☐PROC ☐OTHER _____

Finance

15. Reply/Comments from Finance:

16. Finance Section Signature: Date/Time:

Full instructions on back page. Requestor fills in blocks 1-5, except # 3 & # 4.g-i (shaded area), signs block 6 (do not forget position), gets appropriate Section Chief or Command Staff approval in block 7, and keeps yellow copy (bottom). If applicable, RESL reviews if resource available, signs block 9 and keeps blue copy. Logistics fills in block 4.g and h, and blocks 10-13, and keeps orange copy. Orderer (LSC or FSC) fills in block 4.i. Finance fills in blocks 15 - 16 and keeps green copy. Pink copy is returned to RESL for tactical/personnel or requestor for non-tactical. White copy goes to DOCL.

1. Incident Name	2. Operational Period (Date/Time) From: To:	UNIT LOG ICS 214-CG
3. Unit Name/Designators	4. Unit Leader (Name and ICS Position)	

5. Personnel Assigned

NAME	ICS POSITION	HOME BASE

6. Activity Log (Continue on Reverse)

TIME	MAJOR EVENTS

7. Prepared by: **Date/Time**

UNIT LOG ICS 214-CG (Rev 04/04)

ICS 214-CG -- Unit Log (Pg 2 of 2)

1. Incident Name	2. Operational Period (Date/Time) From: To:	UNIT LOG (CONT.) ICS 214-CG

6. Activity Log (Continue on Reverse)

TIME	MAJOR EVENTS

7. Prepared by: **Date/Time**

UNIT LOG ICS 214-CG (Rev 04/04)

FIELD ORGANIZATION FORM

INSTRUCTIONS: Draw the organization of the Field Response Teams (FRT) within this box. Include all teams below the Branch Director. Include team names, team leaders, boat captains, and team member names. If possible, include vessels, major equipment and any tactics utilized from the ACS Technical Manual. Use the first page to show the Task Force, Division, Group Leaders that report directly to the Branch Director. Use subsequent pages for each Task Force, Group, or Division. Ensure all the pages are numbered to include the entire response operation. Write legibly. FAX this form to the Incident Command Post (ICP) as soon as it is completed.

Alaska Clean Seas — T-Card Color Coding

GRAY – (Header Card) – ICS 219-1
Column Headers, Division, Group, location

WHITE – (Personnel) – ICS 219-5
Overhead Personnel

WHITE / ORANGE – (Accountable Property) – ICS 219-9
Sensitive Items
Radios/Satellite Phones
FLIR/GPR/GPS Units
Firearms

PINK – EQUIPMENT (non-vessel skimmers, storage, etc.) – ICS 219-3
Skimmers (E – S)
Portable Storage (E – PS)
Pumps
Light Plants, Heaters
Envirovacs
Trailers

TAN – VESSELS (Task Force, Strike Team, All Vessels.) – ICS 219-8
Task Force, Strike Team
Work Boat
Mini-Barge
Landing Craft

SALMON – BOOM (All boom types except Absorbent Boom) – ICS 219-6
Ocean Boom
Harbor Boom
Shoreseal Boom
Fire Boom
Current Buesters

BLUE – AIRCRAFT (All Fixed Wing and Helicopter Assets) – ICS 219-4
Helicopter (H)
Fixed Wing (A)

YELLOW – VEHICLES (Wheeled and tracked vehicles) – ICS 219-7
Vacuum Truck
Loader
ATV

GREEN – CREWS / TEAMS (Crews/Teams plus leaders) – ICS 219-2
Hand Crew
SCAT Team
Wildlife Hazing Team

UNITED STATES COAST GUARD

"T-Card COLOR CODING

GRAY (Header Cards), ICS 219-1

WHITE (Personnel), ICS 219-5
Overhead Personnel

PINK - Equipment (non-vessel skimmers, marine storage, etc.), ICS 219-3
Skimmers [E-S]
Portabel Storage (E-PS)
Boom (E-B)

TAN – Vessels (VL) (task force, strike team, all vessels), ICS 219-8
Task Force
Strike Team
Crew Boat [VL-CB]
Deck Barge [VL-DB]
Tug Boat [VL-TB]
Work Boat [VL-WB]
Oil Spill Recovery Vessel (VL-RV)
Tank Vessels (VL-TV)

SALMON (Aircraft), ICS 219-6
Fixed Wing (A)

BLUE (Aircraft), ICS 219-4
Helicopter [H]

YELLOW – Vehicles (VH) (Vacuum trucks, wheeled vehicles, etc.), ICS 219-7
Vacuum Truck [VH-VT]
Tank Truck [VH-TT]
Dozer [VH-D]

GREEN (Crews/Teams), ICS 219-2
Hand Crew [C]
HAZMAT Team (C-HM)
SERT (C-SAL)
SCAT (C-SCAT)

APP-A

APPENDIX B

POSITION CHECKLISTS

This appendix contains spill response positions checklists reprinted from the U.S.C.G. Incident Management Handbook, August 2006.

Contents include (in the following order):

- Common Responsibilities
- Incident Commander (IC)
- Safety Officer (SOFR)
- Operations Section Chief (OSC)
- Branch Director (OPBD)
- Division/Group Supervisor (DIVS)
- Strike Team/Task Force Leader (STCR/TFLD)
- Single Resource Leader
- Staging Area Manager (STAM)
- Check-In/Status Recorder (SCKN)
- Field Observer (FOBS)

Common Responsibilities (Pg 1 of 2)

COMMON RESPONSIBILITIES

(Chapter 2, U.S.C.G. Incident Management Handbook, August 2006)

The following checklist is applicable to all personnel in an ICS organization:

a. Receive assignment from your agency, including:
   - Job assignment (e.g. designation, position, etc.).
   - Brief overview of type and magnitude of incident.
   - Resource order number and request number/Travel Orders (TONO).
   - Travel instructions including reporting location and reporting time.
   - Any special communications instructions (e.g. travel, radio frequency).
   - Monitor incident related information from media, internet, etc., if available.
   - Assess personal equipment readiness for specific incident and climate (e.g. medications, money, computer, medical record, etc.). Maintain a checklist of items and possibly a personal Go-Kit.
   - Inform others as to where you are going and how to contact you.
   - Review Coast Guard Incident Management Handbook.
   - Take advantage of available travel to rest prior to arrival.

b. Upon arrival at the incident, check in at the designated check-in location. Check-in may be found at any of the following locations:
   - Incident Command Post (ICP).
   - Base.
   - Staging Areas.
   - Helibases.

   Note: If you are instructed to report directly to an on-scene assignment, check in with the Division/Group Supervisor or the Operations Section Chief.

c. Receive briefing from immediate supervisor.

d. Agency representatives from assisting or cooperating agencies report to the Liaison Officer (LNO) at the ICP after check-in.

e. Acquire work materials.

f. Abide by organizational code of ethics.

g. Participate in IMT meetings and briefings as appropriate.

h. Ensure compliance with all safety practices and procedures. Report unsafe conditions to the Safety Officer.

i. Supervisors shall maintain accountability for their assigned personnel with regard as to exact location(s), personal safety, and welfare at all times, especially when working in or around incident operations.

j. Organize and brief subordinates.

k. Know your assigned communication methods and procedures for your area of responsibility and ensure that communication equipment is operating properly.

l. Use clear text and ICS terminology (no codes) in all radio communications.
m. Complete forms and reports required of the assigned position and ensure proper disposition of incident documentation as directed by the Documentation Unit.
n. Ensure all equipment is operational prior to each work period.
o. Report any signs/symptoms of extended incident stress, injury, fatigue or illness for yourself or coworkers to your supervisor.
p. Brief shift replacement on ongoing operations when relieved at operational periods or rotation out.
q. Respond to demobilization orders and brief subordinates regarding demobilization.
r. Prepare personal belongings for demobilization.
s. Return all assigned equipment to appropriate location.
t. Complete Demobilization Check-out process before returning to home base.
u. Participate in After-Action activities as directed.
v. Carry out all assignments as directed.
w. Upon demobilization, notify RESL at incident site and home unit of your safe return.

INCIDENT COMMANDER (IC)

(U.S.C.G. Incident Management Handbook, August 2006)

The IC's responsibility is the overall management of the incident. On many incidents, the command activity is carried out by a single IC. The IC is selected based on qualifications and experience. The IC Job Aid (reference (a)) should be reviewed regarding the responsibilities and duties of the IC.

The IC may have Deputy IC's, who may be from the same agency or from an assisting agency. The Deputy IC must have the same qualifications as the person for whom they work, as they must be ready to take over that position at any time. When span of control becomes an issue for the IC, a Deputy IC/Chief of Staff may be assigned to manage the Command Staff.

The major responsibilities of the IC are:

a. Review Common Responsibilities in Chapter 2.
b. Obtain a briefing from the prior IC (201 Briefing).
c. Determine Incident Objectives and general direction for managing the incident.
d. Establish priorities.
e. Establish an ICP.
f. Brief Command Staff and Section Chiefs.
g. Establish an appropriate organization.
h. Ensure planning meetings are scheduled as required.
i. Approve and authorize the implementation of an IAP.
j. Ensure that adequate safety measures are in place.
k. Coordinate activity for all Command and General Staff.
l. Coordinate with key people and officials.
m. Approve requests for additional resources or for the release of resources.
n. Keep agency administrator informed of incident status.
o. Approve the use of trainees, volunteers, and auxiliary personnel.
p. Authorize release of information to the news media.
q. Ensure Incident Status Summary (ICS 209-CG) is completed and forwarded to appropriate higher authority.
r. Order the demobilization of the incident when appropriate.
s. Maintain Unit Log (ICS 214-CG).

SAFETY OFFICER (SOFR)

(U.S.C.G. Incident Management Handbook, August 2006)

The SOFR function is to develop and recommend measures for assuring personnel safety and to assess and/or anticipate hazardous and unsafe situations. Only one primary SOFR will be assigned for each incident. The SOFR Job Aid (reference (e)) should be reviewed regarding the organization and duties of the SOFR.

The SOFR may have assistants, as necessary, and the assistants may also represent assisting agencies or jurisdictions. Safety assistants may have specific responsibilities, such as air operations, hazardous materials, etc.

The major responsibilities of the SOFR are:

a. Review Common Responsibilities in Chapter 2.
b. Participate in tactics and planning meetings, and other meetings and briefings as required.
c. Identify hazardous situations associated with the incident.
d. Review the IAP for safety implications.
e. Provide safety advice in the IAP for assigned responders.
f. Exercise emergency authority to stop and prevent unsafe acts.
g. Investigate accidents that have occurred within the incident area.
h. Assign assistants, as needed.
i. Review and approve the Medical Plan (ICS 206-CG).
j. Develop the Site Safety Plan and publish Site Safety Plan Summary (ICS 208-CG) as required.
k. Develop the Work Safety Analysis Worksheet (ICS-215a-CG) as required.
l. Ensure that all required agency forms, reports and documents are completed prior to demobilization.
m. Brief Command on safety issues and concerns.
n. Have debriefing session with the IC prior to demobilization.
o. Maintain Unit Log (ICS 214-CG).

Operations Section Chief (Pg 1 of 2)

OPERATIONS SECTION CHIEF (OSC)

(U.S.C.G. Incident Management Handbook, August 2006)

The OSC, a member of the General Staff, is responsible for the management of all tactical operations directly applicable to the primary mission. The OSC will normally be selected from the organization/agency with the most jurisdictional responsibility for the incident.

The OSC activates and supervises organization elements in accordance with the IAP and directs its execution. The OSC also directs the preparation of operational plans; requests or releases resources, monitors operational progress and makes expedient changes to the IAP, as necessary; and reports such to the IC. The OSC Job Aid, Reference (a), should be reviewed regarding the organization and duties of the OSC.

The OSC may have Deputy OSC's, who may be from the same agency or from an assisting agency. The Deputy OSC must have the same qualifications as the person for whom they work, as they must be ready to take over that position at any time. **In complex incidents, the OSC may assign a Deputy OSC to supervise on-scene operations (major responsibilities (d) through (k) listed below) while the OSC participates in the incident planning process (major responsibilities (l) through (w) listed below).**

The major responsibilities of the OSC are:

a. Review Common Responsibilities in Chapter 2.
b. Obtain briefing from IC.
c. Evaluate and request sufficient Section supervisory staffing for both operational and planning activities.
d. Supervise Operations Section field personnel.
e. Implement the IAP for the Operations Section.
f. Evaluate on-scene operations and make adjustments to organization, strategies, tactics, and resources as necessary.
g. Ensure the Resources Unit is advised of changes in the status of resources assigned to the section.
h. Ensure that Operations Section personnel execute work assignments following approved safety practices.
i. Monitor need for and request additional resources to support operations as necessary.
j. Assemble/dissemble task force/strike teams as appropriate.
k. Identify/utilize staging areas.
l. Evaluate and monitor current situation for use in next operational period planning.
m. Convert operational incident objectives into strategic and tactical options. These options may be documented on a Work Analysis Matrix (ICS- 234-CG).
n. Coordinate and consult with the PSC, SOFR technical specialists, modeling scenarios, trajectories, etc., on selection of appropriate strategies and tactics to accomplish objectives.

o. Identify kind and number of resources required to support selected strategies.
p. Subdivide work areas into manageable units.
q. Develop work assignments and allocate tactical resources based on strategic requirements (i.e. develop the ICS-215-CG).
r. Coordinate planned activities with the SOFR to ensure compliance with safety practices.
s. Participate in the planning process and the development of the tactical portions (ICS 204-CG and ICS 220-CG) of the IAP.
t. Assist with development of long-range strategic, contingency, and demobilization plans.
u. Develop recommended list of Section resources to be demobilized and initiate recommendation for release when appropriate.
v. Receive and implement applicable portions of the incident Demobilization Plan.
w. Participate in operational briefings to IMT members as well as briefings to media, and visiting dignitaries.
x. Maintain Unit Log (ICS 214-CG).

BRANCH DIRECTOR (OPBD)

(U.S.C.G. Incident Management Handbook, August 2006)

The OPBD's when activated, are under the direction of the OSC and are responsible for the implementation of the portion of the IAP appropriate to the Branches.

The major responsibilities of the OPBD are:

a. Review Common Responsibilities in Chapter 2.
b. Obtain briefing from person relieving.
c. Receive briefing from the OSC.
d. Identify Divisions, Groups, and resources assigned to the Branch.
e. Ensure that Division and/or Group Supervisors (DIVS) have a copy of the IAP.
f. Implement IAP for the Branch.
g. Develop with subordinates alternatives for Branch control operations.
h. Review Division/Group Assignment Lists (ICS 204-CG) for Divisions/Groups within the Branch. Modify lists based on effectiveness of current operations.
i. Assign specific work tasks to DIVS.
j. Supervise Branch operations.
k. Resolve logistic problems reported by subordinates.
l. Attend planning meetings as requested by the OSC.
m. Ensure through chain of command that Resources Unit is advised of changes in the status of resources assigned to the Branch.
n. Report to OSC when: the IAP is to be modified; additional resources are needed; surplus resources are available; or hazardous situations or significant events occur.
o. Approve accident and medical reports (home agency forms) originating within the Branch.
p. Consider demobilization well in advance.
q. Debrief with OSC and/or as directed at the end of each shift.
r. Maintain Unit Log (ICS 214-CG).

DIVISION/GROUP SUPERVISOR (DIVS)

(U.S.C.G. Incident Management Handbook, August 2006)

The DIVS reports to the OSC (or OPBD when activated). The DIVS is responsible for the implementation of the assigned portion of the IAP, assignment of resources within the Division/Group, and reporting on the progress of control operations and status of resources within the Division/Group.

The major responsibilities of the DIVS are:

a. Review Common Responsibilities in Chapter 2.
b. Obtain briefing from person relieving.
c. Receive briefing from supervisor.
d. Identify resources assigned to the Division/ Group.
e. Provide the IAP to subordinates, as needed.
f. Review Division/Group assigned tasks and incident activities with subordinates.
g. Implement IAP for Division/Group.
h. Supervise Division/Group resources and make changes as appropriate.
i. Ensure through chain of command that Resources Unit is advised of all changes in the status of resources assigned to the Division/ Group.
j. Coordinate activities with adjacent Division/Group.
k. Determine need for assistance on assigned tasks.
l. Submit situation and resources status information to the Branch Director or the OSC as directed.
m. Report hazardous situations, special occurrences, or significant events, e.g., accidents, sickness, discovery of unanticipated sensitive resources, to the immediate supervisor.
n. Ensure that assigned personnel and equipment get to and from assignments in a timely and orderly manner.
o. Resolve logistics problems within the Division/ Group.
p. Participate in the development of Branch plans for the next operational period, as requested.
q. Consider demobilization well in advance.
r. Debrief as directed at the end of each shift.
s. Maintain Unit Log (ICS 214-CG).

STRIKE TEAM/TASK FORCE LEADER (STCR/TFLD)

(U.S.C.G. Incident Management Handbook, August 2006)

The STCR/TFLD reports to an OPBD or DIVS and is responsible for performing tactical assignments assigned. The Leader reports work progress, resources status, and other important information and maintains work records on assigned personnel.

The major responsibilities of the STCR/TFLD are:

a. Review Common Responsibilities in Chapter 2.
b. Review Common Unit Leader Responsibilities in Chapter 2.
c. Obtain briefing from person you are relieving.
d. Obtain briefing from supervisor.
e. Review assignments with subordinates and assign tasks.
f. Monitor work progress and make changes when necessary.
g. Keep supervisor informed of progress and any changes.
h. Coordinate activities with adjacent Strike Teams, Task Forces and single resources.
i. Travel to and from active assignment area with assigned resources.
j. Retain control of assigned resources while in available or out-of-service status.
k. Submit situation and resource status information through chain of command DIVS/ OPBD/OSC as appropriate.
l. Debrief as directed at the end of each shift.
m. Maintain Unit Log (ICS 214-CG).

SINGLE RESOURCE LEADER

(U.S.C.G. Incident Management Handbook, August 2006)

The person in charge of a single tactical resource.

The major responsibilities of the Single Resource Leader are:

a. Review Common Responsibilities in Chapter 2.
b. Review assignments.
c. Obtain briefing from person you are relieving.
d. Obtain necessary equipment and supplies.
e. Review weather/environmental conditions for assignment area.
f. Brief subordinates on safety measures.
g. Monitor work progress.
h. Ensure adequate communications with supervisor and subordinates.
i. Keep supervisor informed of progress and any changes.
j. Inform supervisor of problems with assigned resources.
k. Brief relief personnel, and advise them of any change in conditions.
l. Return equipment and supplies to appropriate unit.
m. Complete and turn in all time and use records on personnel and equipment.
n. Debrief as directed at the end of each shift.
o. Maintain Unit Log (ICS 214-CG).

STAGING AREA MANAGER (STAM)

(U.S.C.G. Incident Management Handbook, August 2006)

The STAM is under the direction of the OSC and is responsible for managing all activities within a Staging Area.

The major responsibilities of the STAM are:

a. Review Common Responsibilities in Chapter 2.
b. Proceed to Staging Area.
c. Obtain briefing from person you are relieving.
d. Establish Staging Area layout.
e. Determine any support needs for equipment, feeding, sanitation and security.
f. Establish check-in function as appropriate.
g. Ensure security of staged resources.
h. Post areas for identification and traffic control.
i. Request maintenance service for equipment at Staging Area as appropriate.
j. Respond to request for resource assignments. (Note: This may be direct from the OSC or via the Incident Communications Center.)
k. Obtain and issue receipts for radio equipment and other supplies distributed and received at Staging Area.
l. Determine required resource levels from the OSC.
m. Advise the OSC when reserve levels reach minimums.
n. Maintain and provide status to Resource Unit of all resources in Staging Area.
o. Maintain Staging Area in orderly condition.
p. Demobilize Staging Area in accordance with the Incident Demobilization Plan.
q. Debrief with OSC or as directed at the end of each shift.
r. Maintain Unit Log (ICS 214-CG).

CHECK-IN/STATUS RECORDER (SCKN)

(U.S.C.G. Incident Management Handbook, August 2006)

SCKN's are needed at each check-in location to ensure that all resources assigned to an incident are accounted for.

The major responsibilities of the SCKN are:

a. Review Common Responsibilities in Chapter 2.
b. Obtain required work materials, including Check In Lists (ICS 211-CG), Resource Status Cards (ICS-219) and status display boards or T-card racks.
c. Post signs so that arriving resources can easily find incident check-in location(s).
d. Record check-in information on Check-in Lists (ICS 211-CG).
e. Transmit check-in information to the RESL.
f. Forward completed ICS 211-CG and Status Change Cards (ICS-210) to the RESL.
g. Receive, record, and maintain resource status information on Resource Status Cards (ICS-219) for incident-assigned tactical resources, and overhead personnel.
h. Maintain files of Check-in Lists (ICS 211-CG).
i. Maintain Unit Log (ICS 214-CG).

FIELD OBSERVER (FOBS)

(U.S.C.G. Incident Management Handbook, August 2006)

The FOBS is responsible for collecting situation information from personal observations at the incident and provides this information to the SITL. The major responsibilities of the FOBS are:

a. Review Common Responsibilities in Chapter 2.
b. Determine:
   - Location of assignment
   - Type of information required
   - Priorities
   - Time limits for completion
   - Method of communication
   - Method of transportation
c. Obtain necessary equipment and supplies.
d. Perform FOBS responsibilities to include but not limited to the following:
   - Perimeters of incident
   - Locations of trouble spots
   - Weather conditions
   - Hazards
   - Progress of operations resources
e. Be prepared to identify all facility locations (e.g., Helispots, Division and Branch boundaries).
f. Report information to the SITL by established procedure.
g. Report immediately any condition observed that may cause danger and a safety hazard to personnel.
h. Gather intelligence that will lead to accurate predictions.
i. Maintain Unit Log (ICS 214-CG).

APPENDIX C

EQUIPMENT CHECKLISTS

This section contains a numerical listing of current checklists for operating various equipment used by ACS during spill response operations and exercises.

Bladders and Tanks

- PC15 Fast Tank
- PC162 Sea Slug Canflex Bladder
- PC184 Canflex Tank

Boom-Related

- PC109 Lamor Boom Deployment Retrieval Operations
- PC150 Kepner Boom Reel Kepner Power Pack
- PC155 Boom Vane
- PC156 MegaSecur Dam
- PC167 NOFI Harbor Buster
- PC171 Hydrofire Power Pack Boom Reel

Cutting/Trenching Tools

- PC14 Chainsaw
- PC16 Ice Auger
- PC43 Rube Witch

Miscellaneous

- PC32 Weatherport
- PC41 Underwater Lights
- PC59 500,000 BTU Frost Fighter
- PC60 Alkota Pressure Washer
- PC62 Gelled Fuel Batch Mixer
- PC63 Helitorch
- PC65 EOA Net Launcher
- PC69 Snow Blower
- PC83 Leaf Blower
- PC100 Atlas Copco XAS 160 Air Compressor
- PC116 Air Shelter Tent

Index (cont.)

- PC78 Lori LSC-3 Brush Skimmer
- PC80 Walosep W - I Skimmer
- PC91 Destroil 150
- PC92 Walosep W-4 Skimmer
- PC96 Lori Skim-Barge System
- PC99 Foxtail with Henrickson
- PC113 Action Petroleum Skimmer
- PC114 Aqua-Guard Brush-Drum Skimmer Power Pack
- PC118 Scavenger Skimmer
- PC126 Lamor Mini Max Skimmer
- PC139 Lamor Mini Max 20 Skimmer
- PC140 Lamor Mini Max 30 Skimmer
- PC141 Lamor Rock Cleaner
- PC152 Elastec Mini Vac MV078 Barrel Vac
- PC154 Vikoma Duplex Skimmer
- PC161 WOA Portable Envirovac
- PC163 Crucial Rope Mop Skimmer
- PC177 Crucial Rope Mop
- PC178 Crucial Disc 13-30 (Vessel Powered)
- PC178 Crucial Disc 13-30
- PC179 Elastec TDS 118 Hydraulic Skimmer
- PC189 Pneumatic Drum Skimmer
- PC192 Crucial Disc Skimmer
- PC193 Crucial Drum Skimmer

Vehicles and Trailers

- PC11 Snow Machine
- PC12 Four Wheeler
- PC25 Wet Decon Van
- PC28 Warm Up Van
- PC29 Mobile Command Center
- PC51 SAM Office
- PC75 Six-Wheeler
- PC89 Wells Cargo
- PC95 Tucker Sno Cat
- PC123 Hagglunds Track Vehicle
- PC130 Kubota RTV900
- PC138 Centaur
- PC144 Equipment Trailer
- PC146 Water Spray Trailer
- PC172 Caterpillar Skid Steer 299C
- PC174 International Boomtruck (Level I)
- PC176 Freightliner (Level I)
- PC183 Mattracks

Vessel-Related

- PC70 Vessel Deck Equipment
- PC71 Vessel Ops
- PC72 Vessel Comm Nav-Aids
- PC79 Mini Barge Operation
- PC97 Mini Barge Lightering

Wildlife Diversion Equipment

- PC64 EOA Electronic Scare-Away
- PC90 Bird Scare Cannon
- PC132 Breco Bird Scare Buoy

PC11 — Snow Machine

Pre-Start

- ❑ Familiarize yourself with all the controls: brake lever, throttle control, ignition switch, choke lever, parking brake, manual recoil starter, electric starter (if equipped), and transmission functions. Determine if you have a 2 or 4 stroke machine.
- ❑ Inspect safety equipment such as the emergency stop switch, lights, emergency starting rope, tool kit, spare spark plugs, drive belt and windshield.
- ❑ Check drive belt and track for wear and alignment.
- ❑ For 2 stroke machines, check fuel and oil injection tank.
- ❑ For 4 stroke machines, check fuel and crank case oil. Note: use only specified oil, check owner's manual or ACS mechanic before adding oil.
- ❑ Check to see if the reverse/forward shift lever is in correct position.
- ❑ Check chain case oil.
- ❑ Check all suspension for loose, missing or damaged parts.

Startup

- ❑ Check throttle for proper operation.
- ❑ Make sure emergency stop switch is in the "on" position.
- ❑ (2 Stroke only) If cold, move choke lever to the "full" choke position.
- ❑ Turn key to start position; when engine starts, release key. Do not run starter for more than 5-10 seconds.
- ❑ (2 Stroke only) After engine starts, put choke to 1/2 position until the engine warms.
- ❑ If manual start is required, follow same procedure listed above.
- ❑ Warning: When engine is not at full operational temperature, do not run at wide open throttle or engine damage will occur.

Shutdown

- ❑ Turn ignition key to the "off" position
- ❑ In the event of an emergency, push the emergency kill switch.

PC12 — Four Wheeler

Pre-Start

- ❑ Check engine oil level.
- ❑ Check fuel level and fuel cock position.
- ❑ Check tires for proper inflation or damage.
- ❑ Check for tool kit and spare spark plug.
- ❑ Check overall condition, i.e., loose or missing bolts or damage.

Startup

- ❑ Open fuel vent on fuel cap (if equipped).
- ❑ Move choke to full on position for cold start and pump primer.
- ❑ Ensure kill switch and key is in the on position.
- ❑ Ensure transmission is in neutral.
- ❑ Push starter button and do not use any throttle until the engine starts.
- ❑ As the engine warms, reduce the choke.

Manual Startup

- ❑ Review appropriate steps above.
- ❑ Identify and operate manual start (kick or rope).
- ❑ Locate and engage compression release for manual start (if equipped).

Forward Travel

- ❑ Apply hand brake.
- ❑ With engine in idle, shift into first gear.
- ❑ Release brake and slowly accelerate.
- ❑ When shifting to a higher gear; let off throttle, lift up on gear shift and accelerate.

Reverse Travel

- ❑ Ensure transmission is in neutral.
- ❑ Put shift lever in reverse and slowly accelerate (Suzuki).
- ❑ Press reverse button, apply hand brake and shift foot lever (Honda).
- ❑ Release brake and slowly accelerate.

Shutdown

- ❑ Turn ignition key to off position and push kill switch.
- ❑ Close fuel vent (if equipped).
- ❑ Ensure lights are off.
- ❑ Set the parking brake.

PC14 — Chain Saw

Safety

- Make sure you have the right size saw for the job.
- Always refuel slowly to avoid spills.
- Never fill the fuel tank while the engine is running or hot.
- Check to see if equipment is for ice operation only before adding bar oil.
- Test kick back guard to ensure chain locks before starting equipment.
- PPE: double eye protection (face shield), hard hat, double ear protection, leather gloves, steel toed boots and chaps.

Operation

- ❑ Always avoid making cuts with the saw between your legs, always cut with the saw to the outside of your legs.
- ❑ Don't stand on a wood/ice and saw between your feet.
- ❑ Always stand to one side of the object you are cutting, never straddle it.
- ❑ Always keep in mind where the chain will go if it breaks; never position yourself or other personnel in line with the chain.
- ❑ Keep the chain out of the dirt; debris will fly, the teeth will be dulled and the chain life shortened considerably.
- ❑ When cutting ice make sure to stand on the main sheet of ice. Not the section to be removed.

Pre-Start

- ❑ Remove the chain guard.
- ❑ Check all fluid levels (fuel is mixed gas). Use no bar oil in saws marked " For Ice Only "
- ❑ Check the plug wire for snugness.
- ❑ Check the chain tension.
- ❑ Check for loose nuts, bolts and bar condition.
- ❑ Check chain brake.
- ❑ Ensure hearing protection and chaps are in place prior to start up.

Startup

- ❑ If engine is cold, close the choke.
- ❑ Set run/stop control to start.
- ❑ Demonstrate safe starting, handling and cutting techniques.

Shutdown

- ❑ Set run/stop control to stop.
- ❑ Replace chain guard.

PC15 — Fast Tank

Safety

- There are many pinch points to avoid during assembly.
- Safety glasses, steel-toed boots and gloves are required during assembly.

Operations

- ❑ What are the purposes and advantages of Fast Tanks?
- ❑ Describe three different types of Fast Tanks available to the Member Company SRT.
- ❑ Describe situations where each of the three types would be used.
- ❑ Where are the Fast Tanks stored, ready for deployment in your area?

Assembly

- ❑ Explain the essential steps to assemble each type of the Fast Tanks.
- ❑ Check metal framework for damage.
- ❑ Check fabric for holes or abrasions.
- ❑ Prior to assembly, lay out all pieces in order.
- ❑ Explain precautions taken to protect against loss of recovered product.

PC16 — Ice Auger

Pre-Start

- ❑ Identify type of engine (2 or 4 cycle) and fuel (straight gas for 4 cycle or mixed gas for 2 cycle) required.
- ❑ Check fluid levels.
- ❑ Check spark plug wire connection.
- ❑ Check on/off switch operation (if equipped).
- ❑ Check the throttle control.
- ❑ Check auger cutting edge.
- ❑ Check auger connecting pin/bolt.

Startup

- ❑ Use two people to start and operate the ice auger.
- ❑ Move on/off switch to on position (if equipped).
- ❑ Ensure fuel tank vent is completely open.
- ❑ Move choke to proper position (use primer (one or two pumps), if equipped).
- ❑ Move throttle to 1/2 open; pull starter rope with a smooth and rapid motion.
- ❑ As engine warms, open choke.
- ❑ When moving from hole to hole, shut off engine.
- ❑ Before adding lengths of auger, remove from hole and shut off engine.

Shutdown

- ❑ Remove auger from ice.
- ❑ If equipped with on/off switch, turn off.
- ❑ If not equipped with on/off switch, put throttle in off position.
- ❑ Ensure fuel tank vent is completely closed.

