ARCTIC RESPONSE TECHNOLOGY
OIL SPILL PREPAREDNESS

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IN SITU BURNING IN ICE-AFFECTED WATERS:

STATUS OF REGULATIONS IN ARCTIC AND SUB-ARCTIC COUNTRIES

FINAL REPORT 7.2.1

Report from Joint Industry Programme to present status of regulations related to in situ burning in Arctic and sub-Arctic countries.

ABOUT THE JIP

Over the past four decades, the oil and gas industry has made significant advances in being able to detect, contain and clean up spills in Arctic environments. To further build on existing research, increase understanding of potential impacts of oil on the Arctic marine environment, and improve the technologies and methodologies for oil spill response, in January 2012, the international oil and gas industry launched a collaborative four-year effort – the Arctic Oil Spill Response Technology Joint Industry Programme (JIP).

Over the course of the programme, the JIP will carry out a series of advanced research projects on six key areas: dispersants, environmental effects, trajectory modeling, remote sensing, mechanical recovery and in situ burning. Expert technical working groups for each project are populated by the top researchers from each of the member companies.

JIP MEMBERS

The JIP is managed under the auspices of the International Association of Oil and Gas Producers (OGP) and is supported by nine international oil and gas companies – BP, Chevron, ConocoPhillips, Eni, ExxonMobil, North Caspian Operating Company (NCOC), Shell, Statoil, and Total – making it the largest pan-industry programme dedicated to this area of research and development.

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CHAPTER 1. INTRODUCTION

This report describes the present status of regulations related to in situ burning (ISB) in Arctic and sub-Arctic countries and identifies the potential obstacles to achieving permission to conduct a controlled burn in jurisdictions where it is not presently allowed. This is followed by a discussion of potential opportunities in the near-term (ca. 2013) to effectively communicate the benefits and merits of ISB as a response countermeasure.

CHAPTER 2. STATUS OF IN SITU BURNING IN COUNTRIES WITH ICE-AFFECTED WATERS

Countries with marine areas affected by ice conditions for at least a portion of the year were surveyed for their regulatory position on the use of ISB as a countermeasure. This included the following Arctic and sub-Arctic nations (Figure 1):

- Canada
- Denmark
- Finland
- Greenland
- Iceland
- Japan
- Kazakhstan
- Norway
- Russia
- Sweden
- United States

Members of the study team contacted key members of governing agencies of each of the respective countries to determine the status of regulations pertaining to ISB. Of those surveyed, only the United States (specifically Alaska) has a documented procedure for approving the use of ISB as a response technique. Two regions in Canada have established guidelines for the use of ISB, and work is presently underway to clarify the guidelines for use in contingency plans related to proposed developments in the Canadian Arctic. In all other countries there has either been little serious thought given to ISB and/or a general antipathy towards its use.