PC25 — Wet Decon Van

Pre-Start

- ❑ Complete a visual inspection of the equipment looking for leaks around the generator area.
- ❑ Ensure all equipment inside of van is secured (if moving unit).
- ❑ Check all fluid levels, i.e., fuel, engine oil and antifreeze.
- ❑ Turn main breaker outside van from shore power to the off position.

Startup

- ❑ Unplug oil pan heaters and battery charger (located on right side of the unit).
- ❑ Push and hold pre-heat button for 15 seconds.
- ❑ Turn ignition switch to the run position (counter clockwise).
- ❑ Release when engine starts. If engine will not start, repeat process. If this fails, call 5246 (Fleet shop) for assistance.

Operation

- ❑ Let generator engine warm up for approximately one minute.
- ❑ Turn main breaker from off to the generator position.
- ❑ Inside the change room, raise the thermostat setting until the heater starts.
- ❑ Turn on water pump.
- ❑ Turn on hot water heater in the clean room.
- ❑ Turn on lights as required.
- ❑ Raise wind sock on outside of unit.

Shutdown

- ❑ Outside van, turn main breaker to the off position.
- ❑ Connect the shore power cord.
- ❑ Turn main breaker to the shore power position.
- ❑ Leave interior light on as a power indicator.
- ❑ Turn the ignition switch on the generator off.
- ❑ Plug in the oil pan heater and battery charger.

PC28 — Warm-Up Van

Pre-Start

- ❑ Complete visual inspection of equipment looking for leaks around generator area.
- ❑ Ensure all equipment inside of van is secured (if moving unit).
- ❑ Check all fluid levels, i.e., fuel, engine oil and antifreeze.
- ❑ Turn main breaker inside van from “shore power” to the “off” position.

Startup

- ❑ On main breaker inside of van, switch from “shore power” to “off” position.
- ❑ On secondary breaker panel, inside van, turn breaker “5” to “off” (electrical heaters).
- ❑ Between van & generator, outside, unplug engine & oil pan heaters, battery charger.
- ❑ Inside the generator compartment, turn master switch to “on” position.
- ❑ Hold “preheat” for 60 seconds. While holding “preheat”; press the start button.
- ❑ After it starts, make sure the yellow light on the “start” button stays on, when letting go of the “preheat’ button.
- ❑ Let the engine warm up for a few minutes.

Operation – Outside of Van

- ❑ Unplug van from the bullrail.
- ❑ On main breaker inside of van, switch from “off” to “generator position”.

Operation – Furnace Inside of Van

Note: Generator cannot power the inside furnace and the outside heater at the same time.

- ❑ On secondary breaker inside van, turn on breaker “1”.
- ❑ Turn on the furnace switch (near the furnace).
- ❑ It is possible the thermostat may need to be raised to get the furnace to start.
- ❑ Shutdown of the furnace is the opposite of start-up sequence.

Operation – Outside Heater

- ❑ Open inside heater duct (so heater doesn’t deadhead).
- ❑ Turn on breaker “5”, inside engine compartment. Fan will start.
- ❑ On heater control box, turn burner switch “on”.
- ❑ To shut down, turn burner switch off, but leave fan running until the heater is blowing cool air. Then turn off breaker “5”, inside engine compartment.

Shutdown

- ❑ Inside the van, turn main breaker to “off” position.
- ❑ Connect to “shore power” with cord from bullrail.
- ❑ Turn main breaker to shore power.
- ❑ Turn on lights and electrical heaters (turn breaker #5 on – secondary breaker panel).
- ❑ Turn generator ignition switch “off”.
- ❑ Plug in the engine and oil pan heater.
- ❑ Plug in battery charger. (Note: outlets are between the van and the generator.)
- ❑ Turn main breaker to the shore power position.
- ❑ Leave interior light on as a power indicator.
- ❑ Turn the ignition switch on the generator off.
- ❑ Plug in the engine, oil pan heater and battery charger.

PC29 — Mobile Command Center

Command Center Generator

- ❑ Check generator fluids.
- ❑ Ensure the power box is in neutral position.
- ❑ Ensure the power box to Command Center is in off position.
- ❑ Ensure that RED emergency shutdown button is pulled out.
- ❑ Ensure the main engine switch on the outside of generator housing is on.
- ❑ Start generator.
- ❑ Pull power switch from neutral to generator position.
- ❑ Lift power switch to Command Center to on position.

Setup

- ❑ Command Center can operate from its own generator or from shore power.
- ❑ Shore power cord is on the back left corner of the Command Center.
- ❑ Set up entry steps.
- ❑ Turn on diesel-fired furnace by turning up the thermostat.
- ❑ Check the breakers to ensure power is on throughout the unit.
- ❑ Check the fax and radio operation.
- ❑ Set observation deck and wind sock up on the Command Center roof.
- ❑ If the Command Center is on its own power, check generator fluids.

Startup

- ❑ On main breaker inside of van, switch from “shore power” to “off” position.
- ❑ On secondary breaker panel, inside van, turn breaker “5” to “off” (electrical heaters).
- ❑ Outside, between the van and the generator, unplug the engine, oil pan heaters and the battery charger.
- ❑ Inside the generator compartment, turn master switch to “on” position.
- ❑ Hold “preheat” for 60 seconds. While holding “preheat”; press the start button.
- ❑ After it starts, make sure the yellow light on the “start” button stays on, when letting go of the “preheat’ button.
- ❑ Let the engine warm up for a few minutes.

Shutdown

- ❑ Secure observation deck, wind sock and antenna.
- ❑ Shut furnace down.
- ❑ Store entry steps inside. Secure all loose items.

PC30 — 125KW Generator

Set-Up

- ❑ Do not load or unload while running.
- ❑ Unplug from bullrail.
- ❑ Check generator fluids.

Startup

- ❑ Remove plywood from front of radiator.
- ❑ Open air louver on front of 125KW building (You will not be able to open door from inside because of vacuum).
- ❑ Turn off breaker to pan and radiator heaters and battery charger.
- ❑ Turn off main breaker (red).
- ❑ Turn off 480 volt breakers (yellow).
- ❑ Turn on the timer for 24 volt lights (black).
- ❑ Turn off the voltage regulator toggle switch (green).
- ❑ Switch from shore power to generator power (white).
- ❑ Turn engine speed control (red) to idle at 1000 rpm on tachometer.
- ❑ Start the 125KW.
- ❑ Check oil pressure.
- ❑ Turn engine speed control to run at 1800 rpm (red).
- ❑ Turn voltage regulator to on position (green).
- ❑ Dial the hertz meter to read 60 hertz by using engine speed control (red).
- ❑ Dial the volts meter to read 480 volts using the voltage adjust knob (black) on main breaker box.
- ❑ Equipment can be plugged in while generator is running.
- ❑ Turn main breaker (red) to on position.
- ❑ Turn the 480 breaker (yellow) to on position.
- ❑ When all equipment is plugged in, re-check the hertz and voltage meters.

Shutdown

- ❑ Switch from the generator to shore power (white).
- ❑ Turn the main breaker to off position (red).
- ❑ Turn engine control knob to off position (red).

PC31 — Barrel Mounted Rope Mop (Electric)

Pre-Start

- ❑ Set up and secure the 55 gallon recovery drum to prevent tipping.
- ❑ Hook hose to the drum for removing recovered fluids with Vac Truck or pump.
- ❑ Mount the ringer system on the drum and secure.
- ❑ Release the spring tension on the bottom rollers.
- ❑ Thread the rope mop over the top roller and come back up between the bottom rollers.
- ❑ Return tension handles down.
- ❑ Stretch out the rope mop to full length (100 feet).
- ❑ Determine the number of pulleys to be used.
- ❑ Pulleys need to be staked off, tied off or anchored.
- ❑ Retrieve the end back to the unit.
- ❑ Tie ends together, one strap at a time, using a square knot.

Operations

- ❑ Plug motor in to 110 outlet; otherwise use a portable generator.
- ❑ To begin collection, engage the power switch to on and watch the rope for slipping.
- ❑ If slipping is occurring, turn off and unplug power source then tighten wringer tension nuts.
- ❑ Be sure to monitor the level of the recovered product and transfer as required.
- ❑ It may be necessary to herd the product to the rope at times.

Shutdown

- ❑ Release tension handles.
- ❑ Untie mop straps and feed back through the machine.

PC32 — Weatherport

Pre-Start

- ❑ Find a level location and approximate size of the tent.
- ❑ Separate all tent pieces into like-kind piles.

Ground Frame

- ❑ Select 90 degree end corner pieces and end pieces (no stubs).
- ❑ Join together with rope hooks facing the outside.
- ❑ Single stub (insert for tent rib) section is required on each side at a diagonal corner.
- ❑ Two double stub sections are required to complete the ground frame.

To Square Ground Frame

- ❑ Measure diagonal from corner to corner until distances match.
- ❑ Use spikes (in kit) to hold/strengthen frame to ground.

Set Upper Tent Frame

- ❑ Select rib section color marked red on one end, no color on the other.
- ❑ Place unmarked end into stub (insert) on sides of ground frame pointing inside.

End Assembly

- ❑ Select “T” shaped fitting; install in rib section with finger pointing inside tent frame.
- ❑ Select matching rib sections; assemble colors together with “T” fittings between rib sections.

Opposite End

- ❑ To set completed rib section into stub, insert on opposite side.
- ❑ Push down and in on rib until rib pipe is all the way down on stub.
- ❑ Repeat process on opposite end of the tent frame.

Center Rib Assembly

- ❑ Repeat end assembly instructions using “cross” shaped fitting instead of “T” shaped fitting between rib sections; ensure all protrusions are on the inside of the frame.
- ❑ Start at one end of the tent frame and install spacer pipe between each rib. If “T” and “cross” fittings are out of alignment, use spacebar to adjust fittings so that spacer slides onto fittings.
- ❑ Remember to start at one end and do one rib (arch) in sequence.
- ❑ Install end cover first (from outside) by separating end rib from spacer, looping cinch rope (seen at top center and either side of cover in small half moon cutouts) over each of the 3 fitting nipples that face inside.
- ❑ Carefully push fitting nipples back into spacer bars.
- ❑ 2-3” of cover should be overlapped on the inside of the end rib frame.
- ❑ Pull down firmly on ropes (bottom and both sides) to tighten.
- ❑ Tie one end to cleat inside corner frame.
- ❑ Take opposite end rope in hand and use foot to push down.
- ❑ Tighten end cover until desired tension is achieved.

Continued on following page...

PC32 — Weatherport (cont.)

- ❑ Tie rope to cleat on inside cover.
- ❑ Lay out the top cover along side of frame.
- ❑ Ensure ground flap is on the outside.
- ❑ Tie arch ropes to outside cleats on outside end section.
- ❑ Pull cover over frame and use cinch process to tighten end arch ropes.
- ❑ Tie securely.
- ❑ From outside/inside under the ground flap, loop rope under each hook that is sticking out from the outside of bottom side frame. Tighten and tie to cleats on the outside end of the tent frame.
- ❑ If winds are evident, place dirt, gravel, rocks or wood on the ground flap to keep wind out.

PC33 — Diaphragm Pump

Safety

- Always refuel slowly to avoid spillage.
- Never fill fuel tank while engine is running or hot.
- Never operate engine in a closed building unless the exhaust is piped outside.
- Never start or operate this pump in an area if any LELs are present.
- Do not operate pump without guard in place.
- Before operation; always make sure discharge line is clear of any debris and not deadheaded. Also open any Valves and remove any Camlock hose ends.

Pre-Start

- ❑ Check oil level in pump gear case (SAE 90 gear oil).
- ❑ Check engine oil (SAE 10w30) and fuel level (unleaded gasoline ONLY).
- ❑ Connect suction and discharge hoses and deploy.
- ❑ Remove all Camlock hose ends and open any valves on discharge line.

Startup

- ❑ Turn fuel valve to a vertical position to open the fuel passage.
- ❑ Close the choke on the carburetor if the engine is warm. It may not need to be choked (gas engines).
- ❑ Set speed control lever to 1/3 open.
- ❑ Depress decompression lever (diesel engines)
- ❑ Engage engine starter rope and pull.

Operation

- ❑ After engine starts, open choke (gas engines).
- ❑ Allow engine to warm up before increasing speed.
- ❑ Priming – these pumps are self-priming to lifts of 15 feet. To prime above 15 feet, remove the stand-pipe plug and put in approximately 1 gallon of water and retighten the plug.
- ❑ Always use the strainer on the suction hose to prevent debris from clogging the valves.
- ❑ Inlet connections must be air tight to prevent loss of vacuum.
- ❑ Vertical discharge limits (heads) for this pump is 25 feet.
- ❑ High suction lift reduces pump volume. Always locate the pump near the pumping surface.
- ❑ Suction hose must be non-collapsible.

Shutdown

- ❑ Reduce engine speed and idle for 2-3 minutes.
- ❑ Depress stop button.
- ❑ Close fuel valve.

PC34 — 12K Komara Skimmer and Power Head

Pre-Start

- ❑ Check that pump drains are closed.
- ❑ Check all fluid levels.
- ❑ Check hoses/fittings for cracks/gaskets.
- ❑ Couple hoses to disc skimmer.

Startup – Electric

- ❑ Push in “Run/Stop” fuel lever.
- ❑ Set decompression levers in down position.
- ❑ Turn the key to start.
- ❑ Let run several minutes prior to operating.

Startup – Manual

- ❑ Push in “Run/Stop” fuel lever.
- ❑ Turn ignition to on position.
- ❑ Engage starting handle.
- ❑ Pull up and hold decompression lever open.
- ❑ Crank handle 4-5 times. Release decompression while cranking.
  NOTE: Hold handle with thumb on top to avoid injury.

Operation

- ❑ Deploy disc skimmer.
- ❑ Turn disc control valve counter clockwise to increase disk speed.
- ❑ Adjust speed to optimum product recovery.

Shutdown

- ❑ Turn disc control valve clockwise to stop disc speed.
- ❑ Pull out “Run/Stop” fuel lever.
- ❑ Open drain valves only if water and no product has been run through the pump.
- ❑ Retrieve disc skimmer.
- ❑ Open hydraulic valve to relieve pressure before unhooking lines.

PC35 — 30K Komara Skimmer and Power Head

Pre-Start

- ❑ Check that the three pump drains are closed.
- ❑ Check all fluid levels.
- ❑ Check hoses/fittings for cracks/gaskets.
- ❑ Couple hoses to disc skimmer.

Startup – Electric

- ❑ Push in “Run/Stop” fuel lever.
- ❑ Set “Start-Dump/Run” lever to “Start-Dump” position.
- ❑ Set pump and disc speed controls to zero.
- ❑ Set throttle to ½ full.
- ❑ Set decompression levers in down position.
- ❑ Let run several minutes before operation.

Startup – Manual

- ❑ Push in “Run/Stop” fuel lever.
- ❑ Set pump and disc speed controls to zero.
- ❑ Turn ignition to on position.
- ❑ Engage starting handle.
- ❑ Pull up and hold decompression levers open.
- ❑ Set “Start-Dump/Run” lever to “Start-Dump” position.
- ❑ Set throttle to full.
- ❑ Crank handle f-5 times. Release decompression levers while cranking.
  NOTE: Hold handle with thumb on top to avoid injury.

Operation

- ❑ Deploy disc skimmer.
- ❑ Pull “Start-Dump/Run” lever to “Run” position.
- ❑ Turn disc speed and pump speed controls clockwise to optimum product.

Shutdown

- ❑ Turn disc and pump speed controls to zero.
- ❑ Push “Start-Dump/Run” lever to “Start-Dump”.
- ❑ Reduce throttle.
- ❑ Pull out engine stop knob.
- ❑ Open drain valves only if water and no product has been run through the pump.

PC36 — Small Gas/Diesel Portable Generators

Pre-Start Powerhead

- ❑ Check all fluids.
- ❑ Ensure AC circuit breaker is off (if required).
- ❑ Turn on the fuel valve (if equipped).
- ❑ Turn on the engine switch.
- ❑ Move choke lever to the closed position (if equipped).

Starting/Operation

- ❑ Engage compression release on diesel models.
- ❑ Pull the starter rope lightly until resistance is felt, then pull briskly.
- ❑ Move the choke lever to open position as the engine warms up (if equipped).
- ❑ Use electric start (if equipped).
- ❑ Turn AC circuit breaker “ON”.

Shutdown

- ❑ Turn the AC circuit breaker “OFF”.
- ❑ Turn the engine switch to the “OFF” position.
- ❑ Turn the fuel valve “OFF”.

PC39 — BP WOA Power Vac

Pre-Start Powerhead

- ❑ Remove the Power Vac cover.
- ❑ Check fuel level.
- ❑ Check radiator coolant level.
- ❑ Check oil level.
- ❑ Check vacuum pump lube oil tank level.
- ❑ Open fuel cock.
- ❑ Replace the Power Vac cover.

Pre-Start Suction Head

- ❑ Check suction head gaskets.
- ❑ Check for free movement of full drum release valve.
- ❑ Check condition of the drum rim and place suction head on the drum.
- ❑ Check for free movement of the pressure regulating release valve.

Pre-Start Hose & Fittings

- ❑ Check all hoses for cracks and gaskets.
- ❑ Check suction lance and nozzles.
- ❑ Couple hoses - except the high pressure stinger.
- ❑ Once water is flowing through the high pressure hose, shut the engine down and couple water stinger - your pump is primed.

Starting/Operating

- ❑ Set throttle to 1/2 speed.
- ❑ Turn on the battery isolator.
- ❑ Insert the ignition key.
- ❑ Turn key counter-clockwise to preheat (glow lamp reddens at proper temp).
- ❑ Turn key clockwise and start. Let run for 30 seconds for oil pressure to rise.
- ❑ Ensure pump lube oil level at sight glass reads 30-40 dpm. Adjust as necessary.
- ❑ Set throttle at operating setting marked on cover.
- ❑ Remove the vacuum hand lance hose from the suction head.
- ❑ Cover the hand lance hose coupling with the board attached. DO NOT use your hand!
- ❑ Check the vacuum gauge for a reading of 400 bar. Loosen locknut and adjust if necessary.
- ❑ Maximum vacuum pressure for a drum is 450 bar and 700 bar for hopper use.
- ❑ Remove cover and replace the hand lance hose.
- ❑ Check the end of the hand lance for vacuum.

Shutdown

- ❑ Vent suction lance (suction air).
- ❑ Allow engine to run 2 minutes at low rpm.
- ❑ Shut off throttle to stop engine.
- ❑ Turn off ignition switch and battery isolator. DO NOT attempt to kill engine with ignition switch.
- ❑ Release pressure in the water stinger.

PC40 — Barrel Vac Units

Setup

- ❑ Thread suction elbow into the fill opening on the drum lid and tighten.
- ❑ Attach the suction hose to the inlet elbow.
- ❑ Connect a suitable attachment to the other end of the suction hose.
- ❑ Locate gasketed vacuum tube on the underside of the transfer tank over the vent opening in the drum lid.
- ❑ Lower the unit until the gasket sits on the vent opening and the 2 legs at the opposite end of the tank rest on the drum lids.
- ❑ Connect a minimum 1/2" flexible high pressure air hose to the inlet valve on the Venturi Power Unit. Normal operating pressure is 60 psi when running.
- ❑ Pressure regulator should be adjusted as needed. Unit requires 35 standard cubic feet of free air at 60 psi for rated performance.

Startup

- ❑ Turn on the air supply.

Operating Tips

- Auto Vac Liquid Level Cut Off: This device is float activated, opening a valve to brake the vacuum when the fluid level in the drum reaches maximum level. When the drum is emptied, the cutoff is reset by pushing down on the valve plunger on top of the cover, sealing the vent opening.
- Mufflers: All Vac-U-Max units are equipped with a muffler and main frame sound levels well within OSHA standards. Mufflers are subject to clogging from water or oil from the plant air supply. Muffler clogging creates back pressure and lowers suction pressure at the unit. Mufflers clogged by oil can sometimes be rejuvenated by degreasing but typically are disposed of.
- Variable Orifice: The variable orifice is similar in construction to a needle valve. It is adjusted by removing the plastic cap and using a screw driver to adjust the valve spindles. When shipped, the needle is in the maximum closed position (needle in) leaving an opening which will pass 35 cfm free air with 60 psi air pressure. When the air pressure is above 60 psi, the needle can be retractable to provide greater suction if required.

Shutdown

- ❑ Turn off the air supply.

PC41 — Underwater Lights

Pre-Operations

- ❑ Underwater lights are extremely fragile - handle them with care.
- ❑ Always inspect light and cord for damage prior to use.

Operations

- ❑ A power source with GFCI protection will be required for powering the light to guard against shock hazard.
- ❑ Underwater lights 1000 watts create a lot of heat and can be damaged unless they are submerged in water prior to being energized.
- ❑ Unplug prior to removal from the water.
- ❑ Keep all cord connections out of any puddles.

PC42 — Drum Skimmer & Power Pack

Safety

- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running.
- Never operate the engine in a closed building.
- DO NOT operate without the guards in place.

Pre-Start

- ❑ Check function of all controls:
  - » Throttle
  - » Run/Stop lever
  - » Pull starter
  - » Hose Connections
- ❑ Check hydraulic pump for leaks.
- ❑ Check fuel and oil.
- ❑ Check for damage or missing parts.
- ❑ Set “Run/Stop” lever to run position.
- ❑ Set decompression levers in down position.
- ❑ Check behind you and pull rope starter firmly.
- ❑ Let run several minutes prior to operating.

Startup

- ❑ Set throttle.
- ❑ Ensure the hydraulic control is in the “OFF” position

Operation

- ❑ Open hydraulic control valve slowly.
- ❑ Adjust hydraulic control valve to proper drum speed.

Shutdown

- ❑ Close hydraulic control valve.
- ❑ Reduce the engine speed and idle for 2-3 minutes.
- ❑ Turn engine “Off”.

PC43 — Rube Witch

Prepare For Installation

- ❑ Unlock the Rube Witch draw bar handle lock and lower the bar to the ground.
- ❑ Position a person on each side of the Rube Witch cage and lower toward the draw bar handle.
- ❑ Ensure remote throttle actuator and saw retainer latches are in the open position.
- ❑ Insert the saw ensuring that the ice deflector boot is positioned into the chain saw's saw groove.
- ❑ Ensure the brake is released before latching the saw in place.
- ❑ Engage the remote throttle actuator.

Operation

- ❑ Position 2 individuals on each side of the cage and stand unit upright.
- ❑ In Rube Witch operation, 2 people are used during starting. One holds the control levers and the other operates the start rope and choke.
- ❑ Before starting, ensure the saw is secured in the Rube Witch frame and latched in place.
- ❑ Start saw using chain saw start up procedures.
- ❑ Position an operator at the draw bar handle to control the throttle.
- ❑ Lower the saw to the desired cutting depth.
- ❑ Slowly walk backward with the saw, having a helper watch for trip hazards.
- ❑ After the first cut has been made, position the right skag in the slot that has been cut in order to use the first cut as a guide for the second cut.

Shutdown

- ❑ Have helper shut down chain saw.
- ❑ Position 2 individuals on each side of the cage and lower it to the ground.
- ❑ To remove saw, ensure that remote throttle actuator and saw retainer latches are in the open position - then remove saw.
- ❑ Position 2 individuals on each side of the cage and stand unit upright.

PC44 — Morris MI-30 Skimmer

Pre-Start

- ❑ Connect ½" hydraulic hoses.
- ❑ Check all fluid levels (fuel=diesel) on Power Pack.

On the Control Panel:

- ❑ Ensure "collect" and "reverse lever is in Neutral.
- ❑ Ensure the disc speed control is closed (clockwise rotation).
- ❑ Ensure the pump speed control is closed (clockwise rotation).

Startup – Manual

- ❑ Push starting handle into the shaft.
- ❑ Set engine stop to the run position.
- ❑ Turn decompression lever to the left and slowly turn the handle several times to lubricate the bearings.
- ❑ Turn the throttle fully left to the run position.
- ❑ With the decompression lever turned left, crank the handle 5-6 times, release decompression lever while still cranking handle 3-4 times; engine will start.
- ❑ Let engine warm up for several minutes.

Startup – Electric

- ❑ Turn throttle fully left to the run position.
- ❑ If engine is cold, turn decompression lever to the left.
- ❑ If engine preheater is installed, turn to preheat and wait 30 seconds.
- ❑ Turn the key to start; let engine run several minutes before operating.

Operations

- ❑ Put "collect/reverse" lever in the "collect" position.
- ❑ Adjust the disc speed control until discs rotate at the proper speed.
- ❑ If additional lengths of hydraulic hose are added, check the hydraulic oil level and refill if necessary.
- ❑ Test reverse control; but DO NOT adjust the disc speed control.

Shutdown

- ❑ Close disc control speed (clockwise rotation).
- ❑ Close pump control speed (clockwise rotation).
- ❑ Return throttle to the idle position and let the engine cool down.
- ❑ Shutdown engine by fully returning the throttle.
- ❑ Disconnect hydraulic hoses using sorbents at connections. Be sure to open disc control and pump control to relieve hydraulic pressure.
- ❑ After engine has cooled down, refill fuel and other fluids as necessary.

PC45 — Trash Pump

Safety

- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- Never use the pump for transferring hazardous materials.
- DO NOT operate the pump without the guard in place.

Pre-Start

- ❑ Check oil level in the pump gear case on some models – SAE 30 gear oil.
- ❑ Check engine oil – SAE 10W-30
- ❑ Check the fuel level (identify whether unleaded gas or diesel model).
- ❑ Connect the suction and discharge hoses and deploy.
- ❑ Prime the pump before starting.
- ❑ To prime, remove the stand-pipe plug, fill with water and re-tighten the plug.

Startup

- ❑ Turn the fuel valve to a vertical position to open the fuel passage.
- ❑ Close choke on the carburetor. If the engine is warm, it may not need choking.
- ❑ Set the speed control lever to 1/3 “open/run” position on diesel (reset shutdown).
- ❑ Depress decompression lever (diesel engines).
- ❑ Engage the engine starter rope and pull – or ignition, if equipped.

Operation

- ❑ After the engine starts, open choke (gas engines).
- ❑ Allow the engine to warm up before increasing the speed.
- ❑ Operational Hints:
  - » Always use the strainer on the suction hose to prevent debris from clogging the valves.
  - » Inlet connections must be air tight to prevent loss of vacuum.
  - » Vertical discharge limits (head) for this pump is 25 feet.
  - » High suction lift reduces pump volume; always locate the pump near the pumping surface.
  - » Suction hose must be non-collapsible.

Shutdown

- ❑ Reduce the engine speed and idle for 2-3 minutes.
- ❑ Depress the stop button.
- ❑ Close the fuel valve.

PC46 — Peristaltic Pump

Pre-Start

- ❑ Check all fluid levels (diesel and oil).
- ❑ Connect and secure all kamlok hoses.
- ❑ Ensure that the drive clutch is disengaged.
- ❑ Ensure that the pump body bypass valve is closed.
- ❑ Set the compression release to the start position.
- ❑ Set the throttle to the start position.

Startup/Operations

- ❑ Start engine and warm up.
- ❑ Engage the clutch on the pump and adjust the throttle as required.
- ❑ The pump may run “dry,” however, disengage clutch or shutdown engine if not pumping for long periods.
- ❑ Never operate Pump for more than 5 hours continuously. At 5 hours of continuous operation, shut pump down and let cool for 1 hour.

Shutdown

- ❑ Disengage clutch.
- ❑ Slow the throttle setting down to stop position.

PC47 — Rope Mop (Engine Driven) CSI 26D PCS

Safety Concerns

- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.

Pre-Start

- ❑ Check the engine oil and fuel levels.
- ❑ Hook the hose from the pump to the sump during training to avoid dead heading pump.
- ❑ Release the spring tension on the rollers.
- ❑ Thread the rope mop over the top roller and come back up between the bottom rollers.
- ❑ Return tension handles up.
- ❑ Stretch out the rope mop to its full length (100 feet).
- ❑ Determine the number of pulleys to be used.
- ❑ Pulleys must be staked off, tied off or anchored.
- ❑ Run the rope mop through the pulleys.
- ❑ Retrieve the end back to the unit.
- ❑ Tie ends together (one strap at a time) using a square knot.

Startup

- ❑ Set the speed control lever to run.
- ❑ Depress the decompression lever, let turn over a couple times than release.
- ❑ Engage the engine starter.

Operations

- ❑ Watch the rope for slipping. If slipping occurs, shut the engine down and adjust the tension springs by turning the tension nuts.
- ❑ Monitor the level of recovered product and transfer as required.

Shutdown

- ❑ Release tension handles.
- ❑ Untie mop straps and feed back through the machine.
- ❑ Shutdown engine.
- ❑ After cool down, refill fluid levels as necessary.

PC48 — Transrec 250

Safety

- Never service or adjust equipment alone. Personnel shall not operate or maintain equipment without the immediate presence or assistance of another person capable or rendering aid.
- Use proper lock and tag out procedures when operating or maintaining hydraulic and mechanical components of the TransRec 250.
- Before removing any hydraulic components from the TransRec 250, make sure that the pressure is vented. Do not remove any connection while the unit is operating.
- Some hydraulic fluid spillage will occur when components are removed. Place a suitable containing underneath the component to catch fluid. Dispose of fluid properly.
- When connecting hydraulic hoses, wipe fittings with a clean rag, connect Case Drain first, Return Hose second and Pressure Hose last.
- When disconnecting hydraulic hoses, disconnect Pressure Hose first, Return Hose second and Case Drain Hoses last.
- All long hydraulic hoses should be secured at appropriate intervals prior to power up to avoid hoses whipping in the event of a rupture.
- If the hydraulic hoses are disconnected, ensure that the protective caps are replaced over the un-made couplings.
- Take effective precautions to keep the hydraulic system free of contamination whenever hydraulic system is open or hose couplings are unmade.
- Take safety precautions to avoid electrical shock. Never work on energized circuitry, unless absolutely necessary.
- Hand, hearing and eye protection are required when operating and maintaining the unit.
- Visual inspection of hoses and couplings should be made for damage, distention or distortion.
- Before operating the system, special care should be taken to ensure all quick lock couplings are fully engaged and secured.
- Smoking on deck is prohibited; volatile vapors can easily ignite.
- All covers on equipment and junction boxes should remain in place except when working.

Pre-Start

- ❑ Check all fluids prior to starting.
- ❑ Ensure the fuel cell valves are in the OPEN position.
- ❑ Open hydraulic by-pass valve (See Figure 1).
- ❑ Ensure Emergency Shutoff is in neutral position (See Figure 1).

Start

- ❑ Set AMOT safety switch to the start position (See Figure 2).
- ❑ Turn start key to start.
- ❑ After engine has started, turn key to “OFF” position.
- ❑ For cold weather starting, use 2 pumps of pilot spray.

Continued on following page...

PC48 — Transrec 250 (cont.)

Operations

- ❑ Power unit must warm up 10 minutes before use.
- ❑ Remove swivel pin located at the base of the reel.
- ❑ Increase engine speed to 2000 RPM.
- ❑ Turn hydraulic control unit 138 BAR is achieved.
- ❑ Move the crane out from its parked position. Red arrows and symbols on the panel indicate the movements of the crane.
- ❑ Connect the skimmer head, (i.e. attach it to the end of the floating hose) then connect Return and Pressure Hoses.
- ❑ Adjust the weir position by using wheel on top of the floats.
- ❑ The skimmer is now ready for launching. The skimmer head is lifted up, swung out over the sea and lowered towards the surface of the water.
- ❑ Reel out the hose so that the skimmer head reaches the water and floats freely.
- ❑ Position the skimmer head towards the bend in the containment boom by reeling out the hose from the drum. (The hose is marked with tape 9 meters from the end. Stop the drum when this mark passes the tip of the crane.)
- ❑ If necessary, the hose can be reeled out a little farther. The hose is reeled out to its maximum length when the end of the hose is at the top of the drum. (This can be observed from the control deck by looking into the drum.) During skimming, it may be necessary to reel the hose further in or out.

NOTE: In free water, the ship is to move forward during unreeling. In harbor, some kind of tension is to be used.

To Reload the Skimmer

- ❑ Stop skimmer functions. Reel in hose. When end of hose reaches tip of crane, lift crane and swing skimmer in over ship's side lowering carefully to deck.
  - » Transfer System: It is possible to pump the oil collected from the collection vessel into a tanker using the TransRec.
- ❑ Detach the skimmer head.
- ❑ Attach a wire from the tanker to the end of the floating hose. Reel out the hose, winching the end into the tanker, and connect this to the cargo pipelines.
- ❑ Reel out hose until the ships have reached the required distance from each other.

Use the Local Control Panel:

- ❑ Connect the moving device by using the handle marked "mooring" while at the same time locking the handle on the drum into the "heave" position.
- ❑ Set the mooring pressure and read the figures of the manometer "mooring pressure". Connect pressure will be approximately 60-80 BAR.

Shutdown

- ❑ Clean the equipment and repair any mechanical defects and replace worn parts.
- ❑ Fill grease in all nipples.
- ❑ Lubricating points: See lubricating chart.
- ❑ Grease the spindle/spooling device.
- ❑ Apply grease to the piston rods on the cylinders.
- ❑ Check and replace transformer oil, if necessary.
- ❑ Drain skimmer head pump. (Extraction valve in the bottom of the volute casing.)

PC49 — Enviro Vac

Startup

- ❑ DO NOT load or unload with potable or gray water on board.
- ❑ DO NOT hook or unhook from power source with the plug energized.
- ❑ Setup steps outside.
- ❑ Start diesel furnace.
- ❑ Call for potable water only. It is a certified potable water system.
- ❑ Water fill is on back side; 2” camlocks.
- ❑ Ensure all valves going to the water pump are turned on.
- ❑ Turn on the wall mounted pump switch (pump will burn up).
- ❑ Turn on the 2 vacuum switches.
- ❑ Turn on power to diesel-fired hot water heater.

Demob

- ❑ Turn off power to hot water heater and drain.
- ❑ Turn off power to pump.
- ❑ Call for gray and potable water to be removed.
- ❑ Call to be winterized in the winter.

PC50 — 30KW with Power Pack

Pre-Start

- Ensure the Power Pack is hooked to the 30KW generator properly, to include the pintle hitch, safety chains and the trailer light plug.
- Check tires for proper inflation and lug nuts to ensure they are tight.
- Ensure breakers are in the off position on both units.
- Ensure the voltage regulator is in the off position.
- Inspect power cords for damage.
- Check fluid levels on 30KW generator.

Startup

- ❑ Turn on power switch.
- ❑ To start the engine, push in safety circuit bypass button while engaging the start button. Hold the safety circuit bypass in until oil pressure shows on the gauge.
- ❑ Check all engine gauges for proper operation.
- ❑ Plug the Power Pack into the 30KW generator.
- ❑ Turn on the voltage regulator.
- ❑ Turn on breakers as needed.
- ❑ Check the electrical output gauges; volts @ 480 and hertz @ 60.

Shutdown

- ❑ Shut off all breakers.
- ❑ Turn off voltage regulator.
- ❑ Let the engine run for approximately 5 minutes at lower RPMs to cool down.
- ❑ Unplug the power cord and store back on the Power Pack.
- ❑ Turn the power switch off.
- ❑ Check and refill fluids as necessary.

PC51 — SAM Office

Setup

- ❑ SAM office can operate for on its own generator or on shore power - cord is on the back end of the unit.
- ❑ Phones, internet and fax will not work without the Air-span system. Contact communications to raise the tower and engage the system.
- ❑ SAM office can use diesel fired furnace, electric wall heaters or both.
- ❑ Turn the diesel-fired furnace on by switching the breaker to on and turning up the thermostat.
- ❑ There are staging signs and stands inside on the floor.

Startup

- ❑ Switch the disconnect box on the front of the shack to the “off” position.
- ❑ Outside, between the van and the generator, unplug the engine, oil pan heaters and the battery charger.
- ❑ Inside the generator compartment, turn master switch to “on” position.
- ❑ Hold “preheat” for 60 seconds. While holding “preheat”; press the start button.
- ❑ After it starts, make sure the yellow light on the “start” button stays on, when letting go of the “preheat’ button.
- ❑ Let the engine warm up for a few minutes.
- ❑ Place the disconnect switch in the on position.

Shutdown

- ❑ Replace staging signs and stands inside.
- ❑ Turn diesel-fired furnace off.
- ❑ Secure phones in the drawers.
- ❑ Place the disconnect switch in the off position.
- ❑ Shut down generator.
- ❑ Unplug power cord from generator and wind up the power cord on the back of the SAM office.

PC56 — Vikoma SS-50 Skimmer w/HR3 Power Pack

Pre-Start SS-50 Skimmer

- ❑ Remove covers and store properly.
- ❑ Inspect skimmer body, disc banks, scrapers and hydraulic hoses for damage.
- ❑ Manually operate the skimmer float to ensure it moves freely.
- ❑ Verify the drain plug is installed in the skimmer hopper.
- ❑ Connect the skimmer discharge hose and secure the cam-loc ears.
- ❑ Connect hydraulic hoses to the power pack and ensure lock-rings are in place.
- ❑ Install hose floats as required for operation.

Pre-Start HR3 Power Pack

Note: Letters () coincide with letters on Lister HR3 Power Pack diagram.

- ❑ Check engine oil level.
- ❑ Check fuel tank level.
- ❑ Remove trapped air by priming the handle under the fuel pump (F) if needed.
- ❑ Check hydraulic oil reservoir level.
- ❑ Check fan and alternator belt condition.
- ❑ Check overall condition of hoses, fittings and wiring prior to start up.

Startup

- ❑ Verify that hydraulic and discharge hoses are connected and secure.
- ❑ Turn the fuel valve (D) to the “ON” position.
- ❑ Set the hydraulic bypass valve (G) to the “START” position.
- ❑ Push in the decompression knob (H).
- ❑ Set throttle lever (J) to one quarter throttle.
- ❑ Pull out the cold start button (K).
- ❑ Turn battery master switch (L) to the “ON” position.
- ❑ Set the ignition toggle switch (M) to the “RUN” position.
- ❑ Set the disc control to the “OFF” position.
- ❑ Press starter button (N) to start engine. Allow the engine to properly warm up.
- ❑ Set the hydraulic bypass valve (G) to the “RUN” position.
- ❑ Adjust the disc speed control (R) until discs rotate at the desired speed.
- ❑ Re-check the hydraulic oil reservoir level and refill as necessary.

Shutdown

- ❑ Move the disc speed lever (R) to the “OFF” position.
- ❑ Move the hydraulic flow control lever (G) to the “OFF” position.
- ❑ Set throttle lever (J) to the zero position and allow engine to idle for 1-2 minutes.
- ❑ Pull the engine shut off control (T) until the engine stops.
- ❑ When the engine has fully stopped, turn switch (M) to the “OFF” position.
- ❑ Switch the battery isolator lever (L) to the “OFF” position.
- ❑ Switch the fuel line valve (D) to the “OFF” position.

PC58 — 25KW Spill Buster Generator

Pre-Start

- ❑ Check the engine oil and coolant level.
- ❑ Check the fuel level.
- ❑ Ensure the main AC circuit is off.
- ❑ Open the fuel vent valve.
- ❑ Move the power transfer switch to generator power.
- ❑ Deactivate ESD system.
- ❑ Turn inside generator/shore power to generator.

Startup

- ❑ Turn black on/off switch on ESD panel to on position.
- ❑ If cold starting, push in the thermal start switch for 30 seconds.
- ❑ Turn the on/off switch to the run position.
- ❑ Turn the AC circuit breaker on.
- ❑ Check the cycle meter to ensure the generator is running at 60 cycles.

Shutdown

- ❑ Turn the main AC circuit breaker off.
- ❑ Turn the on/off/auto switch to the off position.
- ❑ Shut the fuel vent valve.
- ❑ Move inside and outside switches to shore power.

PC59 — 500,000 BTU Frost Fighter Heater in Spill Buster

Pre-Start

- ❑ Remove the cover for the heater outlets outside.
- ❑ Check the fuel level.
- ❑ Attach the heater hose trunks to the outlet.
- ❑ Turn breakers 5 and 7 to the on position.
- ❑ Turn the louver switch circuit 7 to the on position.
- ❑ Open damper to outlets.

Startup

- ❑ Turn the toggle switch on backside of heater to the manual position.
- ❑ If the heater burner does not ignite, press the red reset button.

Shutdown

- ❑ Turn the burner switch to the off position.
- ❑ Remove the heater trunks.
- ❑ After the fan has cooled down, replace the outlet covers and close the damper.
- ❑ Turn the louver switch circuit 7 to the off position.
- ❑ Turn breaker 5 to the off position.

PC60 — Alkota Pressure Washer

Safety

- Hearing Protection is required while in mechanical room.
- Wear eye protection at all times.
- Be aware of trip hazards.

Pre-Start

- ❑ The generator must be running to operate the pressure washer.
- ❑ Check that circuit 7 is in the on position.
- ❑ Open the valve at the water feed pump.
- ❑ Close the air inlet valve to the drain system.
- ❑ Turn on the pump switch.
- ❑ Close the steam and soap control knobs.
- ❑ Check all fluids, fuel, coolant and water supply.
- ❑ Disconnect the drain fitting and connect the spray wand.

Startup

- ❑ Turn the ignition key left for 20-30 seconds to preheat.
- ❑ Turn the key all the way right to start the engine.
- ❑ Check to see that the water reserve tank fills.

Operation

- ❑ Spool out and hook up desired hose length.
- ❑ Turn on the burner switch (for hot water application).
- ❑ Depress the trigger wand.
- ❑ Adjust the wand tip for desired stream.

Shutdown

- ❑ Turn off the burner switch.
- ❑ Run water through the wand until the water temperature is cooled.
- ❑ Turn the key switch off and push the kill button.
- ❑ Remove the wand and replace the drain fitting.
- ❑ Hold or secure fitting.
- ❑ Turn the air inlet valve on. Run air until all the water is out of the system.
- ❑ If traveling in cold weather, leave the air inlet valve cracked until in warm storage.

PC62 — Gelled Fuel Batch Mixer

Safety

- Fill or transfer fuel in a well-ventilated area.
- Discharge hose is equipped with an internal static wire making a second static wire unnecessary.
- Spark arrestor is installed on the engine.
- No smoking within a 50-foot radius.
- Use cotton clothing (inner and outer) exclusively while mixing.
  NOTE: If gasoline is spilled on an individual wearing NOMEX clothing, wet them down with water as the fuel soaked clothing is removed. Static electricity may build up and ignite the fuel if the fabric sparks while removing. (NOMEX) may be worn as long as they are not part of the mixing operation.
- Use caution in the application of gel on projects.
- Untrained personnel should not operate the mix-transfer system.
- Ground mix-transfer system to earth prior to use.
- Ensure the hoses are not draped over the engine.
- Do not start the engine until the suction line is open.
- Do not run the engine with the discharge lines closed for longer than 2 minutes. Fuel will bypass in the pump and generate heat.
- Do not exceed pressure rating 100 PSI.

Pre-Start

- ❑ Ensure all lines and fasteners are secure.
- ❑ Check all fluid levels.
- ❑ Ensure all engine fasteners are tight.
- ❑ Remove the engine/pump shroud.
- ❑ Ensure the pump is lubricated and all fasteners are tight.
- ❑ Ensure the dry-lock connections are clean and free moving.
- ❑ Check the manhole gasket for defects.
- ❑ Ensure the sump emergency valve is free operating.
- ❑ Ensure the 3-way valve is free rotating.

Startup

- ❑ Turn the fuel valve on.
- ❑ Set the choke.
- ❑ Pull-start the engine and advance the engine to full throttle.

Filling

- ❑ Close the circulating valve.
- ❑ Close the dry-break valve.
- ❑ Care must be taken not to introduce foreign matter into the system that might damage the pump or valve.
- ❑ Fill unit with desired fuel through the fill port. Do not exceed 250 gallons.

Continued on following page...

PC62 — Gelled Fuel Batch Mixer (cont.)

Mixing

- ❑ If mixing, weigh required quantity of gelling agent 0.1 per gallon of fuel.
- ❑ Refer to the operator's manual for valve position in different configurations.
- ❑ Turn hand crank on sifter until the gelling agent has been dispersed into tank.
- ❑ Write down time; re-circulate at full throttle for 5 minutes after gelling agent has been dispensed.
- ❑ Stop the engine and recirculate.
- ❑ Wait the duration of time required for gelling and check consistency.

Shutdown

- ❑ Clean the mix-transfer system before long periods of storage.
- ❑ Care must be taken not to introduce foreign matter into the system that might damage the pump or valve.
- ❑ Clean the sifter thoroughly and store with the mix-transfer system.
- ❑ Flush the total system with raw fuel in recirculation mode.
- ❑ Clean and flush the discharge hose in the transfer-to-torch mode.
- ❑ Start the engine and advance to full throttle and run for 5 minutes.
- ❑ To drain, place the hose reel dry-break into a waste barrel equipped with dry-break.
- ❑ Start the engine and run until the tank is dry.
- ❑ Do not let the pump run dry for more than 1 minute.
- ❑ Wipe and scrub all gelled fuel spills on the unit.
- ❑ Close all the valves to keep the hoses air tight.
- ❑ Replace the line caps and plugs and secure the manhole lid.

PC63 — Helitorch

Safety

- Fill the helitorch barrels or mix gelled fuel in a well-ventilated area.
- When filling, mixing or dispensing fuel, a ground wire must be connected from the torch to an earth ground.
- Proper PPE (cotton clothing, dust mask) must be worn when mixing fuel.
- No smoking with-in a 50 foot radius.
- Ensure a fire extinguisher is located in the mixing area.
- Ensure all mixing paddles are a non-sparking material (i.e..wood. aluminum)
- Clean up and spilled fuel immediately.

Pre-Start

- ❑ Inspect the entire unit for loose nuts and bolts.
- ❑ Inspect the electrical cord and plugs for abrasions or other damage.
- ❑ Inspect the lifting harness for loose nuts, bolts or damaged cables.
- ❑ Ensure the mixing drum is secured properly to unit.
- ❑ Ensure the dry-lock valve is operating properly.
- ❑ Ensure the electrical switches are in the off position.
- ❑ Ensure all guards are in place.
- ❑ Inspect the mixing drum, mixing paddles and lid.

Filling/Mixing

- ❑ Ensure the unit is connected to an earth ground.
- ❑ Close the dry-lock valve.
- ❑ Fill with desired fuel.
- ❑ Weigh required quantity of gelling agent; 0.1 per gallon of fuel.
- ❑ Add gelling agent at a moderate rate while mixing.
- ❑ Continue mixing while gel is forming.
- ❑ If material contains any lumps, break by hand to ensure maximum dispersion.

Test Procedure

- ❑ Notify all personnel involved that the helitorch is being tested.
- ❑ Turn on the ignition switch and make sure pump switch is off.
- ❑ Activate the torch switch.
- ❑ Observe torch tip to see if a blue spark is crossing from the igniter rod to tfuel tip.
- ❑ Open valve on propane bottle so the pressure gauge reads from 5-10 PSI.
- ❑ Activate the torch switch again.
- ❑ Observe propane being ignited at torch tip; flame should fill the area around torch nozzle tip.
- ❑ Turn the ignition switch off.
- ❑ Turn the pump switch on.
- ❑ Place an empty container under the torch tip.
- ❑ Open the dry-lock valve.

Continued on following page...

- ❑ Activate the torch switch.
- ❑ Observe thickened fuel flowing from the tip.
  NOTE: Air may need to be bled from system. Open the bleed valve located on the tip assembly until air is bled and thickened fuel begins to flow. Close valve.
- ❑ Ensure the torch switch is in the off position.
- ❑ Turn on both the ignition switch and the pump switch.
- ❑ The helitorch is ready for use.

Storage

- ❑ Clean and purge all lines to be free of gelled fuel.
- ❑ Clean the torch frame, barrel and connecting assemblies.
- ❑ Turn off all the valves.
- ❑ Turn off all the switches.
- ❑ Ensure the lifting harness and electrical assembly is stored with the helitorch.

PC64 — EOA Electronic Scare-Away

Startup

- ❑ Where is it located?
- ❑ Mount the speaker bracket to the roof of the vehicle with the 4 suction cups.
- ❑ Plug into the control box.
- ❑ Plug control box into the cigarette lighter.
- ❑ Turn on the power.
- ❑ Insert the cassette.
- ❑ Choose proper function and volume.

Shutdown

- ❑ Remove the cassette.
- ❑ Turn off the power.
- ❑ Disconnect from the cigarette lighter and speakers.
- ❑ Store control box and speaker bracket in the EOA Wildlife Trailer.

PC65 — EOA Net Launcher

Startup

- ❑ Where is it located?
- ❑ Check the net launcher bolt for proper operation and lubrication.
- ❑ Leave the net launcher bolt open.
- ❑ Screw 4 - 12” black net container bolts into the end of the net launcher.
- ❑ Slide in the orange net container and attach the retaining strap.
- ❑ Insert 4 - 6” stainless net weights into the 12” bolts that hold the net container.
- ❑ Insert 1 - 308 caliber blank round.

Net Launcher is now ready to fire - keep pointed in a safe direction.

Shutdown

- ❑ Check to ensure the net launcher is NOT loaded.
- ❑ With the firing bolt open, remove the orange net container.
- ❑ Remove 4 - 12” black net container bolts.
- ❑ Use the net launcher cleaning kit if necessary.
- ❑ Return the net launcher to the storage container.
- ❑ Store in the EOA Wildlife Trailer.

PC66 — T-Disc Skimmer & Hyde Power Pack

Pre-Start T-Disc Skimmer

- ❑ Remove the covers and store properly.
- ❑ Inspect skimmer body, disc banks, scrapers and hydraulic hoses for damage.
- ❑ Connect the discharge hose and secure the cam-lock ears.
- ❑ Connect the hydraulic hoses and ensure the lock-rings are in place.
- ❑ Install hose floats as required for operation.

Pre-Start HYDE Power Pack

- ❑ Open the site glass valve and check the fuel level; close valve.
- ❑ Check the coolant level.
- ❑ Check the hydraulic reservoir level.
- ❑ Check the engine oil level.
- ❑ Check the fan and alternator belts.
- ❑ Check the battery connections.
- ❑ Open the fuel valve to the engine inside the LH vent door.
- ❑ Open the hydraulic valve inside the RH vent door.
- ❑ Verify that pump and disc controls are in the “NEUTRAL” position.

Startup

- ❑ Verify that the throttle is set to the lowest setting.
- ❑ Turn the key to the “ON” position.
- ❑ Activate the Glow Plug toggle switch until the light goes off.
- ❑ Turn the key to the “START” position.
- ❑ Allow the engine to operate 3-5 minutes at 1000 rpm before placing under load.
- ❑ Increase the throttle to the desired operating speed.
- ❑ Engage the disc control (RH) lever.
- ❑ Engage the pump control (LH) lever.
- ❑ Adjust the engine speed to set desired pump/disc speed.
- ❑ Monitor the hydraulic fluid level at the sight glass.

Shutdown

- ❑ Disengage the disc control (RH).
- ❑ Disengage the pump control (LH).
- ❑ Reduce the engine speed to idle and allow cooling for 3-5 minutes.
- ❑ Turn the ignition key to the “OFF” position.
- ❑ Close the hydraulic valve inside the right hand louvered vent door.
- ❑ Close the fuel valve inside LH vent door.
- ❑ Close the fuel valve on the sight glass.
- ❑ Disconnect the hydraulic lines and install the protective caps in fittings.

PC68 — KRU 15KW Spill Buster Generator

Pre-Start

- ❑ Check the engine oil level and coolant level.
- ❑ Check the fuel level.
- ❑ Ensure the main AC circuit breaker is in the “OFF” position.
- ❑ Open the fuel vent valve.
- ❑ Move the power transfer switch to generator power.
- ❑ Deactivate the ESD system.
- ❑ Turn inside generator/shore power switch to generator.

Startup

- ❑ Turn the black on/off switch on the ESD panel to the “ON” position.
- ❑ If cold starting, push in the thermal start switch for 30 seconds.
- ❑ Turn the on/off/auto switch to run.
- ❑ Turn the AC circuit breaker to the “ON” position.
- ❑ Check the cycle meter to ensure generator is running at 60 cycles.

Shutdown

- ❑ Turn the main AC circuit breaker “OFF”.
- ❑ Turn the on/off/auto switch to the “OFF” position.
- ❑ Shut the fuel vent valve.
- ❑ Move inside and outside switches to shore power.

PC69 — Self-Propelled Snow Blower

Safety

- Wear proper PPE (hearing protection, safety glasses, non-skid boots).
- Keep hands and feet out of the tracks, blower chute and auger blades.
- Keep the blower chute pointed away from people.
- Turn the snow blower off before freeing any blockage from auger blades, blower chute or tracks.
- Turn off the snow blower and let it cool before refueling.
- Read all caution stickers.

Pre-Start

- ❑ Check all fluid levels.
- ❑ Ensure that both tracks are on properly.
- ❑ Ensure that there is no blockage in the auger blades or snow chute.

Startup

- ❑ Place the throttle lever in neutral.
- ❑ Turn the fuel lever to the on position.
- ❑ Turn the key switch to the on position.
- ❑ Put the speed lever in the choke position.
- ❑ Pull the starter grip.
- ❑ Return the speed lever to the slow position.

Operation

- ❑ Set the transmission release lever to engage.
- ❑ Set the blower chute to the proper angle.
- ❑ Engage the drive clutch.
- ❑ Slowly move the throttle lever to the forward position.
- ❑ Engage the auger clutch.
- ❑ Slowly increase the speed lever to the necessary speed.
- ❑ Transmission release lever can be set to the release position, when necessary, to disengage the tracks.

Shutdown

- ❑ Disengage the auger clutch.
- ❑ Place the speed lever to slow.
- ❑ Place the throttle lever to neutral.
- ❑ Disengage the drive clutch.
- ❑ Turn the key switch to the off position.
- ❑ Turn the fuel lever to the off position.
- ❑ Put the transmission lever in the release position.

PC70 — Vessel Deck Equipment

Safety

- Required PPE
  - » PFD
  - » Hard hats (crane operations)
  - » Gloves
  - » Safety glasses
  - » Steel toed boots

Capstan Safety Considerations

- Ensure that lines are coiled and properly stowed.
- Ensure that adequate deck space is available around the capstan.
- Do not stand in the bight of lines under tension and position yourself out of the line of fire should a line part.
- Ensure that all crew on deck are aware that the capstan is coming under load.
- Hold lines leading into the capstan a minimum of 24" from the capstan head to prevent line surges from pulling hands into the roller.

Capstan Operations

- ❑ Energize the circuit breaker for the hydraulics to the capstan.
- ❑ Take 3-4 wraps around the capstan head.
- ❑ Ensure that lines on both sides of the capstan are clear and free of pinch points.
- ❑ Operate the capstan with either the foot switch or valve depending on the vessel.

Anchor Safety Considerations

- Ensure that lines are coiled properly prior to deployment.
- Do not stand in the bight of the line as it is payed out and the anchor set.
- Lines under tension present many hazards; watch your position and do not get your hands in pinch points.

Anchor Operations

- ❑ Energize the circuit breaker to the hydraulic system.
- ❑ Ensure that the dog/latch is operable prior to deploying the anchor.
- ❑ Check all shackles, rigging and inspect the anchor line for damage prior to deployment.
- ❑ Verify the water depth and line scope for anchoring.
- ❑ Make sure the vessel is at a stop or backing slowly so that it does not pass over the anchor during deployment.
- ❑ Ensure that the anchor line has chafing gear or is chocked where it passes over the side of the vessel.
- ❑ Set the dog/latch on the anchor to prevent accidental payout of line.
- ❑ Instruct the captain to back slowly to ensure that the anchor is set properly.
- ❑ Check anchor regularly to ensure that chafing gear is in place and that it is holding fast on the bottom.

Continued on following page...

PC70 — Vessel Deck Equipment (cont.)

Crane Safety Considerations

- Hard-hats must be worn at all times while crane operations are under way.
- Inspect all rigging prior to lifting.
- Notify the rest of the crew prior to lifts as vessel stability may be affected when loads are swung over the side.
- Tag lines must be used on all loads.
- DO NOT SIDE LOAD THE CRANE UNDER ANY CIRCUMSTANCES!
- DO NOT USE THE CRANE AS A TAG LINE FOR SKIMMERS OR OTHER DEPLOYED EQUIPMENT!

Crane Operations

- ❑ Energize the circuit breaker for the hydraulic system.
- ❑ Review the load weight and verify that the rigging is sized properly for the load.
- ❑ Review load chart on the crane for allowable boom angles/length for the lift.
- ❑ Review the crane signals that will be utilized prior to lifting.
- ❑ Lower lift cable and raise the boom out of the cradle (if applicable).
- ❑ Ensure the boom is clear of the cradle prior to swinging the crane over the load.
- ❑ Ensure that deck is clear of tie-down lines and the crew has an escape route if the load should shift during lifting.
- ❑ Ensure that crane boom is centered over the load prior to lifting.
- ❑ Put tension on the crane line and lift the load 2-3" to determine if it is balanced and that it will not swing dangerously as the vessel rolls.

PC71 — Vessel Operations

Safety

- Personal Flotation Devices shall be worn at all times while on deck of vessel.
- All crew and support staff shall receive a Vessel briefing on the location and procedures for operating emergency equipment prior to departure.
- Prior to departure, a Float Plan must be filed via Fax to ACS Base stating departure time, route and names of personnel on board.
- Ensure that all lines and loose equipment are properly stored prior to departure.
- Inspect overall condition of vessel, tie-up lines, and anchor system.

Pre-Start Procedures

- ❑ Go through vessel light off procedures and enter required information in vessel log.
- ❑ Check all fluid levels including engine oil, transmission oil, hydraulic oil and coolant.
- ❑ Visually inspect engine compartment for loose belts & wires, hose condition and engine leaks.
- ❑ Check bilge for liquids. Remove any sheen prior to discharging. Do Not Discharge from Engine room bilge accept in an Emergency.
- ❑ Switch on the battery isolator switches located in the engine room (Normally left on).

Startup

- ❑ Energize power at breaker panel if equipped with Micro Commanders, ensure that transmissions are in neutral and throttle is set to lowest setting.
- ❑ Start both engines and allow them to warm up.
- ❑ Set breaker switches to the “ON” position.
- ❑ Check gauges and indicator lights for system status.
- ❑ Switch on all navigation and communications equipment (PC72 Vessel Coms/Nav).

Operation

- ❑ Ensure all crew are wearing the appropriate safety gear for the task and conditions.
- ❑ Ensure that all deck cargo is lashed down appropriately.
- ❑ Evaluate wind and current directions prior to letting go of tie-up lines.
- ❑ Let go spring lines, if applicable, then stern and bow lines.
- ❑ Engage transmissions and throttles and maneuver away from the dock or barge.
- ❑ Observe no wake zones around other vessels and equipment.
- ❑ Observe wind and current conditions prior to approaching tie-up area.
- ❑ Set spring line, if applicable, then stern and bow lines.

Shutdown

- ❑ Allow engines to cool for 3-5 minutes.
- ❑ Shut down all systems such as running lights, heaters and wipers.
- ❑ Shut down all electrical equipment such as radar, GPS, depth finder and radio.
- ❑ Turn off all breaker switches.
- ❑ Turn off key switches.
- ❑ Verify storage of loose equipment.
- ❑ Ensure that vessel is fueled, serviced and ready for re-deployment.
- ❑ Complete vessel log , remove yellow and pink copies and turn in to Marine Lead
- ❑ Close Float Plan with ACS Base.

PC72 — Vessel Communications/Navigational Aids

There are six pieces of navigation and communications equipment on each of the larger ACS vessels. The smaller vessels are equipped with some or all of these items as well. These items include:

- Marine Depth Sounder
- Marine Radar
- Global Positioning System (GPS)
- Marine VHF Radio
- ACS OS Spectra Radio
- Marine HF/SSB Radio

The objective of this Proficiency Check is to familiarize the students with the equipment and to ensure that they will be sufficiently knowledgeable in the power up/power down, setup, configuration, and operation of the systems. In addition, they will learn to rely on the data they provide in order to safely navigate the waters of the North Slope both inside and outside of the Barrier Islands.

It is imperative to shut power down on each individual electronic component before shutting power off at the breaker panel.

Specific goals for each item include:

Marine Depth Sounder

- Demonstrate the basic operation and setup for the depth sounder.
- Interpret the data provided using the advanced functions of Threshold Control and Automatic Bottom Tracking.
- Demonstrate the ability to adjust the depth sounder Gain Control and Range selection functions.

Marine Radar

- Demonstrate power up and stand-by function.
- Demonstrate the basic operation of the system including adjustment of the gain and A/C SEA controls.
- Demonstrate how to measure and interpret range and bearing information.
- Demonstrate how to reduce interference and clutter, and how to interpret navigational data.

GPS/Chart Plotter

- Demonstrate the setup and configuration functions of the GPS
- Demonstrate how to use the operational flow chart.
- Demonstrate which Fix/Compass functions and Datum to use.
- Demonstrate the use of Cartography and navigation functions.
- Demonstrate the ability to interpret the displays from each system and make course adjustments.
- Demonstrate use of MOB function

Continued on following page...

PC72 — Vessel Communications/Navigational Aids (cont.)

Marine VHF Radio

- Demonstrate the basic functions including on/off, volume control, squelch and channel selection of the radio.
- Demonstrate how to use the scan and memory functions.
- Demonstrate the ability to use proper radio call procedures.

ACS VHF Spectra Radio

- Demonstrate the basic functions including on/off, volume control, squelch and the two methods of channel selection.
- Demonstrate the procedures for setting up and using the scan functions.
- Demonstrate the ability to use proper radio call procedures.

Marine HF/SSB Radio

- Demonstrate the basic functions including on/off, volume, squelch and channel selection.
- Demonstrate how to use the programming and scan functions.
- Demonstrate the ability to use proper radio call procedures.

PC74 — Vikoma Fasflo

Safety

- Minimum of 2 personnel
- Personal Flotation Device required when deployed in open water along with all appropriate PPE (Hardhat required when boom truck or crane are utilized in deployment).
- Be aware of trip hazards and loose lines.
- Always stay up-stream of unit when placed in current.

Setup

- ❑ Check all connections are secure and drift pins are pinned in place.
- ❑ Inspect Fasflo for damage or tears in the boom connection junction.
- ❑ Inspect Hydroplane assembly for damage, loose bolts, and correct angle.
- ❑ Check for debris / rocks in skimmer unit and discharge pipe.
- ❑ Inspect boom for tears or damage.

Deployment

- ❑ Pre-determine water depth is sufficient to deploy skimmer (minimum depth 3').
- ❑ Place skimmer in water and secure in current (anchors or posts may be used).
- ❑ Secure all lines and assure skimmer angle is correct (water level in skimmer is at the same height as the Weir hinge).
- ❑ Adjust pontoons and / or Hydroplane as needed to obtain correct angle (skimmer unit should float slightly bow down).
- ❑ Deploy Boom and secure to skimmer (set boom angle to skimmer approx. 15 degrees).
- ❑ Attach lines to boom at skimmer mouth to prevent separation by water pressure.
- ❑ Attach suction hose to discharge pipe.