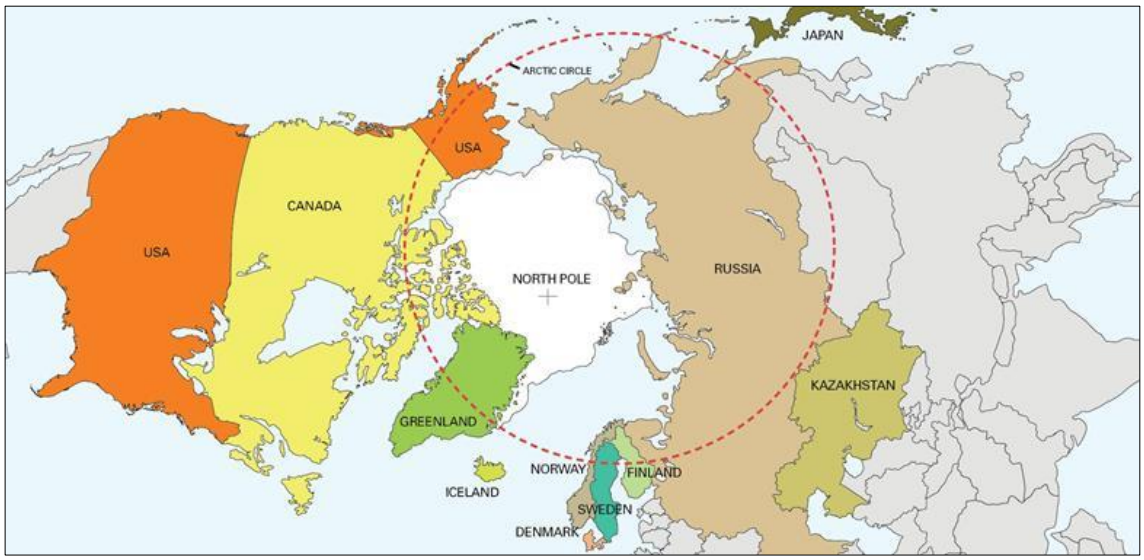

Figure 1: Countries surveyed for regulatory status of ISB

2.1 Status of ISB in United States (Alaska)

The State of Alaska has a comprehensive set of guidelines, regulations, and authorization requirements for the use of controlled ISB during a spill event. The full potential for controlled burning under extreme cold conditions was recognized more than 30 years ago in Alaska as the State and oil companies expanded their offshore exploration and production activities. The Alaska Department of Environmental Conservation (ADEC) worked closely with the U.S. Coast Guard, The U.S. Minerals Management Service, (now the Bureau of Safety and Environmental Enforcement, BSEE), the U.S. National Oceanographic and Atmospheric Administration (NOAA), and the U.S. Environmental Protection Agency to explore the relative advantages and disadvantages of ISB; the potential for burning under Arctic conditions; possible environmental impacts; and safety issues involving responders and the general public. Exhaustive studies and workshops were conducted involving subject matter experts, academia, regulators, oil company representatives, and potentially affected native communities. These efforts resulted in the preparation and approval of the in situ burning guidelines for Alaska, revision 1 (Alaska 2008). The Alaska Regional Response Team (ARRT), along with BSEE and NOAA continue to work with closely with Federal and State agencies and with oil company representatives to monitor ISB technology and improvements, and to use the State ISB Guidelines for planning, training, and implementation of all ISB activities.

The guidelines stipulate that before any in situ burn can be used, regulatory approval must be obtained. This is accomplished by filling in and submitting an "Application and Burn Plan" (provided as Appendix 1 in the State Guidelines at http://www.dec.state.ak.us/spar/perp/docs/ISB-Rev1 (Final-August%202008).pdf) to the Unified Command.

Alaska Clean Seas is a response organization for the North Slope of Alaska, i.e., for the area in and around Prudhoe Bay, Alaska. Their response manual provides a good summary of the decision-making procedure involved in an application to burn (Figure 2; ACS 2012). The flowchart illustrates the four fundamental decisions considered by the Federal and State On-Scene Coordinators when reviewing an application to burn. These decisions involve the

adequacy of mechanical containment and recovery alone, the feasibility of conducting a burn, possible exposure of the public to the burn and its smoke plume, and the ability to issue appropriate warnings to the public.

While mechanical recovery of a spill is, and will likely remain, a favored option for spill response, physical containment and removal of spilled oil will rarely account for a major percentage of a spill. Since mechanical removal will often be feasible, but not sufficient, the second decision step involving "feasibility" in Figure 2 includes such considerations as:

- The nature and location of the spill source and proposed burn(s);
- The type, condition and volume of the oil to be burned;
- The weather conditions (wind, waves, visibility, etc.);
- The nature and amount of ice present;
- The availability of fire boom, igniters, vessels, aircraft, etc. and;
- The availability of trained personnel to initiate, sustain, and monitor burns.

These and other feasibility issues are addressed within the Alaska guidelines along with specific information needs (Steps 3 and 4 in Figure 2) involving the protection and warning of the public. The guidelines provide "Safe Distances" that must be achieved between in situ burns and downwind human populations. Such distances are typically between 1 and 3 miles (approximately 1.6 to 5 km) depending upon the location of the burns (on land or on water and distance from shore), the type of terrain involved, and the atmospheric conditions at the time of any proposed burns.

Before ADEC will grant approval for the use of controlled burning (whether offshore, nearshore, inland or onshore), the Alaska ISB Application and Burn Plan form must be complete with detailed information on:

- The planned number of burns;
- The most-likely trajectories for the smoke plumes;
- How resources will be deployed to conduct the burns;
- Plans for recovery of burn residue;
- How burns might be coordinated with simultaneous skimming and/or dispersant application activities; and
- How the burns and their smoke plumes will be monitored and documented.

The Alaska guidelines address specific operational requirements regarding the safe and effective use of igniters and ignition techniques; equipment deployment considerations and limitations; radio communications among responders; supervisors and command; and the implementation of fire suppression and control measures, if needed.