Breakdown

- ❑ Disconnect suction hose from discharge pipe (take care to prevent oil from spilling).
- ❑ Disconnect boom from skimmer unit.
- ❑ Secure unit to shore or vessel and disconnect securing anchors or post from unit.
- ❑ Remove or sling unit from open water onto support frame.
- ❑ Clean unit of debris and Decon of oil.
- ❑ Inspect unit and boom for damage.
- ❑ Package for transport.

PC75 — Six Wheeler

Pre-Ride Inspection

- ❑ Tires - check condition and pressure. Wheels - check wheel nuts, axle nuts, ensure cotter pin on axle nut is secured.
- ❑ Ensure fuel oil and coolant are filled to proper level. Turn fuel valve to on position.
- ❑ Check operation of all controls (includes auxiliary brake), brake fluid reservoir full.
- ❑ Ensure head/tail/brake lights function.
- ❑ Check drive chain condition and slack (chain slack should not exceed 1.25”-1.5”).
- ❑ Ensure the steering operates freely.
- ❑ Visually inspect for loose parts.
- ❑ Check the condition and operation of dump box bed / latch mechanism.

Pre-Start

- ❑ Check tires for proper inflation or damage.
- ❑ Check for tool kit and spare spark plug.
- ❑ Check overall condition, i.e., loose or missing bolts or damage.
- ❑ Ensure the engine stop switch is in the on position.

Startup

- ❑ Move choke to full on position for cold start; half for warm weather start.
- ❑ Ensure transmission is in neutral.
- ❑ Push starter button and do not use any throttle until the engine starts.
- ❑ As the engine warms, reduce the choke.
- ❑ Once engine has warmed check engine stop switch function

Manual Startup

- ❑ Review appropriate steps above.
- ❑ Identify and operate manual start (pull rope).

Forward Travel

- ❑ Apply hand brake.
- ❑ With engine in idle; shift gear lever from neutral (N) into high (H) or low (L).
- ❑ Release brake and slowly accelerate.
- ❑ Polaris 6x6 has an automatic transmission; there is no gear shifting required.
- ❑ NOTE: Do Not Shift Transmission Lever from Low (L) to High (H) while in forward motion! STOP the machine: shift to Neutral (N), then shift to High (H).

Reverse Travel

- ❑ Ensure transmission is in neutral.
- ❑ Put shift lever in reverse (R) and slowly accelerate.
- ❑ NOTE: Polaris ATVs have a Reverse Speed Limiter system. To obtain full reverse power, depress Override Switch.
- ❑ WARNING: Never activate Override while throttle is open as loss of control may result. Stop ATV: depress Override and accelerate slowly.

Continued on following page...

PC75 — Six Wheeler

Shutdown

- ❑ Stop ATV and place transmission in neutral.
- ❑ Set the park brake.
- ❑ Ensure lights are off.
- ❑ Turn ignition key to off position.
- ❑ Turn fuel supply valve to off position

PC76 — Sykes Pump

Safety

- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- DO NOT operate the pump without the belt guard in place.

Pre-Start

- ❑ Place pump in a level position.
- ❑ Set rear out rigger on ground
- ❑ Check engine oil level, top off if necessary.
- ❑ Check vacuum pump oil level, top off if necessary.
- ❑ Check fuel level, top off if necessary (Diesel Fuel Only).
- ❑ Connect and position suction and discharge hose. (Avoid hose stress, sharp bends).
- ❑ Assure pump intake petcock sump valve is closed.

Startup

- ❑ Check that decompression lever is in RUN position.
- ❑ Check that engine is free to turn without obstruction.
- ❑ Check that engine control level is in the START position.
- ❑ Turn key switch in a clockwise direction and hold until engine fires then release.

Operation

The Sykes pump is self governing and self priming. Once pumping operations have begun an operator must remain on standby and monitor pumping operations.

Shutdown

- ❑ Engine may be HOT, use gloved hand to shutdown.
- ❑ Move control lever counter clockwise to STOP position.
- ❑ Once engine has stopped, ensure the electrical start switch is in off position.

PC78 — LORI LSC-3 Brush Skimmer

Safety

- Mounting of skimmer requires use of vessel crane. Hard Hats are required.
- Be aware of pinch points when mounting skimmer unit on side of vessel.

Skimmer Setup

- ❑ Set rigging for level pick.
- ❑ Ensure mount receivers on bulwarks are securely attached.
- ❑ Locate receiver pins and have ready to install.
- ❑ Attach tag line to outer eye on skimmer.
- ❑ Set skimmer unit into position and secure stainless steel pins with hitch pin.
- ❑ Secure the tag line to aft cleat on bulwarks.
- ❑ Ensure float is properly secured to boom arm.
- ❑ Attach forward stay line to shackle eye on float.
- ❑ Lower boom to water w/o skirt; slide boom end connector into receiver on skimmer.
- ❑ Raise boom arm, slide boom end connector into receiver on float. Working aft; tie off skirt to boom arm as you go.
- ❑ Slide boom end connector into receiver on skimmer.
- ❑ Lower boom to water, position forward of skimmer using forward stay line to deploy.
- ❑ Guide forward stay line through chock eye and secure to cleat.
- ❑ Attach 3" cam-loc hose from Desmi pump to mini barge or other tankage.

Hydraulic Hook-up

- ❑ Attach two hoses for brushes to brush control lines on vessel.
- ❑ Attach the three hoses for the Desmi pump to the pump control lines on the vessel.
- ❑ Ensure all hydraulic connectors are tightly secured to the ring marking.
- ❑ Bring vessel power to 1100 RPMs to allow use of hydraulics.
- ❑ Turn on skimmer control breaker in wheel house.
- ❑ Test function of brushes with brush control valve.
- ❑ Test function of Desmi pump with pump control valve.
- ❑ Note that brush control valve must be cracked a bit to sense a load to run just the Desmi pump. Pump will not operate without brush hooked up and slightly engaged.

Operation of Skimmer

- ❑ Optimum skimming speed is approx. 1 to 2 knots.
- ❑ Brush and pump speed should be monitored and adjusted as required.

Shutdown

- ❑ Secure vessel hydraulics.
- ❑ Disconnect hydraulic lines ensuring sorbents are available.
- ❑ Retrieve boom arm and boom. Loosen forward stay line, allow boom arm to drift back toward stern.
- ❑ Slide boom end connector up and out of skimmer receiver using hay hook.
- ❑ Pull Boom Arm forward with stay line, raise boom, remove skirt, and stow.
- ❑ Lower Boom Arm, disconnect from skimmer, bring on board and stow.
- ❑ Remove skimmer from side of vessel with crane.
- ❑ Report any malfunctions for repairs.

PC79 — Mini-Barge Operations

Barge Operation Skill

Captains must be proficient with all barge deck operations. This includes all equipment associated with filling and decanting as well as towing configurations.

Safety Concerns

- These barges fully loaded can weigh upward of 100,000 lb. The inertia created by the weight of the barge can be massive.
- The barge will not stop on its own! All hands are to stay out of pinch points of barge/vessel.
- Barge layout
- Hazards associated with barges
- Cleats
- Davit
- Hatches
- Equipment storage
- Hose fittings, location, and purpose

Deck Operations

- ❑ 2" Trash pump (decanting)
- ❑ Hose hook ups, and location
- ❑ Barge capacity indicator location
- ❑ Fill operations

Towing Operations

- ❑ On the Hip (side of Vessel)
- ❑ Towing (off stern)
- ❑ Pushing (off bow)

PC80 — Walosep W-I Skimmer w/ HYPU

Safety Concerns

- Hearing protection required
- Safety glasses

Pre-Start Inspection and Procedures

- ❑ Check all fluids - engine oil, hydraulic oil, fuel
- ❑ Connect and lock hydraulic hoses (hoses only hook up one way)
- ❑ Open by-pass valve in neutral
- ❑ Close Speed control valve
- ❑ Connect suction and discharge hoses

Startup Procedures

- ❑ Set priming pump valves
  - » Open valves 1 & 2
  - » Close valve 3
  - » Fill primer tank with water
- ❑ Start engine and allow to warm up
- ❑ Set RPM to 2000

Operation

- ❑ Close by-pass valve #4.
- ❑ Start skimmer by engaging rotor control to the down position
- ❑ Set rotor to 16-20 RPM with speed control valve
- ❑ Engage priming pump by moving handle to the down position
- ❑ Use priming pump speed control valve for flow control. When product discharges into tank, the main pump can be started.
- ❑ Close valve 1 & 2.
- ❑ Open valve 3.
- ❑ Engage main pump by moving handle to the “UP” position.
- ❑ Use speed control valve for pumping rate.

Light Oil Lubrication System

- ❑ Fill tank on bottom of power unit with either diesel or emulsion breaker (diesel will lubricate rotor and hoses to make pumping easier).
- ❑ Connect hose from hypu to skimmer head.
- ❑ Use hand pump to dispense fluids as necessary.

Shutdown

- ❑ Disengage main pump by moving handle to the neutral position
- ❑ Disengage rotor control by moving handle to the neutral position
- ❑ Lift skimmer higher than power unit and re-engage main pump to drain the system
- ❑ Set engine to idle
- ❑ Open by-pass Valve # 4
- ❑ Shut down engine and check all fluids. Fill as necessary.
- ❑ Drain main pump
- ❑ Disconnect all hoses, coil up and connect ends together when possible

PC83 — Leaf Blower

Safety Concerns

- Hearing protection required
- Safety glasses

Pre-Start

- ❑ Check fuel level. This is a 2 cycle engine and uses mixed gas. (Most are 24:1)
- ❑ Check spark plug wire connection
- ❑ Check on and off switch operation
- ❑ Check throttle control for proper function
- ❑ Check condition of pull rope, ensure it is not frayed

Startup

- ❑ Insure proper connector is on end of blower
- ❑ Move on and off switch to on position
- ❑ Move choke to on position
- ❑ Move throttle to 1/4 position, pull starter rope with smooth rapid motion
- ❑ As engine warms up, move choke to off position, increase RPM's as needed

Shutdown

- ❑ Move throttle to idle position
- ❑ Move on/off switch to off position

PC89 — Wells Cargo

Prior to Moving

- ❑ Unplug all trailers before leaving bullrail.

Setup

- ❑ Back up with truck and lower trailer onto pintle hitch.
- ❑ Place locking pin in place on pintle hitch.
- ❑ Hook up both safety chains and make sure that they will not drag.
- ❑ Plug in trailer lights.
- ❑ Use 4-way flashers to test all lights and turn signals.
- ❑ Ensure all contents in van are secure for travel.
- ❑ Inspect frame for cracks, breaks, bends, etc.
- ❑ Check tires for proper inflation.
- ❑ Inspect axles.
- ❑ Check rear trailer jacks before moving trailer.
- ❑ Demonstrate ability to back and tow trailer.

ALWAYS USE A SPOTTER WHEN BACKING!

PC90 — Bird Scare Cannon

PPE

- Safety Glasses
- Hearing Protection
- Leather Gloves
- Nomex Coveralls

Safety

- Always use hearing protection
- Never operate on a structure
- Always place Scare-Away Cannon on flat ground
- Use only original pressure reducer valve
- Always point Scare-Away Cannon in a safe direction
- Never walk in front of Scare-Away Cannon
- Never point at anyone or stare down cannon

Operations

- ❑ Ensure weep hole on barrel extension is facing down
- ❑ Ensure bolts holding barrel extension to barrel are tight
- ❑ Connect to propane bottle (Do not turn on till ready to fire)
- ❑ Ensure pressure reducer is mounted label side down to let water drain from weep hole
- ❑ To increase firing frequency, turn handle counter-clockwise
- ❑ To decrease firing frequency, turn the handle clockwise
- ❑ Slowly open the valve on propane bottle
- ❑ If striker goes off and no detonation occurs, shut off the propane and stand clear for 5-10 minutes
- ❑ To prevent accidental detonations bleed remaining fuel by disconnecting rubber tubing from needle valve

Shutdown

- ❑ Turn off propane
- ❑ Wait 5-10 minutes before disassembly

PC91 — Destroil 150

PPE Requirements

- Hearing protection
- Eye protection
- Steel toe boots
- Protective gloves (task specific)

Hazard Analysis

- ❑ High pressure in air and hydraulic lines.
- ❑ Auger dangers include pinch points, crushing, loose clothing hazards and stored energy. (NOTE: Auger may be operational in both forward and reverse).
- ❑ Always operate skimmers with protective grate in place over augers.
- ❑ If used with a crane use tag lines to control skimmer head.
- ❑ Monitor for leaks and spills.
- ❑ Noise level requires hearing protection.

PC for SKWR-0011

- ❑ Hook hydraulic hoses from HYPU to skimmer.
- ❑ Hook air hoses from compressor to skimmer float when applicable.
- ❑ Hook discharge hose from skimmer to storage.
- ❑ Make sure grate is in place over auger.
- ❑ Test auger.
- ❑ Adjust weir height with air floats and mechanical floats to oil/water interface.

PC for HYPU-0014

- ❑ Check fluids - oil and hydraulic.
- ❑ Return stop lever to “RUN” position (located under fuel solenoid).
- ❑ Push “START” button.
- ❑ For hand start:
  - » Compression release located by oil fill cap.
  - » Hand crank located by battery.
- ❑ Adjust throttle to 2000 rpm.
- ❑ Engage hydraulic lever (move lever towards power pack forward, away for release).

PC92 — Walosep W-4 Skimmer

Safety

- Hearing protection
- Eye protection
- Steel toe boots

Hazard Analysis

- ❑ High pressure lines
- ❑ Rotating equipment
- ❑ Chemical exposure
- ❑ When used with crane, use tag lines

Pre-Start

- ❑ Check all fluid levels and fill as required.
- ❑ Hook up hydraulic hoses from power pack to skimmer. Hoses only hook up one way.
- ❑ Open hydraulic by-pass valve.
- ❑ Ensure all direction handles are in neutral position.
- ❑ Ensure speed regulation valves are open 1/2 turn.

Startup

- ❑ Start engine and allow to warm up.
- ❑ Set engine RPM to 1800 to 2000 RPMs.
- ❑ Close hydraulic by-pass valve.
- ❑ Open skimmer direction valve (rotor). Adjust to approximately 10 RPM.
- ❑ Open screw pump regulating valve to approximately 2/3 full open.
- ❑ Start pump with direction valve. If pump does not start quickly, alternate between forward and reverse until it does.
- ❑ Priming the screw pump is accomplished by reversing the direction valve for approx. 30 seconds. This fills the pump through the back up valve. Pump until fluid reaches the media hose. The skimmer is now ready for operation.
- ❑ Adjust screw pump capacity speed in relation to the oil available with the speed control valve. Note: Adjust pump rate so no clear water zones appear around the starter. If pump housing becomes clogged, reverse screw pump direction to clean it.

Oil Skimming in Heavy or Light Oil

- ❑ Activate floatation cylinder with the stator direction valve.
- ❑ Stator can be lifted ~12 in. Frame and float can be lowered ~6 in.
- ❑ Adjust skimming speed so that oil is concentrated in the center.
- ❑ Adjust pumping rate to amount of available oil.

Shutdown

- ❑ Stop screw pump by moving direction valve to neutral.
- ❑ Stop skimmer by moving rotor handle to neutral.
- ❑ Lift skimmer out of the water and pump out remaining liquid.
- ❑ Open hydraulic by-pass valve.
- ❑ Close all speed regulating valves, and then open 1/2 turn.
- ❑ Set engine RPM to idle. Cool down for 5 minutes.

PC95 — Tucker Sno Cat

Safety

- Vehicle is VERY top heavy and high off ground. Use extreme caution on side slopes.
- Wear seat belts and safety glasses.
- File a route plan with Security and Environmental before leaving road system and perform a radio check.
- Be sure that you have all survival supplies needed for trip duration.
- Be ready for any weather and delays that could be encountered.

Pre-Start

- ❑ Check fluid levels. (oil, transmission fluid, coolant, fuel, and battery)
- ❑ Check general condition and housekeeping
- ❑ Check engine compartment for leaks, hose condition, loose wiring, etc.
- ❑ Check track condition, tension wheel spindles for cracks, tears and broken welds.
- ❑ Check installed drip pan for any fluids.
- ❑ Check transmission breather tube to make sure it is not frozen shut.

Operation

- ❑ Turn on Master Switch.
- ❑ Start vehicle and allow it to warm up.
- ❑ Check all gauges for proper operating zones.
- ❑ Check operation of radios and navigation equipment.
- ❑ Ensure that there is a valid tundra travel permit and check with Environmental before doing any unnecessary tundra travel.
- ❑ Always have unit moving when using the steering. (failure to do so will result in damage to steering system)
- ❑ Always stop before engaging differential locks.
- ❑ Always engage rear differential lock, then engage front differential lock.
- ❑ Always return transmission to neutral before setting parking brake to prevent transmission damage.
- ❑ Always use parking brake when parked and disengage before travel resumes.
- ❑ When stopped, set engine high idle at 1200 rpm.

Shutdown

- ❑ Always idle engine for 5 minutes before shutting down.
- ❑ Turn off all lights, switches and electronic equipment.
- ❑ Shut engine off.
- ❑ Turn off master switch.
- ❑ Clean out tracks and suspension of snow or dirt.
- ❑ Inspect drip pan and around vehicle for leaks.
- ❑ Inspect for any loose or hanging items from vibrations.
- ❑ Close out route plan with Security and Environmental.
- ❑ Report any problem with unit to SRT.
- ❑ Complete Tundra travel permit route map.

PC96 — LORI Skimming System with a Barge

Safety

- Deploy and recover equipment utilizing barge-based cranes and ground tackle.
- Hard hat, safety shoes, eye protection and flotation device will be worn on deck.
- Hearing protection will be worn while operating and around skimming equipment.
- Emphasis on safe line handling and seaman ship skills when mooring and unmooring vessels and mini barges during lightering operations.
- Pre-deployment briefing must be conducted.

Ro-Boom 2000 Deployment

- ❑ The boom is deployed from the stern of the barge.
- ❑ A 5/8" diameter line with painted black end is shackled & secured to boom tow end.
- ❑ The tow end is used as the attachment point of the boom for the tow vessel.
- ❑ The towline is pre-reeved through the 5/8" block which is attached to the barge free board forward of the skimmer deployment area.
- ❑ The tow vessel positions itself forward of the skimmer area.
- ❑ The rigger tending the towline secures it to a cleat painted a corresponding color.
- ❑ Boom deployment can be accomplished simultaneously on both port and starboard.

Ice Deflection System Deployment

- ❑ The ice deflection system will be rigged during boom deployment.
- ❑ The crane operator positions the ice deflector near the edge of the deck so the wire guide pennants can be inserted through the hinge pipe and bracing arm.
- ❑ The colored coded blocks with 3/8" line reeved through them are shackled and secured to the corresponding colored pad eyes or rods on the ice deflector.
- ❑ The working ends are shackled and secured to the color corresponding location on the perspective piece of equipment.
  - » Yellow = outboard LORI boom riding line.
  - » Red = LORI tow line and bridals.
  - » Blue = inboard LORI boom riding lines.
- ❑ The DOP and the hydraulic hoses are connected to the LORI skimmer.
- ❑ The crane block is attached to the ice deflector and lifted into position.
- ❑ Once the ice deflector is lifted over the side of the barge, it is slowly lowered down until it engages into the deflector support pins attached to the side of the barge.
- ❑ Secure the hinge pipe section and brace arm.
- ❑ Attach chain come-along to the wires and tighten the cables firmly into position.
- ❑ Once all the fastening wires have been secured, the hoisting sling can be disconnected from the crane and secured.

LORI Skimmer Deployment

- ❑ Remove the lifelines and stanchion from the barge outboard of the LORI.
- ❑ Attach a tending line to the starboard aft corner of the LORI to assist in controlling the skimmer while being hoisted.
- ❑ The riggers tending the lines will move forward of the skimmer.
- ❑ As the skimmer is entering the water, the rigger tending the blue line will heave around until the inboard deflection boom is fully deployed.

Continued on following page...

PC96 — LORI Skimming System with a Barge (cont.)

- ❑ Rigger then secures line through chock to corresponding colored cleat at deck edge.
- ❑ Rgger controlling skimmer tending line will pull the skimmer along side the barge.
- ❑ Once the skimmer is alongside the barge, detach the hoisting slings from the crane.
- ❑ The riggers tending the yellow and red lines will then heave around on their lines and place the skimmer into position.
- ❑ The red line needs to be adjusted to take the strain and act as the primary towline for the skimmer.
- ❑ The red and yellow lines need to be secured through the open chocks to the corresponding color-coded cleat.
- ❑ With all primary lines secured, the tending line for hoisting straps can be secured.
- ❑ Once the skimmer is in the water and operating, the lifeline chains will be replaced until the skimmer is retrieved back to the barge.

Skimmer Retrieval

- ❑ With the barge still making ½ knot headway, the yellow and red lines are to be slacked and the load of the skimmer transferred to the blue line.
- ❑ Once the LORI is alongside the barge, the towing vessel operator is notified to bring the barge dead in the water.
- ❑ The barge lifeline chains will be lowered at the skimmer retrieval location.
- ❑ Once skimmer is alongside barge, crane will be attached to hoisting straps.
- ❑ Once the crane has taken the load of the skimmer, the blue line will then be slacked as the crane lifts the LORI skimmer.
- ❑ All riggers will slack their color-coded lines so that the tension is removed from the skimmer while it is being hoisted.
- ❑ Once on deck, the skimmer is to be secured.

Ice Deflection System Retrieval

- ❑ The crane is to attach to the hoisting strap for the ice deflector.
- ❑ Riggers tending the color-coded lines will stay aft of the skimmer.
- ❑ Riggers will release tension on ice deflector retaining straps and disconnect the come along.
- ❑ The retaining wires will be removed and secured.
- ❑ The red, blue, and yellow color-coded blocks will be detached from the ice deflector and the lines coiled and secured.

Ro-Boom 2000 Retrieval

- ❑ The towing vessel will allow the boom and tending line to slack.
- ❑ The rigger tending the black color-coded line will slack the line.
- ❑ A boat hook will be used to retrieve the line and bring the line aboard to be tended aft to the boom retrieval reel.
- ❑ Once the end of the boom is aboard, the black color-coded line will be disconnected from the boom.
- ❑ The working end of the line will be taken forward on the barge back to the area where it was secured during recovery operations.
- ❑ The working end will be made off to the cleat and the remaining line coiled and secured.

PC97 — Mini-Barge Lightering Procedures

Safety

- All offloading will be accomplished by trained personnel under the direction of the Barge Person in Charge (PIC).
- The following PPE will be required during offloading procedures:
  - » Protective Clothing
  - » Eye Protection
  - » Hearing Protection
  - » Hard Hat
  - » PFD
  - » Respirator (as required)
- Handling of mooring lines and equipment is done safely with proper care taken around mooring lines under load.

Pre-Operation

The following procedures will be followed prior to commencing any fluid transfer operations:

- ❑ The PIC of the receiver and the PIC on the mini barge will be determined.
- ❑ A Declaration of Inspection will be filled out by both PICs.
- ❑ Communications will be established between the receiver PIC, the PIC on the mini barge and the power unit operator.

Setup

The following procedures will be followed prior to commencing any transfer operations:

- ❑ All discharge and hydraulic hoses must be checked to ensure they are properly attached and in good operating condition.
- ❑ Hose connection locations to the receiver's piping systems will be directed by the receiver PIC.
- ❑ The DESMI pump will be lowered to the deck of the mini barge and attached to the lowering davit.

Offloading

Offloading will be conducted in accordance with the receiver's Oil Transfer Procedures. The following steps will be taken:

- ❑ Start the Power Pack according to manufacturer's instructions.
- ❑ Connect the pump sling to the lifting wire and position the pump over the tank opening.
- ❑ Lower the pumps into the product until it is partially submerged and secure the lifting wire.
- ❑ Start the pump at low rpm. The rpm's gradually increased to check for leaks and proper flow.
- ❑ As the tank level drops, the pump will continue to be submerged below the product level, enough so it does not cavitate.
- ❑ When pumping is completed, the pump will be returned to storage location.
- ❑ To minimize contamination on the barge decks, a drip pan will be placed under the pump when moving to the next tank.

Continued on following page...

PC97 — Mini-Barge Lightering Procedures (cont.)

- ❑ Once the mini barge has been emptied, the pump will be retrieved and secured to the handhold inside the tank.
- ❑ The transfer hose will be disconnected and blanked off on both sides. Hydraulic lines will be disconnected and all hoses attached to the pump will be coiled and attached to the handhold inside the tank.
- ❑ Discharge and hydraulic hoses from the receiver will be returned and secured.
- ❑ The pump will remain on the mini barge and in containment for the next use.

Final Disassembly

Pumps will be placed in plastic bags and removed from the mini barge. The pumps will then be taken to the decontamination area. All hoses will be blanked off and secured until they can be decontaminated.

PC99 — Foxtail Skimmer with Henrickson Power Pack

Safety

- Hand, eye and hearing protection required.
- Operation of skimmer requires use of vessel crane. Hard hats required.
- Be aware of pinch points and overhead loads.
- Use tag lines.

Pre-Start

- ❑ Remove cover and turn over to use as a tank.
- ❑ Hook up hydraulic hoses.
- ❑ Hook up product transfer hoses from skimmer to pump to tank.
- ❑ Ensure hydraulic controls are in neutral position.
- ❑ Check fuel and hydraulic fluid levels and fill as required.
- ❑ Open hydraulic bypass valve.
- ❑ Check engine oil level - fill as required.
- ❑ Place throttle in the start position.
- ❑ Ensure cooling fan belt is in place and in good condition.

Startup

- ❑ Start engine and allow to warm up.
- ❑ Move throttle to run position.

Operation

- ❑ Hoist skimmer and place vertical adhesion bands in the oil. Use caution not to kink or stretch any hoses.
- ❑ Close hydraulic bypass valve.
- ❑ Operate skimmer. Monitor bands to ensure they do not get tangled.
- ❑ Operate pump and skimmer at speeds to work together. Never allow the pump to run dry.

Shutdown

- ❑ Stop the skimmer.
- ❑ Stop the pump when skimmer is empty.
- ❑ Open the hydraulic bypass valve.
- ❑ Reduce engine speed to idle and allow to cool for 10 minutes before shutting down.
- ❑ Clean and re-stow the skimmer and hoses. Replace cover.
- ❑ Check and fill fuel and oil as needed.

PC100 — Atlas Copco XAS 160 Air Compressor

Safety

- Hearing and eye protection required.
- Ensure all hoses and fittings are in good working condition.
- Ensure all hose connections are fully engaged and locked and lock wired if required by type of fitting.
- Never use compressed air to remove dirt, dust, etc. from person or clothing.

Pre-Start

- ❑ Check engine oil level and fill as needed.
- ❑ Check unit fuel level and fill as needed.
- ❑ Check air compressor oil level. If low; notify a maintenance technician for assistance; tank may be under pressure and could cause injury.
- ❑ Ensure air supply valves are closed.

Startup

- ❑ Turn on master switch (toggle switch).
- ❑ Press and hold oil safety override switch.
- ❑ Press starter switch.
- ❑ After engine obtains oil pressure, release oil safety override switch.
- ❑ After engine is warmed up, press compressor operate switch (blue button) to engage air compressor.
- ❑ Open air supply valves slowly to ensure hoses and fittings will hold air pressure.

Shutdown

- ❑ Close air-supply valves.
- ❑ Turn off master switch.
- ❑ Check fuel level; fill as needed.

PC109 — Lamor-Boom Deployment and Recovery Operations

Safety Equipment

- PFD, hard-hats (crane operations)
- Gloves
- Safety glasses and steel-toed boots are required to be worn during boom operations.
- Hearing protection may be required depending on proximity to operating machinery.

Safety

- An overall understanding is necessary that boom deployment operations can be a hazardous task if all safety and operating guidelines are not correctly adhered to.
- Slips, trips and falls hazards are always present around Lamor-Boom operations.
- Ensure that you have a sufficient number of team members to safely and efficiently perform the operation and that good communications with-in your Lamor-Boom team is maintained at all times.
- Make sure each individual within the group is aware of their individual task responsibilities and the responsibilities of the rest of the team members.
- Always conduct a Tailgate safety meeting prior to operations.
- Identify all potential pinch-points associated with the Lamor-Boom operations including the reel rotation mechanism.
- NEVER attempt to step across the Lamor Boom, as it is being deployed or retrieved, ALWAYS walk around.
- Always use proper lifting techniques and have adequate manpower.
- Ensure that radio communications have been established and agreed upon between the PIC, Deployment Team Leader, and Tow Vessel.

Pre-Operation

- ❑ Check all fluids in associated hydraulic power unit. The Power Pack is a dual-purpose unit. The unit provides hydraulic power to the Lamor Boom-reel and as well providing air inflation for the boom pillows for deployment or suction to remove air from the pillows during retrieval. This is accomplished by switching the cam lock hose from the discharge air to the suction air on hydraulic power unit. The Power pack can also be used to power additional hydraulic equipment such as DOP pumps using the auxiliary hydraulic connections and controls.
- ❑ Visually inspect entire unit for any leaks, damage, or belt failures.
- ❑ Ensure that all hydraulic controls are in the “Neutral” position.
- ❑ Attach Hydraulic remote control unit.
- ❑ Turn Battery master switch to the “On” position.
- ❑ Start unit. Depress “Murphy Switch” and engage starter with the key. After unit starts, the oil pressure light will turn off and the pressure will stabilize at 9 Bars. Allow unit to warm up for 3-5 minutes @ 900-1000 RPMs. CLOSE Plexiglas gauge cover prior to operation, as this will interfere with the hydraulic controls if left open.
- ❑ After unit has been sufficiently warmed-up, bring up to operating speed of 1500-1700 RPMs and commence boom deployment.

Continued on following page...

PC109 — Lamor-Boom Deployment and Recovery Operations (cont.)

Deployment

- ❑ Ensure that the tow bridle and 1 inch line are securely attached to the end of the Lamor Boom. The unit operator will begin paying the boom out onto the deck using the system hydraulics. Initially the boom will require manual assistance in feeding to the stern rollers. Continue paying out the boom until the first three pillows are lying on deck. Inflate the pillows using the Lamor Inflation Tool. The Lamor inflation tool is used to open the cap, inflate the pillow, and to re-secure the cap. It is important to ensure that the cap is securely closed after inflating the pillow to avoid deflation as the pillow passes over the stern rollers. This is accomplished by taking an extra 1/8 turn to ensure that the cap is snug.
- ❑ Remove the chains from atop the stern roller and prepare to pass the towline off to the towing vessel. It is important that this line is led under the outboard face wire used to connect the tugboat to the barge.
- ❑ After the towing vessel has received the towline, made it fast, and begins to take up the slack; commence paying out the boom until the next three pillows to be inflated are on the deck. Stop the boom reel, inflate the pillows, secure the cap and payout until the next three pillows requiring inflation are on deck. It is critical that that Stern Roller operator and Boom Reel operator maintain constant visual contact and communications throughout the deployment process. This will ensure that a synchronized operation of paying out three pillows at a time, stopping, and filling is maintained, resulting in a safe, smooth, and efficient deployment of the Lamor Boom.

Cross Bridle Connections for J Configuration and V Configuration

- ❑ The Barge master will direct the crew in the location and placement of the cross bridle system. Location and placement will depend on the amount of boom deployed and the configuration being used.
- ❑ After all boom has been deployed from the reel and inflated, secure the end of the boom to the deck with pelican hooks to ensure the boom will remain on deck while the boom is being released from the reel. Attach the tow bridle to the end of the boom. Attach the cable from the winch to the D-ring at the end of the tow bridle. Also attach the retrieval line to the D-ring and pay it out as the boom end is winched over the side of the barge, securing it to the stern after the boom is in position.
- ❑ This completes the deployment of the Lamor Boom System, as it relates to the operations aboard the Endeavor Barge. Skimming Exercises can now be implemented.

Boom Retrieval

- ❑ Retrieval of the boom is accomplished by reversing the general deployment procedure. The retrieval line is re-secured to the empty reel and spooled onto the reel as the deck winch line is slacked. When sufficient boom has been pulled onto the deck, the operation is halted so that the boom can be secured with the safety cable to facilitate removal of the tow bridle. After the safety cable has been secured, remove the retrieval line from the reel, remove the (4) bolts connecting the tow bridle, re-attach the (2) retrieval lines to the end of the boom and secure it to the empty boom reel.
- ❑ The hydraulic air discharge line is swapped to the suction side on the hydraulic power unit to deflate pillows as they come in.
- ❑ Commence reeling in the boom. Opening the inflation valve deflates the pillows. The inflation valves are to be secured as they boom is being spooled onto the reel.
- ❑ It is critical to ensure that the proper side-to-side tension is maintained so that the boom will lay on the reel properly.

PC113 — Action Petroleum Skimmer

Safety

- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- DO NOT operate without the guards in place.
- Be sure to use eye protection when using this equipment.

Pre-Start

- ❑ Check all fluid levels (engine oil, hydraulic oil and fuel).
- ❑ Ensure all Hydraulic controls are in off position.
- ❑ Ensure that power pack is in duck pond prior to operation.

Startup

- ❑ Connect hydraulic hoses to skimmer unit before putting in water.
- ❑ Connect 2" suction hose to skimmer unit before putting in water.
- ❑ Be sure that cam-locks are locked in place before putting unit in water.
- ❑ Adjust pontoons so that bottom of drum is no deeper than 1" in water. Adjust light products so that bottom of drum is no lower that the bottom of the product.
- ❑ Connect hydraulic lines to the power pack.
- ❑ Attach the suction hose from collection box to the storage tank.
- ❑ Push run knob on the engine to the run/start position and tighten knob.
- ❑ Turn fuel valve to down position.
- ❑ Pull the start rope till you feel strong resistance. Return to initial position.
- ❑ Push down on decompression lever. It will return automatically when recoil is pulled.
- ❑ Pull start rope.
- ❑ With the power pack running, pull the skimmer on/off knob to the On position.
- ❑ With the skimmer running adjust drum rotation rate so that the water picked up by the drum will shed off the drum prior to collecting in the collection box.
- ❑ With the skimmer running, pull the suction pump on/off valve to the On position. Let the collection box fill with 3" to 4" of product before setting speed. Adjust the speed control to keep roughly 2" to 3" of product in the collection box at all times.
- ❑ When finished with clean up, speed drum up to pick water flushing pump and lines.

Changing Skimmer Head

- ❑ Remove 4 snap pins from the mounting bracket.
- ❑ Lift the skimmer head out of water if possible to disconnect the hydraulic lines.
- ❑ Remove the wiper blade from the collection box and change with the new blade.
- ❑ Connect hydraulic lines to new skimmer head before putting the unit into the water.
- ❑ Install the new skimmer head on the mounting brackets and install snap lock pins.

Shutdown

- ❑ Be sure all hydraulic controls are in the off position.
- ❑ Lower engine speed to idle and let unit cool down prior to shutting it off.
- ❑ Remove the equipment from the water before removing the hydraulic lines.
- ❑ Place the skimmer head into a containment pit for decon.
- ❑ Check all fluids and top off prior to putting equipment away in proper location.

PC114 — Aqua-Guard Brush/Drum Skimmer & Power Pack

Safety

- Always refuel slowly to avoid spillage
- Never fill the fuel tank while the engine is running or is hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- DO NOT operate without the guards in place.

Startup

- ❑ Familiarize yourself with all the controls on the power unit:
  - » Throttle
  - » Fuel Shut Off Valve
  - » Decompression Lever
  - » Hydraulic Bypass Valve
  - » Hose Connections
- ❑ Check fuel, oil and hydraulic fluid levels
- ❑ Check for damage or missing parts.
- ❑ Hookup hydraulic hoses between the skimmer and the power pack.
- ❑ Make sure that hydraulic bypass valve is in the “ON” position.
- ❑ Open the fuel shut off valve.
- ❑ Move the throttle to “RUN”.
- ❑ Set the decompression levers in down position.
- ❑ Pull the start cord, until power unit starts.

Operations

- ❑ Close hydraulic bypass valve.
- ❑ Adjust throttle for proper rotation of the drum/brush.

Shutdown

- ❑ Open the hydraulic bypass valve.
- ❑ Move the throttle control to “STOP” position.
- ❑ Close fuel shut off valve.
- ❑ Once the unit has shut down; disconnect all the hydraulic lines.

PC116 — Air Shelter Tent

Safety

- When using “Electric Blower” observe all electrical high voltage procedures/precautions.
- Do not operate “Electric Blower” for more than 20 minutes to avoid overheating of the motor.

Pre-Start Inspection and Procedures

- ❑ Find and clear area being used for shelter setup.
- ❑ Place shelter bag upside down in area being used.
- ❑ Remove case.
- ❑ Unroll and unfold shelter.
- ❑ Stake base down.
- ❑ Connect blower or air bottle to tent fill valve (could take more than 1 air bottle).
- ❑ Connect blower to portable generator.
- ❑ Ensure intake valve on tent is open.
- ❑ Turn blower on or open air bottle valve (do not operate blower for more than 20 minutes). Air bottle requires its own hose to fill tent.
- ❑ Ensure at least one door of the tent is fully open while inflating tent. Allow inflating to continue until airframe is fully pressurized.
- ❑ Secure intake valve.
- ❑ Shelter may need to be re-filled every 4 – 6 hours.

Floor Install

- ❑ Position floor loops facing up.
- ❑ Insert first loop through grommet.
- ❑ Insert next loop through grommet and previous loop.
- ❑ Repeat previous step until floor is completely installed.
- ❑ Tie off last loop.

To Fill Floor

- ❑ Connect blower to floor inlet valve.
- ❑ Open intake valve.
- ❑ Ensure floor sides are fully inflated (floor is used a containment).
- ❑ Secure intake valve.

Floor Removal

- ❑ Detach last loop on one side or both sides of floor.
- ❑ Pull floor away from shelter frame. Loops will pull out of grommets.

Demobe

- ❑ Connect inflation hose to shelter intake valve.
- ❑ Connect inflation hose to deflate side of blower.
- ❑ Open intake valve on shelter.
- ❑ Turn blower on until all the air is removed from the airframe (do not operate more that 20 minutes).

Continued on following page...

PC116 — Air Shelter Tent (cont.)

- ❑ Place canopy and deflated airframe within the floor area of the shelter.
- ❑ Fold shelter in half, then in half again.
- ❑ Roll shelter towards intake valve.
- ❑ Place shelter in carrying case.

Items Needed/Options

- ❑ 1 accessory bag with all options
- ❑ 1 2 kw generator for fill and deflation of shelter, or
- ❑ 2 air bottles for filling the shelter, or
- ❑ 1 leaf blower for filling the shelter

PC118 — Scavenger Skimmer

Pre-Operations

- ❑ Remove cover.
- ❑ With cover on ground, top down, remove Scavenger Skimmer and float hose/cable.
- ❑ Connect supply hose (hose with red floats) to Scavenger Skimmer outlet and opposite end of hose to inlet of Transfer Pump.
- ❑ Connect float control cable to controller (3 prong). NOTE: Hoses and cables should run through side portals so top of box can be reinstalled.
- ❑ Connect discharge hose to Transfer Pump discharge side and connect end to appropriate tank or bladder for waste oil.
- ❑ If desired: connect Automatic Shut-off switch to side of controller box and secure float switch end in collection tank.
- ❑ Connect power supply.

Operations

- ❑ To start: Turn Controller Switch to “HAND” until there is fluid in supply line and then switch over to “AUTO”.
- ❑ NOTE: Automatic Shut-off switch will shut off pump when fluid in collection tank reaches shut off switch set level.
- ❑ Replace Cover on Box to protect from elements.
- ❑ Keep all cord connections out of any puddles.

PC119 — WOA 100kw Generator

Pre-Operations

- ❑ View schematic of engine/generator that is posted inside the generator trailer to become familiarized with locations of pertinent items.
- ❑ Check engine oil and coolant; coolant level can be viewed at Murphy switch sight glass.
- ❑ Confirm main breaker is in the “OFF” position. Breaker is located at foot level on the breaker panel at the front of trailer.
- ❑ If generator is to be moved from its home location, disconnect shore power cord prior to moving trailer.

Operations

- ❑ To Start: Set throttle by pulling lever towards you and tightening locking screw. Push start button and hold down until engine fires. Let warm up at low RPM.
- ❑ After warm up increase RPMs with throttle lever until the hertz meter shows 60 cycles. Hertz meter is located on front wall of engine compartment. Engine should run about 1800 RPMs.
- ❑ Make all connections to outlets at this time (connect equip. to generator)
- ❑ Throw main breaker to “ON” position
- ❑ Switch power selector from Shore to Generator. Lights will go out then return as switch is made.
- ❑ If outside are temp is above freezing or generator will be running for an extended period open the intake louvers located in the ceiling of the trailer.

Shutdown

- ❑ Throw main breaker to “OFF” position.
- ❑ Disconnect equipment from generator. At this time you may wish to plug shore power cord into power source, if available.
- ❑ Switch power selector from Generator to Shore.
- ❑ Pull engine kill switch located next to throttle lever.

PC123 — Hagglunds Track Vehicle

Safety

- Hagglunds use rubber tracks and loose traction on Ice Roads and Lakes. Use extreme caution on side slopes.
- Wear seat belts and safety glasses.
- Wear hearing protection.
- File a route plan with Security and Environmental before leaving road system and perform a radio check.
- Ensure Tundra travel has been approved before off pad travel for all projects with Environmental.
- Be sure that you have all survival supplies needed for trip duration.
- Be ready for any weather and delays that could be encountered.

Pre-Start

- ❑ Check fluid levels. (oil, transmission fluid, coolant, Fuel, and battery)
- ❑ Check general condition and housekeeping
- ❑ Check engine compartment for leaks, hose condition, loose wiring, etc.
- ❑ Check track condition, road wheels for cracks, tears and broken welds
- ❑ Turn on Wabasco Heater. Make sure circulating pump is on.
- ❑ Check air cleaner filter for ice and snow.

Operation

- ❑ Turn on Wabasco heater.
- ❑ Start vehicle and allow it to warm up. If parked outside let warm up for 15 minutes before moving.
- ❑ Check all gauges for proper operating zones.
- ❑ Check operation of radios and navigation equipment.
- ❑ Ensure that there is a valid tundra travel permit and check with Environmental before doing any unnecessary tundra travel.
- ❑ Always have unit moving when using the steering. (failure to do so will result in damage to steering system)

Shutdown

- ❑ Always idle engine for 5 minutes before shutting down to cool down the turbo.
- ❑ Turn off all lights, switches and electronic equipment.
- ❑ Shut engine off.
- ❑ Put engine covers on front and back.
- ❑ Clean out tracks and suspension of snow or dirt.
- ❑ Inspect drip pan and around vehicle for leaks.
- ❑ Inspect for any loose or hanging items from vibrations.
- ❑ Close out route plan with Security and Environmental.
- ❑ Report any tundra damage to Environmental.

PC126 — Lamor Mini Max Skimmer

Safety

- Hearing Protection
- Eye Protection
- Steel Toe Boots

Pre-Op

- ❑ Remove cover.
- ❑ Make sure brushes are free of debris
- ❑ Replace cover
- ❑ Connect hydraulic hoses
- ❑ Connect 2” suction hose

Operation

- ❑ Place unit in product
- ❑ Adjust controls on Power Pack until Best Product Recovery is reached.
- ❑ Remove plastic cover for visibility of brushes

Shutdown

- ❑ Raise unit from product while brushes are turning to clean brushes.
- ❑ Shut down hydraulics
- ❑ Shut down pump
- ❑ Remove brushes from unit and clean unit.

PC130 — Kubota RTV900

Pre-Start

NOTE: See Kubota RTV900 User Guide, Periodic Service, for Inspection protocols.

- ❑ Prior to operating vehicle, review Kubota RTV 900 Operator's manuals for safety and operational concerns. These manuals are located under the operator's seat.
- ❑ Pay attention to all Danger, Warning and Caution labels on the vehicle.
- ❑ Perform walk around inspection.
- ❑ Inspect Roll-Over Protection Structure prior to operation.
- ❑ Raise Cargo Bed
  - » Loosen hold down knob for the control lever lock plate (located next to the park brake) and slide the lock plate back.
  - » Push the control lever forward into the "float" position.
  - » Manually lift the cargo bed, install the lock mechanism onto the lift cylinder and place the control lever back into the center position.

NOTE: Cargo bed must be raised to check engine oil and transmission fluid level.

- ❑ Check brake fluid level.
- ❑ Check coolant level.
- ❑ Clean grill, radiator screen if necessary.
- ❑ Check brake and speed control pedals.
- ❑ Check parking brake
- ❑ Check indicators, gauges and meter.
- ❑ Check front and rear axle CVU-joint boots.
- ❑ Check tire inflation pressure (if tires are installed).
- ❑ Check all lights for proper operation.
- ❑ Refuel unit if necessary (Diesel fuel only).

NOTE: Inspection protocol for Mattrax can be found within the LiteFoot Owner's Manual.

- ❑ Check for loose links, lug nuts and adapter brackets.
- ❑ Check for bent adapter brackets. (DO NOT OPERATE IF BRACKETS ARE BENT).
- ❑ Check to see that the tracks are clear of debris, sticks and rocks.
- ❑ Inspect tracks for cracks, damage, excessive wear and proper tension.

Startup

- ❑ Fasten seat belt.
- ❑ Set parking brake.
- ❑ Set gear shift lever to "Neutral".
- ❑ Lock the hydraulic lift cylinder lever to the "Neutral" position.
- ❑ Push the speed control pedal down about ½ way.
- ❑ Turn the key switch to the "ON" position to use the Easy Checker™ Lamps to check the following:
  - » Parking brake light
  - » Electrical charge light
  - » Engine oil pressure light
  - » Glow plug light
  - » Hydraulic outlet (if equipped).
  - » Hazard/Turn signal (if equipped).

Continued on following page...

PC130 — Kubota RTV900 (cont.)

- ❑ If conditions are cold, turn the key to the “PREHEAT” for following duration:

Temperature	Preheat Time
Over 0° (32°F)	2 to 3 seconds
0 to -5°C (32 to 23°F)	5 seconds
-5 to -15°C (23 to 5°F)	10 seconds
Limit of continuous use	30 seconds

- ❑ Turn the key to “START” and release when engine starts. (check the Easy Checker™ lamps to ensure that all lamps are off).
- ❑ Let the engine warm up thoroughly before operating.

Operation

NOTE: Operation protocol can be found within the Kubota RTV900 user’s guide.

- ❑ Ensure that parking brake is set.
- ❑ With engine running, select travel speed and direction of travel with the range gear shift lever.
- ❑ If terrain requires 4WD; select 4WD with the level.
- ❑ Unlock parking brake and start slowly by controlling speed with accelerator pedal.
- ❑ If it is necessary to stop the vehicle, use the brake pedal.
- ❑ Immediately stop if the following occurs:
  - » The engine suddenly slows down or accelerates.
  - » Unusual noise is suddenly heard.
  - » Exhaust fume suddenly become very dark.
  - » An Easy Checker™ warning light comes on.
- ❑ Move machine forward and backward to test the steering.
- ❑ When shifting the transmission into any gear, machine must be at a complete stop.

To engage differential lock:

- ❑ Pull up on the red control knob located above the park brake lever.
- ❑ Step down on the lever located on the floor board near the operator’s left foot and release the red control knob.

To disengage the differential lock:

- ❑ Step down and release the lever on the floor.

NOTE: No matter the type of terrain or conditions of the weather, always take care when operating the vehicle. Refer to the Kubota RTV900 User’s Guide the Mattrax guide for specific instructions on how best to operate the vehicle on various terrain types and conditions.

- ❑ If left to idle, shift range gear shift lever to neutral position and set parking brake.
- ❑ Place high idle switch, (located near gear selector) into “on” position.

Shutdown

- ❑ Shift transmission into neutral and set brakes.
- ❑ Allow the engine to idle and cool down.
- ❑ After shutdown, check all fluid levels and refill as necessary.

PC132 — Breco Bird Scare Buoy

Safety

- Hand, eye, and hearing protection as well as floatation gear required.
- Be aware of back strain hoisting buoy over the railing or dropping off the swim step.

Deployment

- ❑ To turn the buoy on, on the large red button. There will be a four minute turn-on delay before the buoy produces sound. The sound level will cause serious hearing damage. Have all personnel on the vessel wear the proper hearing protection.
- ❑ Record the buoy tag number, date and time deployed, and GPS latitude/longitude.
- ❑ Buoys can be helicopter deployed but from no more than 33 feet.
- ❑ Buoys should be deployed no more than 1 mile apart.
- ❑ The batteries will provide 72 hours of use.
- ❑ Contact the communications technician immediately after deployment so that replacement batteries can be ordered and received prior to the end of the 72 hours.

Retrieval

- ❑ Retrieving the buoys is accomplished by using a handheld telemetry receiver and directional antenna. These are stored in the ACS Deadhorse warehouse at spot code B1-2 in a plastic gun case.
- ❑ The antenna consists of a fixed boom and 3 folding elements (see figure 1). Place or hold the boom perpendicular to your body with the wing nuts pointing up as shown. Swing the elements outward in order, 1, 2, 3, 4, 5, and 6; (for proper overlapping). Note that elements 5 and 6 are reversed from 1-4. Tighten the wing nuts.
- ❑ Attach one end of the antenna cable to the antenna and the other end to the receiver.
- ❑ The Telemetry receiver is preprogrammed with 10 channels. The number on the buoy denotes the channel number in the receiver.
- ❑ The receiver is operated by turning on the power with the “pwr/vol” control and setting to the desired channel using the “dial” control, adjusting the “gain” control for the proper gain (turn to the right for long range and the left for close in tracking), and sweeping the antenna side to side while listening for a tone from the buoy and while looking at the signal strength bar on the receiver. As you get closer to the buoy (around 200’) the signal from the buoy will be too strong to get any directional information..You will need to reduce the gain and turn down the volume control.

Continued on following page...

PC132 — Breco Bird Scare Buoy (cont.)

- Most of the buttons on the receiver keypad (all except the up and down arrows) are locked. The receiver can scan the different channels if you have multiple buoys deployed and want. Care should be used in setting up scan because frequency and channel setting can be changed when you unlock the keypad. To set up scanning hold the “memo” button for 5 seconds. Using the “dial” knob go through the channels pushing the “pass” button to “pass over” a channel you don’t want to scan. Notice that a small letter “P” is displayed to the left of the frequency on any channel that is passed over. To “unpass” (scan) a channel, push the “pass” button again while viewing that channel. Once you have finished setting up the scan, press the “memo” button again for 5 seconds to lock the keypad. Then activate scanning by pushing the “scan” button. To exit scan push “memo” or “clear”. If you push the wrong button at any time, turn the receiver off, back on again, and push the “memo” button again for 5 seconds. This will reload stored memory and lock the keypad.
- Once retrieved the buoys can be silenced by pushing in the red button. The buoys should be inspected for cracks in the housing and rinsed down with fresh water. If any cracks are discovered, return the buoy to ACS base for immediate disassembly.
- When all buoys have been collected, turn off the receiver, disconnect the antenna cable, fold the antenna in the reverse order from above, and replace everything in its original container.

PC136 — Rotan Internal Gear Pump

Safety

- Hearing protection must be worn.
- Pumps operation must not be done in direct area of personal.
- Never shut in lines while pump is in operation.
- Keep hands away from moving parts and high pressure lines.

Pre-Start

- ❑ Position pump in proper location.
- ❑ Make sure pump shaft moves freely.
- ❑ Check alignment of pump and motor.
- ❑ Check all bolts for tightness.
- ❑ Fill pump casing with product or water.
- ❑ Do not run pump without liquid.
- ❑ Check pump for obstructions.
- ❑ Hook up product lines and hydraulic lines.
- ❑ Use this PC in conjunction with DESMI—HT11D Power Pack PC

Startup

- ❑ Start up will be completed when PC is performed on power pack.

Operation

- ❑ Operation done by power pack.

Shutdown

- ❑ Disconnect suction line from product source and let pump purge line for 10 seconds.
- ❑ Shut down power pack.
- ❑ Disconnect product lines and hydraulic lines.
- ❑ Drain product from pump.
- ❑ Store in proper location.

PC 137 — DESMI - HT11D Power Unit

Safety

- Wear proper eye and hearing protection.
- Be aware of hot exhaust and engine.
- Use caution around high pressure hydraulics.

Pre-Start

- ❑ Check all fluid levels.
- ❑ Turn control handle counter clockwise until handle rotates freely.
- ❑ Connect hydraulic hoses to power unit and pump.
- ❑ Use this PC in conjunction with ROTAN gear pump PC

Startup

- ❑ Open the fuel cock.
- ❑ Set the engine speed lever at idle.
- ❑ Turn the key to start position.
- ❑ Start engine at low speed and allow unit to warm up.
- ❑ If pump is set up and ready to run turn control valve clockwise until it stops. (Refer to pump PC)
- ❑ After initially running pump check level of hydraulic fluid

Operation

- ❑ Adjust pumping speed by increasing engine speed.
- ❑ Watch engine for proper operation.

Shutdown

- ❑ Decrease engine speed and de-energize the hydraulics system.
- ❑ Move speed control to off position (counter-clockwise).
- ❑ Turn off the key.

PC138 — Centaur

Pre-Start

- ❑ Check coolant level.
- ❑ Check the engine oil level.
- ❑ Check the transmission oil level.
- ❑ Check the engine intake screens for debris.
- ❑ Check the battery for visible damage.
- ❑ Check the fuel (diesel) level.
- ❑ Check the throttle control.
- ❑ Check the tire pressure: 7 lbs/Summer - 20 lbs/Winter (max w/tracks)
- ❑ Turn on master switch.

Startup

- ❑ Fasten seat belts.
- ❑ Lower arm rest to activate steering.
- ❑ Ensure the transmission is in neutral and the brakes are set.
- ❑ Turn ignition switch to 1st position to activate glow plugs.
- ❑ Start engine.
- ❑ Let the engine warm up thoroughly before operating.
- ❑ Move machine forward and backward to test the steering.
- ❑ When shifting the transmission into any gear, the machine must be at a complete stop.
- ❑ If left to idle, set fast idle at preset RPM.

Shutdown

- ❑ Shift transmission into neutral and set brakes.
- ❑ Allow the engine to idle and cool down. *Turbo needs to cool down.
- ❑ After shutdown, check all fluid levels and refill as necessary.
- ❑ Raise arm rest to lock out steering.
- ❑ Turn off master switch.

PC139 — Lamor Mini Max 20 Skimming System

Safety

- Wear hearing protection
- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- DO NOT operate without the guards in place.
- Be sure to use eye protection when using this equipment.

Pre-Op

- ❑ Make sure brushes are free of debris
- ❑ Check all fluid levels (engine oil, hydraulic oil and fuel).
- ❑ Ensure all Hydraulic controls are in off position.
- ❑ Ensure that power pack is in duck pond prior to operation.

Startup

- ❑ Connect hydraulic hoses to skimmer unit before putting in water.
- ❑ Connect 3” suction hose to skimmer unit before putting in water.
- ❑ Be sure that cam-locks are locked in place before putting unit in water.
- ❑ Adjust pontoons so that skimmer will float at correct height in water.
- ❑ Connect hydraulic lines to the power pack.
- ❑ Attach the suction hose from collection box to the 3” suction hose intake fitting.
- ❑ Connect the 3” discharge hose to the power pack 3” discharge fitting.
- ❑ Turn engine key to start the power pack.
- ❑ With the power pack running, activate the skimmer brushes by turning the hydraulic control valve. Check to determine if the skimmer is turning in the proper direction.
- ❑ With the skimmer running adjust brush rotation rate so that the water picked up by the drum will shed off the drum prior to collecting in the collection box.
- ❑ Pump operation is handled automatically, pump speed cannot be adjusted.

Operation

- ❑ Place skimmer in the water to recover product.
- ❑ Adjust controls on Power Pack until Best Product Recovery is reached.

Shutdown

- ❑ Raise unit from product while brushes are turning to clean brushes.
- ❑ Shut down hydraulics.
- ❑ Lower engine speed to idle; let unit cool down prior to shutting it off.
- ❑ Remove the equipment from the water before removing the hydraulic lines, discharge and suction hoses.
- ❑ Place the skimmer head into a containment pit for decon.
- ❑ Check all fluids and top off prior to putting equipment away in proper location
- ❑ Shut down pump
- ❑ Remove brushes from unit and clean unit.

PC140 — Lamor Mini Max 30 Skimming System

Safety

- Wear hearing protection
- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- DO NOT operate without the guards in place.
- Be sure to use eye protection when using this equipment.

Pre-Op

- ❑ Make sure brushes are free of debris
- ❑ Check fluid levels in power pack prior to starting (engine oil, hydraulic oil and fuel).
- ❑ Ensure all Hydraulic controls are in off position.
- ❑ Ensure that power pack is in duck pond prior to operation.

Startup

- ❑ Connect hydraulic hoses to skimmer unit before putting in water.
- ❑ Connect hydraulic hoses to the skimmer pump before putting in the water. Three hoses must be connected; pressure, return and a case drain hose.
- ❑ Connect 3" suction hose to skimmer unit before putting in water.
- ❑ Be sure that cam-locks are locked in place before putting unit in water.
- ❑ Adjust skimmer head to recover position prior to placing in water (utilize the securing bolts found at both sides of the front of the skimmer to make the adjustment).
- ❑ Connect all hydraulic lines to the power pack.
- ❑ Energize power pack by turn on the main power.
- ❑ Set the engine throttle prior to start-up.
- ❑ Hold down bypass button and turn the engine key to start the power pack. Once running, set the throttle to desired RPMs for operation of skimmer.
- ❑ With the power pack running, activate the skimmer brushes by moving the hydraulic lever number 2. Check to determine if the skimmer is turning in the proper direction.
- ❑ With the skimmer running adjust drum rotation rate so that the water picked up by the drum will shed off the drum prior to collecting in the collection box.
- ❑ Pump operation is handled by utilizing hydraulic control lever number 1. Check pump operation by bumping the lever to see if the pump will turn freely (DO NOT RUN THE PUMP DRY, JUST BUMP THE LEVER TO SEE IF IT WILL TURN FREELY, RUNNING THE PUMP DRY WILL DAMAGE THE PUMP).

Operation

- ❑ Place skimmer in the water to recover product.
- ❑ Adjust controls on Power Pack for the skimmer and the pump until Best Product Recovery is reached.

Shutdown

- ❑ Raise unit from product while brushes are turning to clean brushes.
- ❑ Shut down hydraulics.

Continued on following page...

PC140 — Lamor Mini Max 30 Skimming System (cont.)

- ❑ Lower engine speed to idle; let unit cool down prior to shutting it off.
- ❑ Remove the equipment from the water before removing the hydraulic lines, discharge and suction hoses.
- ❑ Place the skimmer head into a containment pit for decon.
- ❑ Check all fluids and top off prior to putting equipment away in proper location
- ❑ Shut down pump
- ❑ Remove brushes from unit and clean unit.

PC141 — Lamor Rock Cleaner

Safety

- Wear hearing protection
- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- DO NOT operate without the guards in place.
- Be sure to use eye protection when using this equipment.

Pre-Op

- ❑ Make sure brushes are free of debris
- ❑ Check all fluid levels (engine oil, hydraulic oil and fuel).
- ❑ Ensure all Hydraulic controls are in off position.
- ❑ Ensure that power pack is in duck pond prior to operation.

Startup

- ❑ Connect hydraulic hoses to Rock Cleaner unit.
- ❑ Connect 3” suction hose to Rock Cleaner unit.
- ❑ Be sure that cam-locks are locked in place.
- ❑ Connect hydraulic lines to the power pack.
- ❑ Attach the suction hose from collection box to the 3” suction hose intake fitting.
- ❑ Connect the 3” discharge hose to the power pack 3” discharge fitting.
- ❑ Turn engine key to start the power pack.
- ❑ With the power pack running, activate the Rock Cleaner brushes by turning the hydraulic control valve. Check to determine if the Rock Cleaner is turning in the proper direction.
- ❑ With the Rock Cleaner running adjust brush rotation rate so that the water picked up by the drum will shed off the drum prior to collecting in the collection box.
- ❑ Pump operation is handled automatically, pump speed cannot be adjusted.

Operation

- ❑ Place the Rock Cleaner in the product.
- ❑ Adjust controls on Power Pack until Best Product Recovery is reached.

Shutdown

- ❑ Raise unit from product while brushes are turning to clean brushes.
- ❑ Shut down hydraulics.
- ❑ Lower engine speed to idle; let unit cool down prior to shutting it off.
- ❑ Remove the equipment from the water before removing the hydraulic lines, discharge and suction hoses.
- ❑ Place the Rock Cleaner into a containment pit for decon.
- ❑ Check all fluids and top off prior to putting equipment away in proper location
- ❑ Shut down pump.
- ❑ Clean unit.

PC144 — Equipment Trailer

In order to complete this PC, you must have successfully passed the operator's PC for TRK-0030, the ACS Peterbilt Tractor, outfitted for this trailer.

Prior to beginning this PC, the tractor shall be warmed up and ready for operation following a thorough pre-trip vehicle inspection.

Connecting Tractor to Trailer

- ❑ Inspect fifth wheel to ensure the plate is well lubricated and the king pin jaws are open.
- ❑ Back tractor under trailer and ensure fifth wheel jaws are closed.
- ❑ Activate the tractor parking brake.
- ❑ Fully raise the landing gear.
- ❑ Inspect glad hands and connect air and electrical from tractor.
- ❑ Inspect marker and signal lights.
- ❑ Remove wheel chocks from trailer if used.
- ❑ With the trailer brakes applied and tractor brakes released, move forward slowly to ensure the trailer has locked onto the tractor securely
- ❑ Supply air to trailer and disengage parking brakes.
- ❑ Ensure all tires on trailer are moving.
- ❑ Ensure the trailer air ride suspension is properly inflated.

Trailer Operations

- ❑ Locate the trailer on solid level ground with ample room for movement of the rear ramp assy. prior to attempting to load or unload equipment.
- ❑ Ensure parking brakes are set on both tractor and trailer. Chock the trailer tires.
- ❑ Inspect the quick couplers and connect hydraulic lines (be sure to place protective caps on coupler blanks mounted to the backboard assy. of the tractor
- ❑ Inspect the hydraulic lines for leaks, chafing, and cuts before engaging P.T.O.
- ❑ Press clutch in fully, properly engage the P.T.O. release the clutch and set engine R.P.M. to proper speed. (700-1000 rpm)
- ❑ Check lines and couplers for leaks.
- ❑ Raise the rear ramp off of the lock assembly.
- ❑ Unlock the rear ramp.
- ❑ Raise rear ramp extension to fully extended position.
- ❑ Lower rear ramp to contact the ground.
- ❑ Place the control valve for the rear ramp in the "float" position.
- ❑ Explain the importance of placing the ramp control valve in the float position before loading or unloading the trailer.
- ❑ Raise front ramp to fully locked position.
- ❑ Using the dump valve located about mid point on the left side of the trailer, dump the air from the air ride suspension prior to loading and unloading equipment.
- ❑ Explain the importance of dumping the air prior to loading and unloading.
- ❑ Demonstrate proper winch operation. Acknowledge the importance and technique for maintaining proper cable lay.
- ❑ Locate free spool valve for winch. Disengage and engage winch clutch.

Continued on following page...

PC144 — Equipment Trailer (cont.)

- ❑ Lower front ramp to flat position. (Use extreme caution if other workers are in the area as this is a severe pinch point hazard area)
- ❑ Raise rear ramp and lower ramp extension to the folded position.
- ❑ Engage the rear locking assembly and lower the rear ramp to locked position.
- ❑ Press clutch in fully and disengage P.T.O.

Securing The Load

- ❑ Inspect chains and binders prior to securing load and ensure they are rated for the load being secured.
- ❑ Demonstrate the proper techniques for securing the load.
- ❑ Acknowledge differences in the center of gravity of the load in relation to the height and type of load for placement on the trailer.
- ❑ Recognize possible precautions necessary for transporting the load.

Disconnecting the trailer from the tractor

- ❑ Ensure parking brakes are set on both tractor and trailer. Chock the trailer tires.
- ❑ Disconnect the airlines, electrical cord from trailer and store in proper locations.
- ❑ Disconnect the hydraulic lines using an absorbent to catch any drips and properly secure the hydraulic lines by connecting them back on to the coupler blanks on the backboard assy.
- ❑ Lower landing gear until the pads make contact with the ground.
- ❑ Release the fifth wheel jaws.
- ❑ Slowly pull tractor out from under trailer.

PC146 — Water Spray Trailer

Safety

- Always refuel slowly to avoid spillage.
- Never operate the engine in a closed building unless exhaust is piped outside.
- Never use the pump for transferring hazardous materials.
- DO NOT operate the pump without supply and by-pass valves open.
- Always wear hearing protection when operating this equipment.
- Never spray or point the nozzle at any personnel.
- Always use a minimum of two personnel manning the fire hose.

Filling Water Tank

- ❑ Close valves 1, 3, and 5.
- ❑ Open Valves 2 and 4.
- ❑ Fill tank to desired level. Watch level so as not to overfill.
- ❑ When tank is filled to desired level, close all valves.
- ❑ If temperatures are below freezing, turn on Webasto heater.

Webasto Heater

- ❑ Open fuel tank valve.
- ❑ Set thermostat to desired temp.
- ❑ Check beacon above control panel, should be on when heater is running.
- ❑ Do not run Webasto heater while engine is running.

Startup

- ❑ Check engine oil level.
- ❑ Check all controls; make sure there is no damage.
- ❑ Check the fuel level and open fuel tank valve.
- ❑ Close all valves with the exception of valves 3 & 4.
- ❑ Ensure pump drain is closed.
- ❑ Start engine and run at idle (1000 rpm) for 5 minutes.
- ❑ Switch engine speed control to Rated position (2100 rpm).
- ❑ Check water pressure gauge at valve 2. Pressure should not exceed 50 psi. If pressure is high, insure valve 4 is open until ready to spray.
- ❑ Make sure Webasto heater is turned off while engine is running.

Operation, Water Spray

- ❑ Hook up hose to valve 2 and leave valve closed.
- ❑ Ensure nozzle is closed on hose.
- ❑ Close valve # 4 and check pressure gauge at valve 2. Pressure should not exceed 170 PSI max. If pressure is above 170 psi, open valve 4 and get mechanical assistance.
- ❑ Open valve 2 and begin spray operations by opening hose nozzle.
- ❑ Use extreme caution when operating hose, and never leave the nozzle unattended while open.
- ❑ When not actively spraying, close hose nozzle and open valve 4

Continued on following page...

PC146 — Water Spray Trailer (cont.)

Shutdown

- ❑ Open valve 4.
- ❑ Close Valve 2.
- ❑ Reduce the engine speed to idle position and run for 5 minutes at idle.
- ❑ Shut down engine.
- ❑ Close the fuel valve.
- ❑ Close valves 3 and 4
- ❑ Open valves 1, 2, 5, and pump drain valve to clear lines.
- ❑ If tank is not drained, turn on Webasto Heater.

Drain Water Tank

- ❑ Open valve 5
- ❑ Open tank drain valve at rear of trailer.
- ❑ When tank is completely drained, open all water valves and purge system with compressed air from fitting on valve 1.

PC147 — LP/Electric Powered Pressure Washer

Safety

- Locate and read all safety decals on unit.
- Wear eye protection at all times.
- Always ensure you have adequate ventilation before operating burner assy.
- DO NOT operate the pump or burner without water supplied to unit.
- Ensure propane bottle is always secure during transportation.
- Do not touch body of burner. It will remain hot for 5-10 minutes after shut down.
- Ensure the burner unit does not have any material on or near it before igniting.
- Never leave unattended.
- Be aware of extremely high water pressure from wand tip and keep pointed away from self or others.
- Inspect electrical cord for cracks, damage or exposed wires before plugging into power source.
- Never operate unit without proper guards in place over belt and pulleys.
- This unit can be operated as a steam pressure washer and can cause severe burns – exercise extreme caution when using this feature and make sure you are using the appropriate PPE.

Attaching water supply hose

- ❑ Locate water inlet connection and securely hook up water supply
- ❑ Ensure sprayer wand and hose are securely attached.
- ❑ With the wand pointed in a safe direction, turn on water supply and inspect system for leaks.

Hooking up power supply

- ❑ Carefully inspect power cord to ensure there are no exposed wires due to cracks, damage or fraying.
- ❑ Locate a proper power source and plug in power cord.

Flushing the system

This unit has a steel coil, which after setting will cause the water remaining in the coil from the previous usage to turn brown or black. This water must be flushed from the system before start up. This procedure should be done without the spray gun tip installed to prevent clogging the gun tip.

- ❑ Ensure water supply and power are turned off
- ❑ Remove the spray gun tip from the end of the gun
- ❑ Turn on water supply.
- ❑ Turn control switch to “Pump” position to start pump.
- ❑ Run unit for 3-5 minutes to flush coil.
- ❑ Turn off pump
- ❑ Turn off water supply.
- ❑ Re-install spray gun tip.

Continued on following page...

PC147 — LP/Electric Powered Pressure Washer (cont.)

Cold water operation

- ❑ Make sure spray gun is pointed in a safe direction.
- ❑ Turn on water supply.
- ❑ Plug unit into power source.
- ❑ Turn control switch to “Pump”.
- ❑ Squeeze trigger on spray gun.

Hot water operation

- ❑ Light the pilot light following these steps:
  1. Remove LP tank from unit and move as far away as the supply line will allow.
  2. Open the valve on the LP tank.
  3. Turn the knob on the gas valve to the “Pilot” position and press and hold the knob down.
  4. After about 5 seconds, press the red igniter button (while still holding the control knob down), the igniter may need to be depressed two or three times to ignite the pilot (check the mirror at the rear of the unit to see if the pilot lights).
  5. Once the pilot is lit, continue to hold down the control knob for approximately one minute while watching to ensure the pilot stays lit.
  6. If the pilot does not remain lit, wait 5 minutes and repeat the entire process detailed above.
- ❑ With the pilot lit, move the control switch to the “Burner” position.
- ❑ Once the trigger on the spray gun is squeezed, it will take approximately 60 seconds for the water to reach a hot temperature.
  NOTE: The burner will only heat the water while the spray gun trigger is depressed. Once the trigger is released, the burner will stop firing.

Steam operation

- ❑ Turn the unloader knob counterclockwise to the minimum setting.
  At this point, the unit will now operate as a steam pressure washer. Be very cautious when adjusting the pressure and controlling the spray gun to avoid the possibility of severe burns.

Shutdown

- ❑ Close the valve on the LP tank.
- ❑ Shut the pilot valve off by depressing the gas valve control knob and turning it off.
- ❑ Squeeze the trigger and discharge the water for approximately 3 minutes to cool off the heat exchanger, hose and spray gun.
  Failure to exercise the proper cool down procedure will cause excessive wear and eventual rupturing of the high pressure hose
- ❑ Turn the control switch off.
- ❑ Squeeze the trigger on the spray gun to relieve any trapped pressure in the system.
- ❑ Secure the LP tank top the unit for transportation.

PC150 — Kepner Boom and Kepner Power Pack

Pre-Check Kepner Boom Reels

- ❑ Remove the covers and store properly.
- ❑ Inspect boom reels, frame work & level wind chain for damage.
- ❑ Connect the hydraulic hoses and ensure the lock rings are in place.

Pre-Start Kepner Power Pack

- ❑ Check the fuel tank level under the grating covering the engine.
- ❑ Check the coolant level.
- ❑ Check the hydraulic reservoir level.
- ❑ Check the engine oil level.
- ❑ Check the fan and alternator belts.
- ❑ Check the battery connections.
- ❑ Open the fuel valve to the engine.
- ❑ Open the hydraulic ball valve inside the control box.
- ❑ Verify that hydraulic controls in the gray control box and the remote control box are in the neutral position.

Startup

- ❑ Verify that the throttle is set to the lowest setting.
- ❑ Turn the key to the on position.
- ❑ Activate the Glow Plug toggle switch until the light goes off.
- ❑ Turn the key to the start position.
- ❑ Depress the starter solenoid button
- ❑ Allow the engine to operate 3-5 minutes at 1000 rpm before placing under load.
- ❑ Increase the throttle to the desired operating speed.
- ❑ Engage the deploy/receive lever.
- ❑ Engage the port & stbd. level wind lever.
- ❑ Adjust the engine speed to set desired reel or level wind speed.

Shutdown

- ❑ Disengage the reel control.
- ❑ Disengage the level wind control.
- ❑ Reduce the engine speed to idle and allow cooling for 3-5 minutes.
- ❑ Turn the ignition key to the off position.
- ❑ Close the fuel valve.
- ❑ Disconnect the hydraulic lines and install the protective caps in fittings.

PC151 — Lamor GT 185 & Hammerhead Mole Powerpack

Pre-Start Lamor GT 185

- ❑ Remove from storage box.
- ❑ Inspect pump body, hydraulic fittings and hoses for damage.
- ❑ Connect the hydraulic hoses and endure the fittings bottom out.
- ❑ Connect the discharge hose and secure the cam-lock adapter.
- ❑ Never run pump dry. Always submerge pump in water to act as a lubricant.

Pre-Start Hammerhead Mole Power Pack

- ❑ Open the inspection door on the power pack.
- ❑ Inspect entire unit for any leaks or obvious damage.
- ❑ Check the coolant level.
- ❑ Check the hydraulic reservoir level via the site glass.
- ❑ Check the engine oil level.
- ❑ Check the fuel level.
- ❑ Check the fan and alternator belts.
- ❑ Check the battery connections.
- ❑ Shut inspection door and open operator panel door.
- ❑ Verify that hydraulic pump switch is in the off position.

Startup

- ❑ Verify that the throttle is set to the lowest setting.
- ❑ Pull red engine kill switch up to the run position
- ❑ Turn ignition key counter clockwise to activate glow plugs. Hold until red light goes out.
- ❑ Start engine.
- ❑ Allow the engine to operate 3-5 min with RPM just above idle before placing under load.
- ❑ Turn pump control switch to the on position.
- ❑ Engage the pump control lever.
- ❑ Adjust the engine speed to set desired pump speed.
- ❑ Monitor the hydraulic fluid level at the sight glass.

Shutdown

- ❑ Disengage the pump control switch.
- ❑ Reduce the engine speed to idle and allow cooling for 3-5 minutes.
- ❑ Push red kill switch down to the off position.
- ❑ Turn the ignition key to the off position.
- ❑ Disconnect the hydraulic lines and install the protective caps in fittings.

PC152 — Elastec Mini Vac Skimmer MV078

Pre-Start

- ❑ Inspect entire Mini Vac unit for any leaks or obvious damage.
- ❑ Check the coolant level.
- ❑ Check the engine oil level.
- ❑ Check the fuel level.
- ❑ Check the fan and alternator belts.
- ❑ Check the battery connections.
- ❑ Inspect all controls for proper function. (i.e. throttle lever, shutdown lever, key switch.)
- ❑ Inspect secondary vacuum shutoff ball valve making sure it opens and closes.
- ❑ Engage and disengage PTO lever with engine off to ensure it is operational.
- ❑ Inspect suction hoses and camlocks for any obvious damage.
- ❑ Inspect DrumIt drum top for damage (especially sight glass and shutoff check ball).
- ❑ Inspect condition of tracks and tow bar.

Special/ Safety considerations:

- ❑ Never use Mini Vac unless it is connected to the “DrumIt”.
- ❑ Never use vacuum system without proper hose connections. This could result in foreign material and debris to be sucked into the vacuum pump causing pump damage.
- ❑ Always ensure the PTO lever is disengaged before startup.
- ❑ Never completely block suction hose or wand end. The suction of this unit can collapse a drum causing recovered material to be re-spilled.
- ❑ Never put suction end on any part of the human body.
- ❑ Always use necessary PPE.

Startup

- ❑ Hook up all hoses and install DrumIt on empty drum.
- ❑ Verify that the throttle is set to the lowest setting.
- ❑ Ensure PTO lever is disengaged.
- ❑ Turn key counterclockwise to activate glow plugs. Hold until red light goes out.
- ❑ Start engine.
- ❑ Allow engine to operate 3-5 min with RPM just above idle before placing under load.
- ❑ Engage the PTO lever.
- ❑ Increase the throttle to the desired operating speed and begin recovery.
- ❑ DrumIt drum top is designed to stop vacuum flow when drum is full. Once this happens, PTO lever should be disengaged and the full drum replaced with empty drum.

Shutdown

- ❑ Disengage the PTO.
- ❑ Reduce the engine speed to idle and allow cooling for 3-5 minutes.
- ❑ Push the shutdown lever until the engine stops.
- ❑ Turn the ignition key to the off position.
- ❑ Disconnect hoses and wand and store in proper location.
- ❑ Remove drum top and dispose of any fluids or material that has been recovered.
- ❑ Open secondary vacuum shutoff ball valve and drain/ recover any fluids that might have accumulated.

PC154 — Vikoma Duplex Skimming System

Safety

- Wear hearing protection and appropriate PPE.
- Always refuel slowly to avoid spillage using a funnel and spill liner.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- DO NOT operate without the guards in place.
- Be sure to use eye protection when using this equipment.

Pre-Op

- ❑ Make sure brushes are free of debris
- ❑ Check fluid levels in power pack prior to starting (engine oil, hydraulic oil and fuel).
- ❑ Ensure all Hydraulic controls are in off position or at Zero.
- ❑ Note: for correct operation of the hydraulic controls it is necessary always to have both the pump and skimmer circuits connected. To operate one piece of equipment only, eg. The transfer pump, either the skimmer must remain connected, or the unused pressure coupling must be connected directly to the return coupling. A short by-pass hose can be used for this purpose.

Startup

- ❑ Connect hydraulic hoses to pump and skimmer unit before putting in water.
- ❑ Connect hydraulic hoses to the power pack prior to start-up.
- ❑ All connecting/uncoupling of hose should be should be completed using drip liners.
- ❑ Inspect all cam-lock o-rings and replace as necessary.
- ❑ Connect 3” suction and discharge hoses to pump and skimmer before submersion.
- ❑ Be sure that cam-locks are locked in place before putting unit in water.
- ❑ Set the engine throttle prior to start-up position.
- ❑ With the power pack running, move the diverter valve to the “operate” position and gently open the flow/speed valves.
- ❑ (Pump is stored with 1 to 1.5 liter of motor oil. Clean before using in clean water or make sure hose is connected to tank)

Operation

- ❑ Place skimmer in the water to recover product.
- ❑ Adjust controls on Power Pack for the skimmer and the pump until Best Product Recovery is reached.

Shutdown

- ❑ Raise unit from product while brushes are turning to clean brushes.
- ❑ Shut down hydraulics.
- ❑ Lower engine speed and let unit cool down prior to shutting it off.
- ❑ Remove the equipment from the water before removing the hydraulic lines, discharge and suction hoses.
- ❑ Place the skimmer head into a containment pit for decon.
- ❑ Check all fluids and top off prior to putting equipment away in proper location.
- ❑ Floating Pump is stored with 1-1.5 liter of motor oil.

PC155 — Boom Vane

Safety

- ❑ Ensure personnel wear proper PPE: Gloves, eye protection and PFD. Waders necessary for personnel deploying and retrieving Boom Vane. Wear hard hat as required.
- ❑ Ensure security and condition of ALL lines and components before deploying Boom Vane. Use appropriate anchoring system for fast water, high-tension applications. DO NOT use light vehicles (no anchoring to pickup trucks).
- ❑ Becoming tangled in the rigging or in a bight of line could quickly drag operator into the middle of river. Use as few personnel as needed to move the Boom Vane into the water. Keep the rudder trip line pulled (spoiling the vane) while positioning the Boom Vane in the water for deployment. Once personnel are on the shore side of all lines and boom, release tension on the rudder trip line and allow Boom Vane to deploy into the current. ALL PERSONNEL are to remain to the shore side of all lines and boom when Boom Vane is deploying.
- ❑ Be cautious around mooring line; high tension has potential for severe snap back of line. Strain loads of 1500-3000 pounds have been documented on the mooring line.
- ❑ Use shackles to connect lines and components (NO carabiners)
- ❑ Rudder trip line must be manned continuously while Boom Vane is deployed.

Setting up the Boom Vane for Deployment

- ❑ Set-up shoreline anchor system for boom vane. Use adequate anchoring such as multiple anchor plates arranged in a chevron, angled in line with mooring line. Selection of anchor point must keep mooring line close to water so Boom Vane doesn't porpoise and loosen anchor plate stakes.
- ❑ Use bowline or double bowline knot ONLY for connecting lines.
- ❑ Assemble Boom Vane on shoreline for the appropriate type of deployment and side of river. As you face up-river (current coming toward you), determine whether you are deploying from the LEFT side (RED DOTS) or RIGHT side (GREEN DOTS) of the river. For LEFT side deployment, RED DOTS on float and frame will be matched to each other; red dot on horizontal stabilizer matches to frame. Use the same positioning of GREEN DOTS for deploying from the RIGHT side of river (looking up-river into current).
- ❑ Match the colored dots to secure the Primary and tail floats to ensure proper orientation. All pins should have cotter clips placed on the "Inside" of vane to avoid accidental removal by rocks or streambed.
- ❑ Properly install connector plate:
  - Stand on the shoreline looking upstream (current coming toward you)
  - Heaviest side of triangle aligned with shoreline, pointing upstream
  - Top vertex of triangle to anchor line
  - Water-side vertex to Boom Vane (with swivel for rudder control on top)
  - Shore side vertex to boom (6' line or strap connects boom bridle to Boom Vane)

Operation in Collection/Recovery Mode

- ❑ Inspect all knots, fittings, bolts and nuts before deployment. Attach boom to Boom Vane connector plate. Maintain a line on the free end of boom but do not anchor boom to shore.

Continued on following page...

PC155 — Boom Vane (cont.)

- ❑ Move Boom Vane into water with rudder trip line pulled (retrieval mode).
- ❑ Once all personnel are clear of Boom Vane, release rudder trip line and allow Boom Vane to move into river current. Ensure that anchors and lines maintain security throughout deployment and that all personnel remain clear.
- ❑ Determine the optimal length and angle of mooring line, amount of boom required, and location for boom anchor. Determine the need for tag lines between boom connections and shore.
- ❑ Retrieve Boom Vane and secure free end of boom to shoreline anchoring system. Attach and anchor tag lines as needed. Check all connections again before allowing Boom Vane to fly into current.

Operation in Deflection Mode

- ❑ Attach boom to Boom Vane connector plate. Anchor boom to shore upstream of Boom Vane location. Attach anchor line to Boom Vane downstream of the Boom Vane location. (No anchor/mooring line is shown in above picture but one is recommended for stability and security.)
- ❑ Follow the procedures outlined above for safely deploying the Boom Vane.
- ❑ Determine the optimal length and angle of mooring line, amount of boom required, and location for boom anchor. Determine the need for tag lines from boom connectors to shore. Retrieve Boom Vane with rudder trip line to make any necessary adjustments

Retrieval and Disassembly

- ❑ Keep rudder trip line far enough upstream to prevent tangling with rigging.
- ❑ Demonstrate control of Boom Vane as it is recovered so it does not slam into shore.
- ❑ Retrieve Boom Vane and remove from water. Properly disassemble and store.

PC156 — MegaSecur Dam

Safety

- Ensure personnel wear proper PPE:
  - » Gloves
  - » Eye protection
  - » PFD. Waders may be necessary for personnel deploying and retrieving MegaSecur Dam.
  - » Wear hard hat as required.
- MegaSecur Dam is heavy and awkward to carry. Use team lift and proper lifting technique when moving rolled dam to deployment site.
- The dam must be unrolled and carried by several people to position it in the stream. Use caution when walking on uneven and soft surfaces. High winds can make the dam very difficult to carry unrolled.
- When deployed, the dam is capable of backing up a significant amount of water. This can cause erosion of the banks at the edges and high water pressure in the middle of the dam. Personnel should not stand on the downstream side of the dam when it is deployed or being retrieved.

Deployment

- ❑ The MegaSecur Dam is designed to create a calm pool (for a collection area) from a small, shallow stream or it install behind the pocket of a collection boom to reduce entrainment. An ideal location has a shallow, accessible stream with moving water (too shallow or too fast to operate a skimmer). Once the dam is deployed, a collection site can be established in the calm pool behind it. The dam itself is NOT used to contain or collect oil.
- ❑ Carry the dam to the deployment site rolled. Properly orient the dam using the picture printed in the outside to ensure correct deployment. Unroll the dam and position it in the stream with the gusseted pockets facing into the current flow. Position the entire dam with the gussets folded flat before allowing water to fill the gusseted pockets. (Once the pockets are filled with water it will be too heavy to move without draining it.) The anchor flap should be walked to eliminate air pockets between dam and stream bed. Rocks can be used to help hold dam in place for deployment.
- ❑ Depending upon the streambed shape, roughness and current velocity, it may be necessary to anchor the bottom of the dam to the streambed and banks.
- ❑ The dam may also be deployed partway across a stream or river behind a collection site to reduce entrainment of oil. Anchors will be required in this configuration to prevent dam from washing away.

Retrieval and Storage

- ❑ Dam may be “failed” at one end and turned out of the stream flow. One end should remain secured to prevent dam from washing downstream. Maintain control of the dam as the water is draining from it. Personnel should not stand on the downstream side of the dam when it is deployed or being retrieved.
- ❑ It may be necessary to use the web handles and “dump “ or pull the water out of the pockets to remove from the stream
- ❑ Unroll the dam in a clean area to clean any residual mud, gravel and debris from it. Rinse and dry the dam thoroughly before rolling it for storage.

PC160 — Kubota Generator (diesel)
Model #GL11000-USA-TM/Diesel Engine D722

Safety precautions

- Never touch moving parts on generator.
- Do not use if battery fluid level stands below the lower mark.
- Exhaust gas is a poison hazard (do not run indoors)
- Electric shock hazard. (do not service machine while running)
- Fire hazard, (keep away from flammable materials)
- Pay special attention to generators warning labels.
- Do not remove radiator cap while engine is hot
- Engine has extremely hot exhaust & surfaces.
- NEVER refuel while engine is running.
- Work must be conducted by certified personnel only.

Pre-Operation

- ❑ Before checking fluids or servicing make sure unit is off and on level ground.
- ❑ Check for oil and coolant leaks.
- ❑ Check cooling air inlet and outlet for obstructions or clogging
- ❑ Check radiator fins for clogging
- ❑ Check fan belt tension
- ❑ Check engine oil level
- ❑ Check coolant level.
- ❑ Check generator grounding
- ❑ Check fuel level

Operation

- ❑ Read safety manual before start up.
- ❑ Always turn the circuit breaker to the off position before start up.
- ❑ Check all wiring and connectors.
- ❑ Terminal cover is equipped with safety devices to detect the opening and closing condition of cover. Safety switch is located on the terminal cover. If you turn the key to start with terminal cover open, it will not activate.
- ❑ Turn off all switches on electrical devices.
- ❑ Turn off the circuit breakers on the control panel.
- ❑ Ensure fuel level is set to the open position.
- ❑ Insert the key into the main switch and turn the key on.
- ❑ Check that the battery charge lamp and oil pressure lamp are on.
- ❑ Turn key to preheat position until the glow indicator goes off.
- ❑ Turn the key to the start position and release when engine starts.
  DO NOT RUN STARTER MOTOR MORE THAN 10 SECONDS
- ❑ Let engine warm up for 10 minutes with no load.
- ❑ If below 14 degrees F warm engine up for 20 minutes with no load.
- ❑ Check to see that the battery charge lamp, oil pressure lamp and water temperature lamp are off.

Continued on following page...

PC160 — Kubota Generator (diesel)
Model #GL11000-USA-TM/Diesel Engine D722 (cont.)

- ❑ Monitor the warning lamps to ensure that none are on.
- ❑ Turn the main circuit breaker on in the control panel.
- ❑ Turn on electrical device switches.

Shutdown

- ❑ Turn off all electrical device switches for connected loads.
- ❑ Turn off the circuit breakers
- ❑ Allow engine to run with no load for 5 minutes before stopping the engine completely.
- ❑ Turn the main switch key to the off position.
- ❑ Turn the fuel level to the closed position.
- ❑ If engine fails to stop in the usual procedure, turn the engine stop lever for 5-20 seconds.

PC161 — WOA Portable Envirovac American, Model #828

Safety

- Sanitize the fresh water supply system periodically.
- Keep water connection fittings from coming in contact with the ground or drain hose to reduce chance of contamination.
- Always have fire extinguisher placed in an easily accessible area.
- Be sure the tow-hitch and truck are capable of towing 13,500 lbs.
- Ensure tires are in good condition and properly inflated. Under inflated tires may overheat and become a potential hazard (throw rubber and cause a blowout).
- Check and tighten wheel lugs regularly (every 50 miles when new until 200 miles are reached and then check every 500 miles.)
- Check brakes in a safe area.
- Pump holding tank before moving.
- Always solidly block trailer wheels before unhitching.
- Before leaving an area with a trailer in tow ensure:
  - » Safety pin or locking lever is seated.
  - » Jack is raised so it cannot come in contact with the ground.
  - » Electrical cord properly stored.
  - » Safety chains are connected and all interior lights are off.

Setup

- ❑ Level unit with front coupler jack. Block wheels- forward and rear.
- ❑ Crank down stabilizer jacks and lock into place (4 corners). Use dunnage blocks for leveling if necessary.
- ❑ Set up stairs. Inspect for damage.
- ❑ Hook up fresh water with ¾ inch garden hose. Water connection is located on lower roadside of trailer. A water pressure regulator is located at the hook up point.
- ❑ Hook up electrical: connect the 110Volt 30 amp outlets roadside of trailer to power source. DO NOT TURN ALL BREAKERS ON AT THE SAME TIME.
- ❑ Check interior lights for proper operation.
- ❑ Check EVERY toilet, urinal and faucet to see if it works properly.
- ❑ Check all dispensers and fill as needed.
- ❑ Clean unit.

Operation of Fresh Water Tank

- ❑ Fill fresh water holding tank.
- ❑ Close fresh water valve: located roadside exterior front of trailer.
- ❑ In equipment room: close tank fill valve.
- ❑ Open tank bypass valve.
- ❑ Open pump access valve.
- ❑ Close anti –freeze valve.
- ❑ Turn electrical breaker for pump to “ON”. Located in electric panel box.
- ❑ Ensure all waste tank termination valves are closed.
- ❑ Connect power and verify breakers and switches are in correct position for operation.

Continued on following page...

PC161 — WOA Portable Envirovac American, Model #828 (cont.)

Operation of Anti-Freeze Trailer

- ❑ In equipment room: connect anti – freeze container to anti freeze valve. Open valve.
- ❑ Open pump access valve.
- ❑ Close tank bypass valve.
- ❑ Close tank fill valve.
- ❑ Turn electrical breaker for pump to “ON”. Located in electric panel box.
- ❑ Blow all lines out.
- ❑ Recommendation: Add 1” of fresh water to waste tank to charge tank to allow paper and solids to dissolve. Single ply quick dissolving toilet tissue is recommended. Do not use double ply tissue or high cloth content tissues as these do not dissolve adequately in the waste tank.
- ❑ Recommendation: for odor control, do not use products containing formaldehyde.
- ❑ Recommendation: Use Rid-X to help dissolve solids and add freshening products such as pine sol to waste tank.

Draining the Water System

After leveling the trailer, the fresh water system should be completely drained by opening all faucets and drain valves, including that on the water heater and water storage tank. The following procedure is recommended.

- ❑ Open all faucets, valves and drains.
- ❑ Leave all drains open.
- ❑ Block the toilet valves open. This may be done by blocking the seal in the bottom of the bowl. Open with some object of proper size, being careful it does not fall through into the holding tank.
- ❑ If water filter is installed, remove filter cartridge and drain lower portion of housing.
- ❑ Drain pump when one is provided. Because of the check valve mechanism built into the pump, blowing the lines will not remove the water from the pump and tank. Proceed as follows.
  - » Drain the tank through the drain provided.
  - » Replace the hose.
- ❑ As an added precaution, after water has quit draining and valves and faucets are still open, apply air pressure to blow out any remaining water that may be trapped.
- ❑ If anti-freeze solution is now added to the water system for more positive protection, be sure it is non toxic antifreeze.
- ❑ Leave all faucets and valves closed during storage. Before operating the trailer again be sure to sanitize the water system in accordance with the instructions.

Things You Should NOT Do

- Do not move unit with waste in any holding tank.
- Do not tow unit with a full fresh water tank. Drain before moving.
- Do not move unit without proper hook up. (i.e., 2 5/16” ball, lights and safety chain).
- Do not use unit without stabilizer jacks down.
- NEVER use stabilizer jacks to lift this unit.
- Do not tow unit unless partition and cabinet doors are secure.
- NEVER store trailer with level stabilizers in the up position.

PC162 — Sea Slug Can-Flex Bladder

Safety

- Wear recommended job specific PPE.

Pre-Operation

- ❑ Ensure that all permits,lift plans,SIMOPS and any other Safety Communications have been addressed and implemented.
- ❑ Ensure that you have adequate work space to deploy this piece of equipment.

Startup

- ❑ Remove lashing from Can-Flex container, remove top cover and remove equipment stored on top of bladder. Then slowly open the front access panel.
- ❑ Flake out bladder on top of protective polyurethane sheet.
- ❑ Inspect valves, hoses, connection nipples, sea anchor, anchor line and navigation lights (ensure that there are spare batteries.)
- ❑ Ensure that the tow bridle as well as the storage container lifting wire have proper rigging inspection tags and pass visual inspection. Document in Rigging Inspection Log.
- ❑ Attach the 4-Way tow bridle to the nose of the bladder.
- ❑ Inflate forward float located inside of the tow bridle connection plate, using the hand-held pump located in the storage container.
- ❑ Attach the three (3) valves with nipples to the three (3) threaded holes along the center of the bladder.
- ❑ Attach navigational lights, perform battery check
- ❑ Attach discharge hose along with hose floats, 16” tail float and valve at the tail section of the bladder.
- ❑ Close all valves except one and slowly begin to fill bladder with pump supplied in storage container.
- ❑ Check for leaks by spraying with a bottle of fresh soapy water or leave the bladder to sit overnight. If no deflation occurs the bladder is in good condition, if deflation occurs a corrective work order must be generated to ensure that the bladder is returned to service ASAP.

Demobe

- ❑ Deflate bladder.
- ❑ Remove all installed equipment.
- ❑ Disconnect all hoses.
- ❑ If bladder was deployed into salt water you must rinse off with fresh water before putting back into storage container.

PC163 — Crucial Rope Mop Skimmer

Safety

- Wear appropriate job specific PPE.

Startup

- ❑ Remove cover and store in a secure area.
- ❑ Check for water build up in the storage containment. If water is present, check for contamination. If no contamination is present, drain water.
- ❑ Release turnbuckles holding Rope-Mop in storage containment.
- ❑ Check all hydraulic connections for debris and/or corrosion, remove if present.
- ❑ Check cam-Loc fittings, o-ring and internal o-ring for debris, remove if present. If none, connect discharge hose to cam-loc fitting
- ❑ Inspect the drive and free roller's for any obvious mechanical problem and or debris.
- ❑ Inspect and attach the 4-way lifting sling to the crane.
- ❑ Start LPP-80 (follow LPP-80 start up procedures) run up to operating speed and check for any leaks, if found shut down and troubleshoot.
- ❑ If no problems exist, shut down LPP-80 to connect the hydraulic hoses.
- ❑ After hydraulic hoses and discharge hoses are connected. Lift Rope-Mop by Crane into area to perform roller test.
- ❑ Run pump test.
- ❑ Remove Rope Mop from test area and pump out any/all water.

Demobe

- ❑ Disconnect hydraulic hoses.
- ❑ If Rope-Mop was placed into salt water, you must spray it down with fresh water as well as the hydraulic hoses and oleophilic ropes.
- ❑ The supporting component (LPP-80) must be returned to response ready state as well fueled, oil check etc.

PC164 — Deep Well GTA-115 Cargo Pump

Safety

- Ensure worker's are wearing the recommended job specific PPE for this task
- Ensure that all Work permits,site characterizations, lift plans, Simops and any other safety communications are implemented and in place.

Pre-Operation

- ❑ Open cargo hold hatch to conduct site Characterization for entry into confined space.
- ❑ If test is not acceptable Close hatch and inform Supervisor. Do Not proceed with this task until air quality is acceptable
- ❑ Attach lifting bridle to stinger attached to crane whip.
- ❑ Disconnect water hose to pump. Cam-loc with leaver keepers.
- ❑ Disconnect bonding cable. ½ in. stud welded to deck.
- ❑ Disconnect cargo hose. Hydro search. Use care to pry clamp ring off and do not drop.

Lift

- ❑ With crane lift pump and hose assembly from tank and lay out on deck. The pump is mounted on a roller assembly and track. Use caution as the roller clears the track as the pump may bind or swing free

Inspection

- ❑ Inspect and lubricate the pump.
- ❑ Inspect hydraulic and water hoses, looking for soft spots, separations and kinks. Check condition of fittings. If needed seek mechanical assistance.
- ❑ Inspect cargo hose. Look for cracks in the hose, pay attention to folds. If at any time hose is to be disconnected from pump be sure to mark alignment and reassemble in same position.

Lift

- ❑ Inspect bridle for damage and make sure it is not binding on hoses.
- ❑ Lift assembly and carefully align rollers on rail and lower pump into hole. Take care to not let pump bind while entering hole.
- ❑ Attach all connections before release from crane. Take care not to drop anything into tank.
- ❑ After all connections are made, close tank hatch.

PC165 — LPP 80 Power Pack

Safety

- Always wear hearing protection.
- Proper fueling techniques.
- Never operate equipment in an enclosed space
- Ensure that all lift plans, work permits and SIMOPS are implemented.

Pre-Operation

- ❑ Remove cover and store in secure place.
- ❑ Remove protective inspection panels.
- ❑ Check fuel level.
- ❑ Check hydraulic oil level.
- ❑ Check fan belt for belt tightness
- ❑ Inspect air filter
- ❑ Inspect battery connections
- ❑ If any any mechanical problems are spotted in your pre-op inspection stop and seek mechanical assistance.

Startup

- ❑ If no mechanical problems are found in your pre-op inspection, start engine.
- ❑ Let engine idle.
- ❑ Check fuel,oil and hydraulic lines, if any leaks are found stop engine and seek mechanical assistance. If none found go on to start up procedure #4
- ❑ Check lever function.
- ❑ Run engine to operating speed and check all connections again.
- ❑ Return engine to idle speed for two minutes then shut system down and once again check all connections and hoses for leaks.

Demobe

- ❑ Once engine is shutdown you may disconnect hoses from the LPP-80, ensure that all connections are debris frree and capped. The hoses as well.
- ❑ Once the LPP-80 is cooled down you may refuel it.
- ❑ Return to response ready state.

PC166 — Post Pounder

Safety

- Always refuel slowly to avoid spills.
- Never fill the fuel tank while the engine is running or hot.
- Avoid pinch points.
- Never place hands or feet under post or in between the coupler and post.
- PPE: Double ear protection, leather gloves, steel toed boots.

Pre-Start

- ❑ Check the fuel level. Fuel is mixed 20:1 two cycle oil with unleaded gasoline.
- ❑ Check to ensure the spark plug wire is fully installed.
- ❑ Check impact lubricant level. Ensure it is in between the two horizontal lines on the sight glass. Impact lubricant is 10w-40 engine oil.
- ❑ Inspect the tool blade and shank for cracks and discard if required.
- ❑ Check the air filter to ensure it is place, clean and tight.
- ❑ Check for loose or missing hardware. Pay special attention to the handlebar hardware.
- ❑ Check condition of pull rope and ensure recoil rewinds rope fully.
- ❑ Attach a tool for the required job (chisel, drive head etc.) by first opening the tool latch, by pushing down with your foot. Insert the tool and close the latch by pushing it upwards.
- ❑ Ensure hearing protection and gloves are in place prior to start up.

Startup

- ❑ Close the choke lever by pushing it upwards.
- ❑ Push the primer bulb 3-5 times. DO NOT EXCEED 5 TIMES
- ❑ Pull the starter grip while holding the throttle lever in the down position.
- ❑ Quickly release the throttle lever once engine starts.
- ❑ Allow engine to warm up for about 5-10 seconds with the choke on full.
- ❑ Slowly move the choke to the off position as the engine is warming up.
- ❑ Allow engine to warm up at idle or near idle for 2-3 minutes before applying full throttle. NEVER APPLY FULL THROTTLE TO A COLD ENGINE. SERIOUS ENGINE DAMAGE COULD OCCUUR.

Operation

- ❑ By pressing the throttle lever the machine speed and impact force is increased.
- ❑ You need not apply excessive force on the machine during operation. LET THE MACHINE DO THE WORK.
- ❑ Demonstrate safe starting and handling techniques.
- ❑ With engine at idle place coupler over post that is being pounded.
- ❑ Apply throttle to engage clutch and start the post driving operation.
- ❑ Drive post to desired depth and let off throttle.

Shutdown

- ❑ Press the stop button until engine dies.

PC167 — NOFI Harbor Buster

Safety

- Any boom handling operations and especially high speed operations involve heavy forces and impose a safety risk. In order to avoid personnel injuries, sound seamanship should be practiced in all operations. Local safety regulations and practice must be followed.
- Make sure there is enough free space on deck before inflating (20'). Use extreme caution when blowing up the system.
- Make sure that the skimming vessel does not drift off during high speed operation leading to the skimmer snagging in the separator.
- Make sure the system does not get snagged, or pinched with debris because there are several areas that are bottle necked/ tapered (Check collector net, tapered channel tunnel and separator outlet.)
- Logs debris and sharp objects may enter the system and cause serious damage. If this occurs stop the operation and remove the debris.
- Be careful of extreme ambient temperature changes, air inside system could expand during the day if filled initially in colder temperatures.

Deployment

- ❑ Deployment time: 25 minutes
- ❑ The unit should be slowly spooled off the boom reel and placed on deck to start inflation.
- ❑ The entire ocean buster is made as one unit and cannot be separated, except the transverse bladders which offer support. However the main inflatable frame consists of individual air chambers. (18 sections)
- ❑ There are 16 mooring and lifting straps running the entire length of the unit. With an additional 19 fastening points.
- ❑ The Ocean Buster should be deployed with guide booms first.
- ❑ Inflation is normally done by a back pack blower or hydraulic fan. To save time 2 blowers should be used during deployment, one on each side. The air chambers should be filled to a max air pressure of 1.45 PSI.
- ❑ The Monsun XII valves have an open and closed feature inflation must be performed with valves in the closed position to obtain full air pressure.

Operation

- ❑ The harbor buster works best with two boats towing and one boat skimming next to the separator.
- ❑ Filling the separator: When towing begins the separator fills slowly with water, this process takes 10-15 minutes.
- ❑ Maximum towing speed: Although the system will collect oil at above 4 knots, operation higher than this is not recommended in offshore conditions. In offshore short period waves the speed should be limited to 1.5 – 3 knots because of extremely high forces. (to reduce splash over).
- ❑ Higher speeds may be used when running at a 90 degree angle to the waves instead of running directly into them.

Continued on following page...

PC167 — NOFI Harbor Buster (cont.)

- Position of skimming vessel: The skimming vessel should be parallel to the ocean buster to avoid damage when moored alongside the separator. ***Be aware that the hull of the vessel may damage the fabric of the ocean buster due to sharp edges***
- In larger waves several mooring lines need to be used, preferably from the bow of the vessel. A mooring line from the bow of the vessel running to the bottom G hook at the bridle point between the front sweep and the guide boom is recommended.
- Towing configuration guidelines:
  - The tow boat with the best maneuverability should lead and the other should follow.
  - Both tow boats should continuously monitor the boom. If any misshape occurs in the guide boom or front sweep it must be corrected immediately.
  - The boats should be parallel.
  - The distance between the towboats should be 165 - 220 feet apart.
  - It is usually easier to keep configuration at speeds above 2 knots.

Retrieval

- Retrieval time: 30 minutes
- Make sure all valves are open when deflating the system.
- When retrieving the retrieval line is connected to the retrieval bridle by a G hook connection.
  ***When retrieving the 70 tons of water filled separator it takes some time before the separator is emptied since the water has to flow through the tampered channel and the narrow water outlet in the separator. This must be done gradually inch by inch without applying too much force. ***
- Deflate and slowly roll system back onto reel.

PC 169 — Portable Indirect Fired Heater

Pre-Start

- ❑ Remove the cover for the heater and exhaust outlets if equipped.
- ❑ Check the fuel level.
- ❑ Inspect power cord for damage.
- ❑ Inspect thermostat cord for damage and ensure cord is plugged in to heater.
- ❑ Hang thermostat at mid-level in area to be heated and set to desired temperature.
- ❑ Plug in power cord.

Startup

- ❑ Turn the burner switch to the on position.
- ❑ If the heater burner does not ignite, press the orange reset button.

Shutdown

- ❑ Turn the burner switch to the off position.
- ❑ Remove the heater trunks.
- ❑ After the fan has cooled down, replace the outlet covers (if equipped).
- ❑ Unplug and store power cord.
- ❑ Coil up and store thermostat cord.

PC170 — Hydrofire Pump

Safety

- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- Never use the pump for transferring hazardous materials.
- DO NOT operate the pump without the guards in place.
- Inspect all pump housing and piping for signs of obvious damage.
- Never point discharge hose at personnel
- Ensure all guards are in place and intact.
- Always wear safety glasses and hearing protection when operating this equipment.

Pre-Start

- ❑ Check engine oil level – SAE 15W-40
- ❑ Check the diesel fuel level.
- ❑ Check coolant level.
- ❑ Ensure discharge strainer is in place.
- ❑ Connect the suction hose and deploy.
- ❑ Connect the discharge hose to the Hydrofire boom via the manifold.
- ❑ Close all drain valves on pump system.
- ❑ Open valve for primer pump.
- ❑ Close the drain on primer pump.
- ❑ Apply pressure to the actuator handle of the check valve to secure it closed while operating the primer pump. Maintain pressure on the actuator handle until the engine is running and the pump takes a prime.
- ❑ Prime the pump before starting using the hand primer located just above pump housing.

Startup & Operation

- ❑ Turn the fuel valve to the open position (in line with fuel line).
- ❑ Turn on master switch.
- ❑ Pull hand throttle lever 1/3 of the way out.
- ❑ Depress and hold “Murphy” reset button.
- ❑ Depress starter button until engine starts.
- ❑ Continue to depress the “Murphy” reset button until oil pressure reaches a minimum of 15 PSI. If pressure does not increase to 15 PSI within 5 seconds, stop the engine to determine the cause.
- ❑ Once engine is started adjust throttle to 1200 RPM and let engine warm up for a minimum of 5 minutes.
- ❑ Verify that pump discharge hose is pumping water. If not pumping water shut engine down and re-prime the housing.
- ❑ Check all gauges for normal operation. If operation is not normal, stop the engine and determine the cause.
- ❑ After 5 minute warm up adjust throttle to rated speed of 1800-2500 RPM.

Continued on following page...

PC170 — Hydrofire Pump (cont.)

- ❑ Operational Hints:
  - » Avoid excessive engine idling. Premature engine wear or damage can result. If engine needs to idle for longer than 5 minutes, stop engine and restart later.
  - » Always use the strainer to prevent debris from clogging the valves and entering boom.
  - » Inlet connections must be air tight to prevent loss of vacuum.
  - » High suction lift should be avoided. Manufacturer recommends no deeper than 4 feet.
  - » Suction hose must be non-collapsible.

Shutdown

- ❑ Reduce the engine speed to 1000-1200 RPM for 2-3 minutes.
- ❑ Depress the emergency stop button.
- ❑ Ensure rain cap is in the down position. Use CAUTION as this may be hot.
- ❑ Close the fuel valve.
- ❑ Open all pump case drain valves and leave in the open position.
- ❑ Disconnect suction and discharge lines from pump and drain them by walking them out. Coil them up and return to connex with package.
- ❑ Return all equipment back to proper location ensuring package is complete.

PC171 — Hydrofire Power Pack and Boom Reel

Safety

- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running or hot.
- Never try to connect hydraulic hoses to powerpack while the engine is running.
- Never operate the engine in a closed building unless exhaust is piped outside.
- Always wear safety glasses and hearing protection when operating this equipment.

Pre-Start Power Pack

- ❑ Visually inspect entire unit for signs of damage and or leaks.
- ❑ Check the hydraulic reservoir level – ISO 32.
- ❑ Check the engine oil level – 5W-40 synthetic.
- ❑ Check the battery connections.
- ❑ Open the fuel valve to the engine.
- ❑ Connect color coded hydraulic hoses to power pack and boom reel.
- ❑ Ensure boom reel control levers are in the neutral position.

Startup

- ❑ Set engine speed control knob to the start position.
- ❑ Turn the key to the “START” position. Release as soon as the engine starts.
- ❑ Allow the engine to operate at a low speed for 2-3 minutes to warm up.
- ❑ Increase the throttle to the desired operating speed.
- ❑ Monitor the hydraulic fluid level at the sight glass.
- ❑ Boom reel control levers may now be used to operate the reel for deployment and or recovery of boom.

Shutdown

- ❑ Return all boom reel control levers to neutral position.
- ❑ Reduce the engine speed to idle and allow cooling for 3-5 minutes.
- ❑ Turn the ignition key to the “OFF” position.
- ❑ Close the fuel valve.
- ❑ Disconnect the hydraulic lines and install the protective caps in fittings.

PC172 — Caterpillar Skid Steer (299C)

Safety

- You must use ladders and steps provided for accessing the cab.
- You must use three points of contact with steps and grab handrails. 75% of all equipment injuries happen when mounting or dismounting equipment.
- Do not use hand controls and hand holds for entering/exiting cab.
- No jumping from equipment.
- Keep cab clean and free of debris/trash.
- Always face the machine when exiting/ entering.
- Know the proper procedures for a disabled machine.
- Be aware of all clearances and weight limitations
- Be aware of conditions of haul roads or job site.
- Conduct a walk around inspection to identify potential or existing problems.
- Before operating skid steer carefully read and understand all safety and operational information. Always operate the skid steer in a safe manner in accordance with operator's manual.
- Always carry attachments as low as possible.
- Use hearing and eye protection while running.
- Operator should have radio or some form of communication.
- Never exit equipment while it is running.
- When running the skid steer near well house, modules, flow lines, etc, always use a spotter and keep unit in low idle.

Pre-Operation

- ❑ Check:
  - » Oil level
  - » Transmission oil level
  - » Engine coolant level
  - » Air filter restriction indicator
  - » Radiator fins for blockage
  - » All hoses for cracks or leaks
  - » All belts for tightness, wear or cracks
  - » Fuel filter for leaks
  - » Seats adjusted for proper travel
  - » Seat belt: damage, wear or adjustment
  - » Horn, back up alarm & lights

Startup

- ❑ Fasten seat belt.
- ❑ Lower the seat bar.
- ❑ Control levels in neutral.
- ❑ Engage parking brake.
- ❑ Engine speed is on low idle.
- ❑ Turn start key to "ON".
- ❑ Engine oil pressure, coolant flow & alternator light will come on.

Continued on following page...

PC172 — Caterpillar Skid Steer (299C) (cont.)

- ❑ Turn start switch to start and release when engine starts.
- ❑ Monitor all gauges and instrument panel lights to determine if unit is ready.
- ❑ Allow unit to warm up at idle for 5 minutes.
- ❑ Sound horn and raise all lowered implements off of the ground.
- ❑ Release parking brake.
- ❑ Set throttle to desired speed.
- ❑ Turn on lights.
- ❑ Move carefully to desired location/ direction.
- ❑ While moving; make sure area is clear.

Shutdown

- ❑ Lower the lift arm.
- ❑ Slow the engine to just above idle.
- ❑ Set the parking brake.
- ❑ Raise the seat bar
- ❑ Remove seat belt.
- ❑ When engine is cool, shut engine down.
- ❑ Exit the equipment.
- ❑ Conduct walk around inspection.

PC174 — International Boom Truck
Driver Awareness Level

*Note: This PC is for driving the truck only. Crane operations require successful completion of Crane Operators classroom training and PC175B

Driver acknowledges this equipment requires a class “B” CDL with airbrake endorsement. If towing a trailer over 10,000 lbs. a class “A” CDL is required.

Pre-Start

- ❑ Check oil level.
- ❑ Check coolant level; remove winter covers if needed.
- ❑ Check under the hood for leaks; hose condition, loose wiring, etc.
- ❑ Check tire inflation, tread condition, lugs and rims.
- ❑ Locate and describe the purpose of the Differential Lock System.
- ❑ Locate the switch for the mirror heaters.
- ❑ Describe the proper RPM requirements for leaving the engine running for prolonged periods of time.
- ❑ Describe the Exhaust regeneration process.
- ❑ Locate the air ride suspension dump switch and describe when and why it should be used.
- ❑ Identify the truck load capacity and the GVWR.
- ❑ Identify the trailer towing capacity and the GCWR.

Startup

- ❑ Turn on Master switches located on driver’s side of cab.
- ❑ Turn key to “ON” position and start the engine.
- ❑ Allow engine to reach operating temperature.
- ❑ Check and clean lights, mirrors and windows
- ❑ Check air brakes, hoses, and glad hands are in good condition.
- ❑ Check that radios are operating and set to proper channels.
- ❑ Check Differential Lock switch and set as needed.
- ❑ Deactivate parking brake prior to getting underway.
- ❑ Select proper transmission gear range to avoid lugging the engine at low RPM’s.

Operation

- ❑ Describe the procedures for transporting spill or other equipment to a spill site.
- ❑ Describe the proper load securement procedures and how to select the proper rigging.
- ❑ Demonstrate proficiency by driving truck to a pre-designated location.
- ❑ Demonstrate proficiency at backing and other maneuvers.

Connecting Truck to Trailer

- ❑ Inspect pintle hitch and ensure jaws are open.
- ❑ Back truck up to trailer and couple properly.
- ❑ Inspect safety chains and trailer light plug and connect properly.
- ❑ If trailer is equipped with air brakes, inspect glad hands and connect air lines.

Continued on following page...

PC174 — International Boom Truck
Driver Awareness Level (cont.)

- ❑ Supply air to trailer.
- ❑ Ensure all tires on trailer are moving.
- ❑ Upon successful completion of trailer maneuvers, park trailer in proper location.
- ❑ Dis-connect from trailer insuring that the landing gear or jack will properly support the trailer.

Shutdown

- ❑ Park the truck in a safe location
- ❑ Place the transmission in Neutral.
- ❑ Activate the parking brake.
- ❑ Allow the engine to cool prior to shutdown.
- ❑ Check the lights, mirrors and other switch positions.
- ❑ Turn off the ignition switch.
- ❑ Turn Master Switches to the “OFF” position.
- ❑ Perform walk around of vehicle to check for overall condition.

APP-C

PC176 — Freightliner Truck
Driver Awareness Level

*Note: This PC is awareness level only.

Driver acknowledges this equipment requires a class “B” CDL with airbrake endorsement. If towing a trailer over 10,000 lbs. a class “A” CDL is required.

Pre-Start

- ❑ Check oil level.
- ❑ Check coolant level; remove winter covers if needed.
- ❑ Check under the hood for leaks; hose condition, loose wiring, etc.
- ❑ Check tire inflation, tread condition, lugs and rims.
- ❑ Locate and describe the purpose of the Differential Lock System.
- ❑ Locate and describe the transfer case engagement switch.
- ❑ Locate and describe the transfer case low range switch.
- ❑ Locate the switch for the mirror heaters.
- ❑ Describe the proper RPM requirements for leaving the engine running for prolonged periods of time.
- ❑ Describe the Exhaust regeneration process.
- ❑ Locate the air ride suspension dump switch and describe when and why it should be used.
- ❑ Identify the truck load capacity and the GVWR
- ❑ Identify the trailer towing capacity and the GCWR

Startup

- ❑ Turn on Master switches located on driver’s side of cab.
- ❑ Turn key to “ON” position and start the engine.
- ❑ Allow engine to reach operating temperature.
- ❑ Check air brakes and hoses are in good condition.
- ❑ Check that radios are operating and set to proper channels.
- ❑ Deactivate parking brake prior to getting underway.
- ❑ Select proper transmission gear range to avoid lugging the engine at low RPM’s.

Operation

- ❑ Describe the procedures for transporting spill or other equipment to a spill site.
- ❑ Describe the proper load securement procedures and how to select the proper rigging.
- ❑ Demonstrate proficiency by driving truck to a pre-designated location.
- ❑ Demonstrate proficiency at backing and other maneuvers.

Connecting Truck to Trailer

- ❑ Inspect pintle hitch and ensure jaw is open.
- ❑ Back truck up to trailer and couple properly.
- ❑ Inspect safety chains and trailer light plug and connect properly.
- ❑ If trailer is equipped with air brakes, inspect glad hands and connect air lines.
- ❑ Supply air to trailer.

Continued on following page...

PC176 — Freightliner Truck
Driver Awareness Level (cont.)

- ❑ Ensure all tires on trailer are moving.
- ❑ Test trailer brakes.
- ❑ Upon successful completion of trailer maneuvers, park trailer in proper location.
- ❑ Disconnect from trailer insuring that the landing gear or jack will properly support the trailer.

Shutdown

- ❑ Park the truck in a safe location
- ❑ Place the transmission in Neutral.
- ❑ Activate the parking brake.
- ❑ Allow the engine to cool prior to shutdown.
- ❑ Check the lights, mirrors and other switch positions.
- ❑ Turn off the ignition switch.
- ❑ Turn Master Switches to the “OFF” position.
- ❑ Perform walk around of vehicle to check for overall condition.

PC177 — Rope Mop (Engine Driven) Crucial C-14

Safety

- Read Crucial's General Operating Instructions
- Always refuel slowly to avoid spillage
- Never fill the fuel tank while engine is running or hot
- Never operate the engine in a closed building unless exhaust is piped outside

Pre-Start

- ❑ Check the engine oil, fuel and gear box oil levels
- ❑ Hook the hose from the sump to the pump or tank
- ❑ Stretch out rope mop too its full length (100')
- ❑ Ensure that ties between sections are tight
- ❑ Determine the number of pulleys to be used
- ❑ Ensure that pulleys and Engine are anchored
- ❑ Run rope mope through pulleys

Startup

- ❑ Release tension on rope mope rollers
- ❑ Set the speed control to start
- ❑ Turn on fuel valve
- ❑ Pull recoil slow till it stops
- ❑ Push down decompression lever
- ❑ Let recoil back than pull to start

Operations

- ❑ Ensure that rope mop is not slipping. If slipping occurs, shut the engine down and adjust the tension springs by turning the tension nuts
- ❑ Monitor the level of recovered product and transfer as required

Shutdown

- ❑ Release tension handle
- ❑ Untie Mop straps and feed back through the machine
- ❑ Shut down engine
- ❑ After cool down, refill fluid levels as necessary
- ❑ Ensure unit is put back in a ready to use state

PC178 — Crucial Disc 13-30 Skimmer (Vessel Powered)

Safety

- Deploying skimmer requires use of vessel crane. Hard Hats are required
- Be aware of pinch points between hoses, skimmer and side of vessel
- Raise skimmer high enough to clear vessel hand rail

Skimmer Setup

- ❑ Set rigging for level pick
- ❑ Attach tag lines to the inboard side of skimmer
- ❑ Attach cam-loc hose and hyd. lines to skimmer
- ❑ Set skimmer unit into position
- ❑ Use davit to secure cam-loc and hydraulics hoses (keep weight off connections)
- ❑ Ensure Sheppard hooks on bulwarks securely attached and in the 2 skimmer eyes
- ❑ Secure the tag line to the vessel
- ❑ Ensure float and fence boom is properly secured to boom arm
- ❑ Attach forward stay line to shackle eye on float
- ❑ Raise Boom Arm, slide boom end connector into receiver on float. Working aft, tie off skirt to boom arm as you go
- ❑ Slide boom end connector into the receiver on the vessel hull
- ❑ Lower boom to water, position aft of skimmer using forward stay line to deploy
- ❑ Guide forward stay line through chock eye and secure to cleat

Hydraulic Hookup

- ❑ Attach two hoses for discs to the disc control lines on vessel
- ❑ Attach the three hoses for the Vogelsang pump to the pump control lines on the vessel
- ❑ Ensure all hydraulic connectors are tightly secured to the ring marking
- ❑ Bring vessel power to 1100 RPMs to allow use of hydraulics
- ❑ Turn on skimmer control breaker in wheel house
- ❑ Test function of discs with disc control valve
- ❑ Test function of Vogelsang pump with pump control valve
- ❑ Note disc control valve must be cracked a bit to sense a load to run just the Vogelsang pump. Pump will not operate without the disc hooked up and slightly engaged

Skimmer Operation

- ❑ Optimum skimming speed is approx. 1 to 2 knots
- ❑ Disc and pump speed should be monitored and adjusted as required to maintain best recovery and efficiency rate

Shutdown

- ❑ Using crane bring skimmer back onto vessel deck
- ❑ Disconnect hydraulic lines from skimmer and vessel hydraulics power source
- ❑ Remove cam-loc hose from skimmer
- ❑ Loosen stay line, allow boom arm to drift back to stern and place in boom arm cradle
- ❑ Slide boom end connectors up and out of float and vessel hull receivers, fold and store on deck
- ❑ Report any malfunctions for repairs

PC179 — Elastec TDS 118 Hydraulic Skimmer

Startup

- ❑ Ensure that hydraulic power unit is off.
- ❑ Connect E150 hydraulic pump to 3” camlock outlet.
- ❑ Connect color coded hydraulic hoses to power pack, skimmer and pump.
- ❑ After performing power pack start up procedures ensure pump and skimmer is running by opening hydraulic control valves (counterclockwise).
- ❑ Increase the throttle on power pack to desired operating speed for oil recovery.

Shutdown

- ❑ Return hydraulic control valves to off position.
- ❑ Reduce the engine speed to idle and allow cooling for 3-5 minutes.
- ❑ Turn the ignition key to the “OFF” position.
- ❑ Disconnect the hydraulic lines, hoses and pump, install the protective caps in fittings.

PC180 — Elastec D10 Hydraulic Power Unit

Safety

- Always refuel slowly to avoid spillage.
- Never fill the fuel tank while the engine is running or hot.
- Never try to connect hydraulic hoses to power pack while the engine is running.
- Never operate the engine in a closed building unless exhaust is piped outside.
- Always wear safety glasses and hearing protection when operating this equipment.

Pre-Start Power Pack

- ❑ Visually inspect entire unit for signs of damage and or leaks.
- ❑ Check the hydraulic reservoir level – ISO 32.
- ❑ Check the engine oil level – 5W-40 synthetic.
- ❑ Check the battery connections.
- ❑ Connect color coded hydraulic hoses to power pack and skimmer and pump.
- ❑ Ensure that hydraulic controls are in off position (clockwise).

Startup

- ❑ Set the throttle control at approximately half throttle.
- ❑ Prime fuel system by pumping primer bulb until resistance is present.
- ❑ Turn the key counterclockwise and hold until glow plug light goes out, then turn key clockwise until engine starts.
- ❑ Allow the engine to operate at a low speed for 2-3 minutes to warm up.
- ❑ Increase the throttle to the desired operating speed.
- ❑ Open control valves to ensure that skimmer drum is turning and the pump is working.

Shutdown

- ❑ Return hydraulic control valves to off position.
- ❑ Reduce the engine speed to idle and allow cooling for 3-5 minutes.
- ❑ Turn the ignition key to the “OFF” position.
- ❑ Disconnect the hydraulic lines and install the protective caps in fittings.

PC181 — Elastec American Marine E150 Hydraulic Pump

Startup

- ❑ Ensure that hydraulic power unit is off.
- ❑ Connect 3” camlock inlet to skimmer.
- ❑ Connect color coded hydraulic hose to power pack, skimmer and pump.
- ❑ After performing power pack start up procedures ensure pump is running by opening hydraulic control valves (counterclockwise).
- ❑ Increase the throttle on power pack to desired operating speed for pump and skimmer.

Shutdown

- ❑ Return hydraulic control valves to off position.
- ❑ Reduce the engine speed to idle and allow cooling for 3-5 minutes.
- ❑ Turn the ignition key to the “OFF” position.
- ❑ Disconnect the hydraulic lines and hoses and install the protective caps in fittings.

PC182 — Floto-Pump

PPE

- Safety Glasses
- Hearing protection
- Water gear

Safety

- Do not use for flammable liquids
- Ensure pressure is relieved when connecting or discounting hoses
- 107db wear hearing protection

Operation

- ❑ Operating temperature -32F to 118F
- ❑ Connect discharge hose to pump
- ❑ Ensure hose is free of twists & kinks
- ❑ Ensure nozzle is closed
- ❑ Open vent on fuel tank
- ❑ Move ignition switch to run
- ❑ Close choke by moving in direction of arrow
- ❑ Grasp lifting handle on top of engine with one hand and pull starter handle with the other hand
- ❑ When pump starts open choke by moving choke lever toward engine

Shutdown

- ❑ Turn ignition switch to stop (off) position
- ❑ Before transporting the pump close the fuel tank vent
- ❑ Disconnect hoses & drain
- ❑ Ensure pump is drained

PC183 — Mattracks

PPE

- Safety Glasses
- Winter gear
- Radio with spare battery

Safety

- When leaving pad ensure there are 2 personal at all times.
- Never exceed 40 MPH as this may damage the track system.
- Ensure all personal have winter gear before leaving pad.
- Ensure equipment has spill kit before leaving pad.
- Conduct a visual inspection of equipment for any obvious damage, excessive wear or leaks prior to operating.
- Exceeding the track system limitations can cause damage to system, vehicle and cause personal injury.

Operation

- ❑ Ensure equipment is full of fuel & all fluid levels are checked before leaving pad.
- ❑ Always follow field protocols for off pad travel and make appropriate notifications throughout the trip.
- ❑ Do not try to steer vehicle when it is not in motion as this can damage the steering system.
- ❑ Do not attempt to turn up hill when running on a side hill of more than 30%
- ❑ When traversing obstacles approach the obstacle at a slow speed as close to a right angle as possible.
- ❑ Drive slowly and beware of hidden objects and drastic changes in the terrain.
- ❑ If vehicle is being towed, the operator must ensure tracks are turning freely to prevent over rotation of track unit.
- ❑ If over-rotation of track unit is observed vehicle must be stopped and obstacle or material causing over rotation must be removed.
- ❑ If the vehicle gets stuck its best to try and back out of what you drive into. Do not try to drive back in the same track or you chance getting the vehicle stuck again and may not be able to back out of it.
- ❑ If ice build-up in the sprockets is observed operator must stop (turn off the vehicle engine) and clean sprockets.

PC184 — Canflex Tank

PPE

- Safety glasses

Safety

- ❑ Ensure tank & liner material is compatible with product
- ❑ Do not exceed the rated capacity of the tank

Setup

- ❑ Clear a flat area of all objects
- ❑ Place ground cover down
- ❑ Unroll tank in centre of ground cover
- ❑ Install ball valves
- ❑ If tank is equipped with air collar fill at this time

Liner installation

- ❑ Remove tanks backing plates
- ❑ Match the centre of the liner with centre of the tank so liners anchor points face up
- ❑ Spread liner around the perimeter of the tank
- ❑ Liner is oversized therefore it should be folded at least 12” around the top of tank’s perimeter
- ❑ Align liner bolt pattern with tank bolt pattern & re-install backing plates
- ❑ Attach all bungees from the liners anchor points to the tank’s anchors points
- ❑ (Bungees are already installed on the tank)

Demobe

- ❑ Off load all fluids dispose of liner & clean tank
- ❑ Fold in half
- ❑ Cover all fittings
- ❑ Fold in half again
- ❑ Align the collar and folded end
- ❑ Roll up to fit in bag (use rope to hold tank tight)
- ❑ Place in storage bag
- ❑ Place all accessories & parts inside storage bag

PC185 — Yanmar Hydraulic Power Pack

Safety

- Wear proper eye and hearing protection.
- Be aware of hot exhaust and engine.
- Use caution around high pressure hydraulics.

Pre-Start

- ❑ Check all fluid levels.
- ❑ Turn control handle counter clockwise until handle rotates freely.
- ❑ Connect hydraulic hoses to power unit and pump.
- ❑ Hook hydraulic lines up before start up.

Startup

- ❑ Open the fuel cock.
- ❑ Set the engine speed lever at idle.
- ❑ Turn the key to start position.
- ❑ Start engine at low speed and allow unit to warm up.
- ❑ If pump is set up and ready to run turn control valve clockwise until it stops. (Refer to pump PC)
- ❑ After initially running pump check level of hydraulic fluid

Operation

- ❑ Adjust pumping speed by increasing engine speed.
- ❑ Watch engine for proper operation.

Shutdown

- ❑ Decrease engine speed and de-energize the hydraulics system.
- ❑ Move speed control to off position. (counter-clockwise)
- ❑ Turn off the key.

PC186 — QualiTech DHPP28C Power Pack

Safety

- Always refuel slowly to avoid spillage
- Never fill the fuel tank while the engine is running or is hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- DO NOT operate without the engine guards in place.
- Wear proper eye and hearing protection.
- Be aware of hot exhaust and engine.
- Use caution around high pressure hydraulics.

Pre-Start Power Pack

- ❑ Check the fuel tank level.
- ❑ Check the coolant level.
- ❑ Check the hydraulic reservoir level.
- ❑ Check the engine oil level.
- ❑ Check the fan and alternator belts.
- ❑ Check the battery connections.
- ❑ Check for damage or missing parts.
- ❑ Inspect all hydraulic hoses and connections.
- ❑ Open the fuel shut off valve to the engine.
- ❑ Open the hydraulic shut off valve.
- ❑ Verify that hyd. controls are in the neutral position.
- ❑ Connect the hydraulic hoses to boom reel.
- ❑ Remove caps/plugs from blower inlet/outlet
- ❑ Turn battery disconnect switch to ON position.

Startup

- ❑ Verify that the throttle is set to the lowest setting.
- ❑ Turn the key to the on position.
- ❑ Push in and hold the Murphy switch.
- ❑ Turn the key to the start position and start engine, holding in the Murphy switch until engine starts.
- ❑ Allow the engine to operate 3-5 minutes at 1000 rpm before placing under load.
- ❑ Increase the throttle to the desired operating speed.
- ❑ Engage the deploy/receive lever.
- ❑ Adjust the engine speed to set desired reel speed.

Shutdown

- ❑ Disengage the reel control.
- ❑ Reduce the engine speed to idle and allow cooling for 3-5 minutes.
- ❑ Turn the ignition key to the off position.
- ❑ Close the fuel valve.
- ❑ Disconnect the hydraulic lines and install the protective caps in fittings.
- ❑ Install caps/plugs on blower inlet/outlet.
- ❑ Close hydraulic shut off valve.
- ❑ Turn battery disconnect switch to OFF position.

PC187 — Swoffer Model 3000 Flow Meter

Safety

- Always wear proper PPE when deploying meter near water.

Startup

- ❑ Attach the #1, 2” propeller to wand and tighten using Allen wrench provided.
- ❑ Attach wand to metering unit.
- ❑ Extend the wand to the desired length.
- ❑ Press and hold the PWR key for two seconds to power up the unit.

Operation

- ❑ Press the “prop” key on the metering unit and select “prop 1”, then press enter.
- ❑ Press the ESC key to return to the initial screen.
- ❑ Press the VELOCITY key then deploy the wand into the stream or river.
- ❑ Press ENTER twice and the meter will begin to calculate flow rate.
- ❑ Refer to the operating instructions provided for any questions or trouble shooting.

Shutdown

- ❑ Press and hold the PWR key for three seconds to power down the unit.
- ❑ Disconnect the wand from the metering unit.
- ❑ Disconnect the propeller from the wand.
- ❑ Collapse the wand and tighten each band.

PC188 — WCS 4-Circuit HYPU

Safety

- Always wear safety glasses and hearing protection while operating equipment.
- Shut engine off during refueling.
- Never try to connect hydraulic hoses with unit running
- Do not operate in an enclosed structure without proper ventilation and air monitoring.
- All hose connections must have hose whip protection while unit is being used.

Pre Start Inspection

- ❑ Visually inspect entire unit for damage and leaks.
- ❑ Check all fluid levels.
- ❑ Check engine belt for excessive wear.
- ❑ Open fuel shut off valve.
- ❑ Ensure main hydraulic valve is open.
- ❑ Ensure all circuit control valves are closed.
- ❑ Turn battery disconnect switch to “ON”.
- ❑ Hook up desired hydraulic circuits.
- ❑ Ensure all hose connections are tight and that hose whips are used.

Startup

- ❑ Open engine control panel, Ensure run/idle switch is in the idle position.
- ❑ Turn key to “ON”, Wait for glow plug light to go out, start engine.
- ❑ Let unit run for 3-5 min. to warm up. Check for leaks.
- ❑ Set run/idle switch to the “RUN” position. Using the Inc/Dec toggle, increase RPMs to 2000 rpm MAX (maximum efficiency for the hydraulic pump).

Operation

- ❑ Adjust main pump pressure to 2800-3000 psi max.
- ❑ Open desired circuit main valve.
- ❑ Adjust circuit pressure knob to desired pressure.
  NOTE: This will be determined by the type of equipment that is being powered by each individual circuit.
- ❑ Adjust circuit flow control knob to desired flow rate.
  NOTE: This increases the speed of the equipment being used.
- ❑ Ensure no leaks are present.

Shutdown

- ❑ Turn all circuit control knobs fully counter clockwise to stop flow and pressure.
- ❑ Turn circuit main valve to closed position.
  NOTE: Unit is equipped with automatic pressure bleed off valves; any residual pressure will automatically bleed off.
- ❑ Ensure that all pressure and flow gauges are at 0 psi.
- ❑ Allow engine to run for 3-5 min with no load to allow proper cool down of unit.
- ❑ Turn engine “OFF”.
- ❑ Close all fuel, and hydraulic main valves.
- ❑ Disconnect all hydraulic hoses and install caps or plugs into connection ends to protect from damage.
- ❑ Clean unit and place in its proper home location when finished.

PC189 — Pneumatic Drum Skimmer

Safety

- Wear proper eye and hearing protection.
- Use whip checks on air line connections.
- Use caution around high pressure air.

Pre-Start

- ❑ Check all wipers for cracks, and contact with the drum.
- ❑ If applicable ensure the power source is in containment.

Startup

- ❑ Make sure the air valve between the air supply and skimmer is off.
- ❑ Connect air hoses to pneumatic supply.
- ❑ Connect suction hose from the skimmer cam-lock fitting to the pump.
- ❑ Pump operation is handled by an independent pump. (Refer to pump PC).
- ❑ Be sure to wire all cam-lock fittings in place prior to operation.
- ❑ Slowly open air supply valve, turn drum slightly to confirm that the drum spins freely.
- ❑ Place skimmer in the product.
- ❑ With the skimmer drum rotating adjust the rate of speed so the water will shed off the drum surface prior to entering the collection box.
- ❑ If pump is set up and ready to run start and adjust the flow rate to balance the skimmer head for optimum collection. (Refer to pump PC)

Operation

- ❑ Adjust skimming speed by increasing or decreasing air flow to the skimmer.
- ❑ Watch for any debris that may become lodged in the wipers.

Shutdown

- ❑ Raise unit from product while drums are tuning to clean the drum surface.
- ❑ Pump the collection until it stops flowing.
- ❑ Shut down air supply.
- ❑ Remove air line and suction hose from the skimmer.
- ❑ Place skimmer in decon.
- ❑ Decon skimmer, hoses, and air lines as needed.

PC190 — F.G. Wilson 17 KW Generator

Safety

- Never touch moving parts on generator.
- Wear hearing and eye protection.
- Be aware of hot exhaust and engine.
- Exhaust gas is poison hazard (Do not run indoors).
- Electric shock hazard. (Do not service machine while it's running).
- Fire hazard, (keep away from flammable materials).
- Pay attention to warning labels.
- Do not remove radiator cap while engine is hot.
- Never fuel while engine is running.
- Work must be conducted by certified personnel only.

Pre-Start

- ❑ Check all fluid levels (on level ground).
- ❑ Check for oil and coolant leaks.
- ❑ Check fan belt tension.
- ❑ Check all wiring and connectors.

Startup

- ❑ Check that the Emergency Shutdown (ESD) is out.
- ❑ Turn the start switch to run and wait for auto start to run.
- ❑ Start engine and allow unit to warm up. (Ten minutes with no load / 20 min. if below 14 degrees F).
- ❑ Once connected, turn on electrical device switches.

Operation

- ❑ Watch engine for proper operation.
- ❑ Watch for "cycling" or power surges.

Shutdown

- ❑ Prior to shutdown run without a load for five minutes.
- ❑ Turn switch to off position.

PC191 — Diesel America West Hydraulic Power Pack (w/500' Kepner Reels)

Safety

- Wear proper eye and hearing protection.
- Be aware of hot exhaust and engine.
- Use caution around high pressure hydraulics.

Pre-Start

- ❑ Check all fluid levels.
- ❑ Turn control handle counter clockwise until handle rotates freely.
- ❑ Connect hydraulic hoses to power unit and pump.
- ❑ Hook hydraulic lines up before start up.

Startup

- ❑ Open the fuel cock.
- ❑ Set the engine speed lever at idle.
- ❑ Turn the key to start position.
- ❑ Start engine at low speed and allow unit to warm up.
- ❑ If pump is set up and ready to run turn control valve clockwise until it stops. (Refer to pump PC)
- ❑ After initially running pump check level of hydraulic fluid.

Operation

- ❑ Adjust pumping speed by increasing engine speed.
- ❑ Watch engine for proper operation.

Shutdown

- ❑ Decrease engine speed and de-energize the hydraulics system.
- ❑ Move speed control to off position. (counter-clockwise)
- ❑ Turn off the key.

PC192 — Crucial Disc Skimmer

Safety

- Always refuel slowly to avoid spillage.
- Check hydraulic level often.
- Before start-up be certain the tank valve is in the open position. The valve is banded in the open position from the factory.
- While the unit is operating, observe the return filter gauge. When the needle moves into the red zone the filter must be replaced.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- DO NOT operate without the guards in place.
- Be sure to use eye protection when using this equipment.
- The hydraulic flow (GPM) and pressure are Pre-Set at the factory. Do not change with-out factory consultation.

Pre-Start

- ❑ Check all fluid levels (engine oil, hydraulic oil and fuel).
- ❑ Ensure all Hydraulic controls are in off position.
- ❑ Ensure that power pack is in duck pond prior to operation.
- ❑ Place unit on flat ground surface.
- ❑ Connect hydraulic hoses to skimmer.

Startup

- ❑ Connect hydraulic hoses to skimmer unit before putting in water.
- ❑ Connect 2" suction hose to skimmer unit before putting in water.
- ❑ Be sure that cam-locks are locked in place before putting unit in water.
- ❑ Connect hydraulic lines to the power pack.
- ❑ Attach the suction hose to the transfer pump.
- ❑ Attach the discharge hose to storage tank.
- ❑ Place throttle In "start" position (Throttle is located on the bottom side of the engine under the control panel)
- ❑ Push down on the RED decompression lever. (Located on the top of the engine.)
- ❑ Make certain the flow control knobs are in the closed position. (Knobs screwed inward)
- ❑ Open flow control knobs until reaching desired skimmer rotating speed.
- ❑ Periodically check for loose fittings and connections.

To Stop Engine

- ❑ Close both flow control valves.
- ❑ Push throttle lever slowly until engine stops.

Operation

- ❑ Inspect the skimmer. Check to make sure that there are no obstructing objects on the disc or in the trough system.
- ❑ Connect the suction hose.
- ❑ Strap on the hose floats and adjust is so the skimmer operates flat and level.

Continued on following page...

PC192 — Crucial Disc Skimmer (cont.)

- ❑ Start the skimmer hydraulic power pack.
- ❑ Slowly open the black knob on the hydraulic manifold block until the disc begins to turn.
- ❑ Place the skimmer into the desired skimming location.
- ❑ Open the black speed control knob until the desired rum speed is achieved.
- ❑ Fully open the black speed control knob on the hydraulic manifold block labeled " High " this will start the Oil transfer pump.

Shutdown

- ❑ Be sure all hydraulic controls are in the off position.
- ❑ Lower engine speed to idle and let unit cool down prior to shutting it off.
- ❑ Remove the equipment from the water before removing the hydraulic lines.
- ❑ Place the skimmer head into a containment pit for decon.
- ❑ Check all fluids and top off prior to putting equipment away in proper location.

PC193 — Crucial Drum Skimmer

Safety

- Always refuel slowly to avoid spillage.
- Check hydraulic level often.
- Before start-up be certain the tank valve is in the open position. The valve is banded in the open position from the factory.
- While the unit is operating, observe the return filter gauge. When the needle moves into the red zone the filter must be replaced.
- Never fill the fuel tank while the engine is running or hot.
- Never operate the engine in a closed building unless exhaust is piped outside.
- DO NOT operate without the guards in place.
- Be sure to use eye protection when using this equipment.
- The hydraulic flow (GPM) and pressure are Pre-Set at the factory. Do not change with-out factory consultation.

Pre-Start

- ❑ Check all fluid levels (engine oil, hydraulic oil and fuel).
- ❑ Ensure all Hydraulic controls are in off position.
- ❑ Ensure that power pack is in duck pond prior to operation.
- ❑ Place unit on flat ground surface.
- ❑ Connect hydraulic hoses to skimmer.

Startup

- ❑ Connect hydraulic hoses to skimmer unit before putting in water.
- ❑ Connect 2" suction hose to skimmer unit before putting in water.
- ❑ Be sure that cam-locks are locked in place before putting unit in water.
- ❑ Light products should be adjusted so that the bottom of drum is no lower that the bottom of the product.
- ❑ Connect hydraulic lines to the power pack.
- ❑ Attach the suction hose to the storage tank.
- ❑ Place throttle In "start" position (Throttle is located on the bottom side of the engine under the control panel)
- ❑ Push down on the RED decompression lever. (Located on the top of the engine.)
- ❑ Make certain the flow control knobs are in the closed position. (Knobs screwed inward.)
- ❑ Open flow control knobs until reaching desired skimmer rotating speed.
- ❑ Periodically check for loose fittings and connections.

To Stop Engine

- ❑ Close both flow control valves.
- ❑ Push throttle lever slowly until engine stops.

Operation

- ❑ Inspect the skimmer. Check to make sure that there are no obstructing objects on the drum or in the trough system.
- ❑ Attach the suction hose to the transfer pump.

Continued on following page...

PC193 — Crucial Drum Skimmer (cont.)

- ❑ Attach the discharge hose to storage tank.
- ❑ Strap on the hose floats and adjust is so the skimmer operates flat and level.
- ❑ Start the skimmer hydraulic power pack.
- ❑ Slowly open the black knob on the hydraulic manifold block until the drum begins to turn.
- ❑ Place the skimmer into the desired skimming location.
- ❑ Open the black speed control knob until the desired rum speed is achieved.
- ❑ Fully open the black speed control knob on the hydraulic manifold block labeled “ High “ this will start the Oil transfer pump.

Shutdown

- ❑ Be sure all hydraulic controls are in the off position.
- ❑ Lower engine speed to idle and let unit cool down prior to shutting it off.
- ❑ Remove the equipment from the water before removing the hydraulic lines.
- ❑ Place the skimmer head into a containment pit for decon.
- ❑ Check all fluids and top off prior to putting equipment away in proper location.

APPENDIX D

RELATED INFORMATION

This appendix contains a variety of information that may be useful during a spill response.

Contents include (in the following order):

- Conversion factors and constants
- Formulas for determining spill volumes (*in addition to those found in Tactic T-7*)
- Knots
- Directions for crane and helicopter slinging

Conversion Factors

Volume

- 1 barrel US = 42 gallons (US) = 159 liters
- 1 barrel (Imp) = 45.1 gallons (Imp) = 205 liters
- 1 gallon (Imp) = 1.2 gallons (US) = 4.546 liters
- 1 gallon (US) = 0.833 gallons (Imp)
- 1 gallon (US) = 128 fluid ounces (US) = 231 cubic inches
- 1 cubic meter = 1000 liters = 6.29 barrels (US)
- 1 liter = 0.22 gallons (Imp) = 0.264 gallons (US)
- 1 cubic foot = 7.48 gallons (US) = 0.0283 cubic meters
- 1 cubic yard = 0.765 cubic meters
- 1 cubic decimeter = 0.001 cubic meters = 1 liter
- 1 tonne (metric) = ~7.5 barrels (US) = 1000 liters

Flow

- 1 gallons/min = 0.134 cu ft/min
- 1 cu ft/min = 448.8 gallons/hr
- ft/sec x 0.6818 = mph
- ft/sec x 0.5921 = kph

Temperature

- (°F - 32) x 5/9 = °C
- (°C x 9/5) + 32 = °F

Weight of Liquid

- 1 gallon (US) = 8.34 lb x specific gravity (SG)
- 1 cubic foot = 62.4 lb x SG
- 1 lb = 0.12 gallon (US) + SG = 0.016 cu ft + SG

Specific Gravity

	SG	Bbl/Tonne	Lb/Gallon
Crude oil	0.80-0.97	8.0-6.6	6.6-8.0
Motor gas	0.71-0.79	9.0-8.1	5.8-6.5
Gas oil	0.82-0.90	7.8-7.1	6.7-7.4
Diesel oil	0.82-0.92	7.8-6.9	6.7-7.6
Lube oil	0.85-0.95	7.5-6.7	7.0-7.8
Fuel oil	0.92-0.99	6.9-6.5	7.6-8.1

Weight of Water

- 1 cu ft @ 50°F weighs 62.41 lb
- 1 gallon @ 50°F weighs 8.34 lb
- 1 cu ft @ 39.2°F weighs 62.43 lb
  (water's greatest density occurs at 39.2°F)
- 1 cu ft of ice weighs 57.2 lb

Conversion Constants

To Change:	To:	Multiply By:
Atmospheres	Inches of mercury	29.92
Atmospheres	Feet of water	34
Atmospheres	Pounds/square inch	14.696
Centimeters	Inches	0.394
Cubic feet	Cubic inches	1728
Cubic feet	Cubic yards	0.03703
Cubic feet	Gallons	7.48
Cubic inches	Cubic feet	0.00058
Cubic inches	Gallons	0.00433
Cubic yards	Cubic feet	27
Feet	Inches	12
Feet	Yards	0.3333
Feet of water	Inches of mercury	0.8824
Feet of water	Pounds/square inch	0.434
Feet of water	Pounds/square foot	62.5
Gallons	Cubic inches	231
Gallons	Cubic feet	0.1337
Gallons	Pounds of water	8.33
Inches	Feet	0.0833
Inches	Millimeters	25.4
Inches	Centimeters	2.538
Inches of mercury	Inches of water	13.6
Inches of mercury	Feet of water	1.1333
Inches of mercury	Pounds/square inch	0.4914
Inches of water	Ounces/square inch	0.578
Inches of water	Pounds/square inch	0.0361
Inches of water	Pounds/square foot	5.2
Kilometers	Miles	0.6214
Long tons	Pounds	2240
Meters	Yards	1.094
Miles	Kilometers	1.609
Millimeters	Inches	0.039
Ounces	Pounds	0.0625
Ounces/square inch	Inches of mercury	0.127
Ounces/square inch	Inches of water	1.733
Pounds	Ounces	16
Pounds of water	Gallons	0.12004
Pounds/square inch	Inches of water	27.72
Pounds/square inch	Feet of water	2.31
Pounds/square inch	Inches of mercury	2.04
Pounds/square inch	Atmospheres	0.0681
Short tons	Pounds	2000
Square feet	Square inches	144
Square feet	Square yards	0.11111
Square inches	Square feet	0.00694
Square yards	Square feet	9
Yards	Feet	3
Yards	Meters	0.914

Volume Determination

Capacity of Vertical Cylindrical Tank

$C \sim D^2 \times 0.49 \times h$

Where: C = capacity of tank in gallons
D = diameter of tank in feet
h = height of tank in inches

Potential Volume Loss from Total Line Rupture

VL = PR x T + D

Where: VL = estimated total volume loss in barrels
PR = pumping rate at start of rupture in barrels/minute
T = time in minutes from rupture to shutdown
D = drainage (contents of pipeline between two nearest valves or other isolation points)

The volume that could drain through the ruptured opening will depend on the elevation of the pipeline segments to each side of the rupture and the location of the nearest valve. The rate of flow and total volume released from a submerged pipeline rupture could be significantly different from a ground-level or elevated pipeline. The effects of hydrostatic head and the displacement of oil with water within the pipeline could increase or decrease the severity of the spill, depending on the properties of the oil and the actual shape/orientation of the pipeline.

Potential Volume Loss from Small Hole in Large-Diameter Pipe

The approximation gained with the following formula is reasonable when the diameter of the hole is less than one-quarter of the pipe's inside diameter, the liquid is packed over the hole, and frictional losses are negligible.

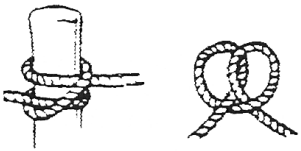
$V \sim 1800 \times A \times T \times \sqrt{OP}$

Where: V = volume in gallons
A = area of hole in square inches
T = time of leakage in hours
OP = pipeline operating pressure in psig

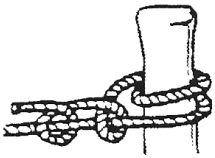
Becket/Sheet Bend - used to join lines of *different* sizes.

Double/Becket Bend - useful when you need to join *two large lines or hawsers* together.

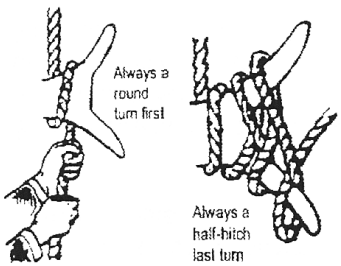
Bowline - useful knot as long as it is under tension.



Clove Hitch - may be used to make up to a piling or bollard

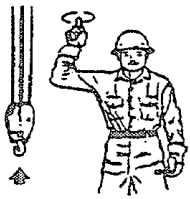
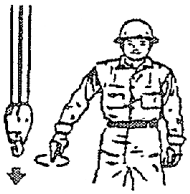
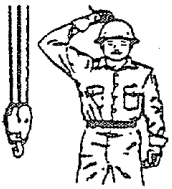
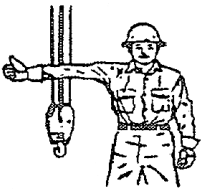
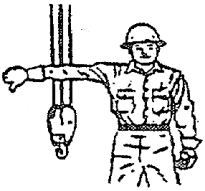
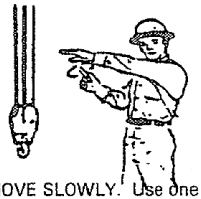
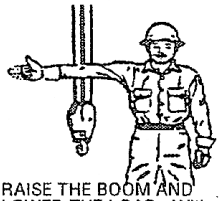
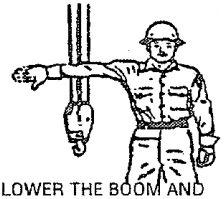


Two Half Hitches - may be used to make up to a piling or bollard.

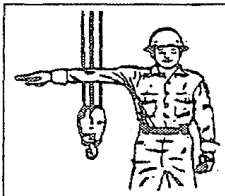
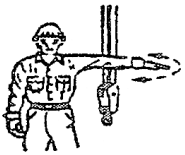
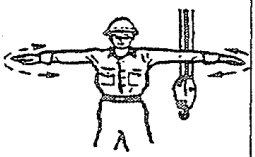
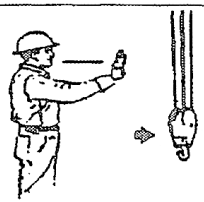
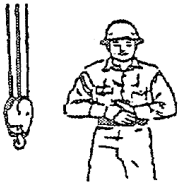


Making up to a Cleat

Crane Hand Signals

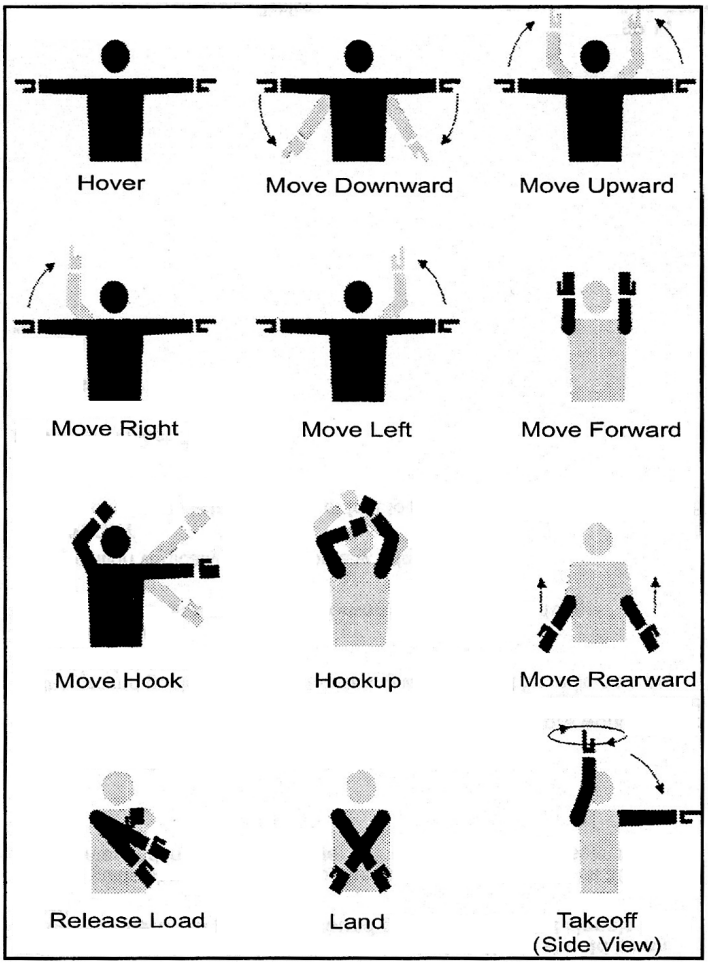
 HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.	 LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circle.	 USE MAIN HOIST. Tap fist on head; then use regular signals.
 USE WHIPLINE (Auxilliary Hoist). Tap elbow with one hand; then use regular signals.	 RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.	 LOWER BOOM. Arm extended, fingers closed, thumb pointing downward.
 MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)	 RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.	 LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.

Crane Hand Signals

 SWING. Arm extended, point with finger in direction of swing of boom.	 STOP. Arm extended, palm down move arm back and forth horizontally.	 EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.
 TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.	 DOG EVERYTHING. Clasp hands in front of body.	 TRAVEL (both tracks). Use both fists in front of body, making a circular motion about each other, indicating direction of travel, forward or backward. (For land cranes only.)
 TRAVEL (One Track). Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist rotated vertically in front of body. (For land cranes only.)	 EXTEND BOOM (Telescoping Booms). Both fists in front of body with thumbs pointing outward.	 RETRACT BOOM (Telescoping Booms). Both fists in front of body with thumbs pointing toward each other.

Helicopter Hand Signals

Ground guide should stand clear of the rotor area and should be 30 to 40 feet from center and in front of helicopter, where he can be easily seen by the pilot. All hand signals are to be given with reference to the pilot. As ground guide faces pilot, the direction of movement is in reference to the direction the pilot plans to move the helicopter. Hand signals are to be used in conjunction with radio communications. **Before slinging is started, there should be an agreement between pilot and ground guide on the hand signals to be used.**



Sling Inspection Checklists

SYNTHETIC SLINGS

Criteria for Removal from Service: A synthetic sling shall be removed from service if damage such as the following is visible and shall only be returned to service when approved by a designated person.

- Acid or caustic burns.
- Melting or charring on any part of the sling.
- Holes, tears, cuts, or snags.
- Broken or worn stitching in load bearing splices.
- Excessive abrasive wear.
- Knots in any part of the sling.
- Excessive pitting or corrosion, or cracked, distorted, or broken fittings.
- Other visible damage that causes doubt as to the strength of the sling.
- Missing or illegible sling identification

WIRE ROPE SLINGS

Criteria for Removal from Service: Wire rope slings shall be immediately removed from service if any of the following conditions are present.

- Ten randomly distributed broken wires in one lay or five broken wires in one strand in one lay.
- Wear or scraping of one-third the original diameter of outside individual wires.
- Kinking, crushing, bird caging or any other damage to wire rope structure.
- Evidence of heat damage.
- End attachments that are cracked, deformed, or worn.
- Corrosion of the rope or end attachments.
- Hooks that have been opened more than 15% of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook.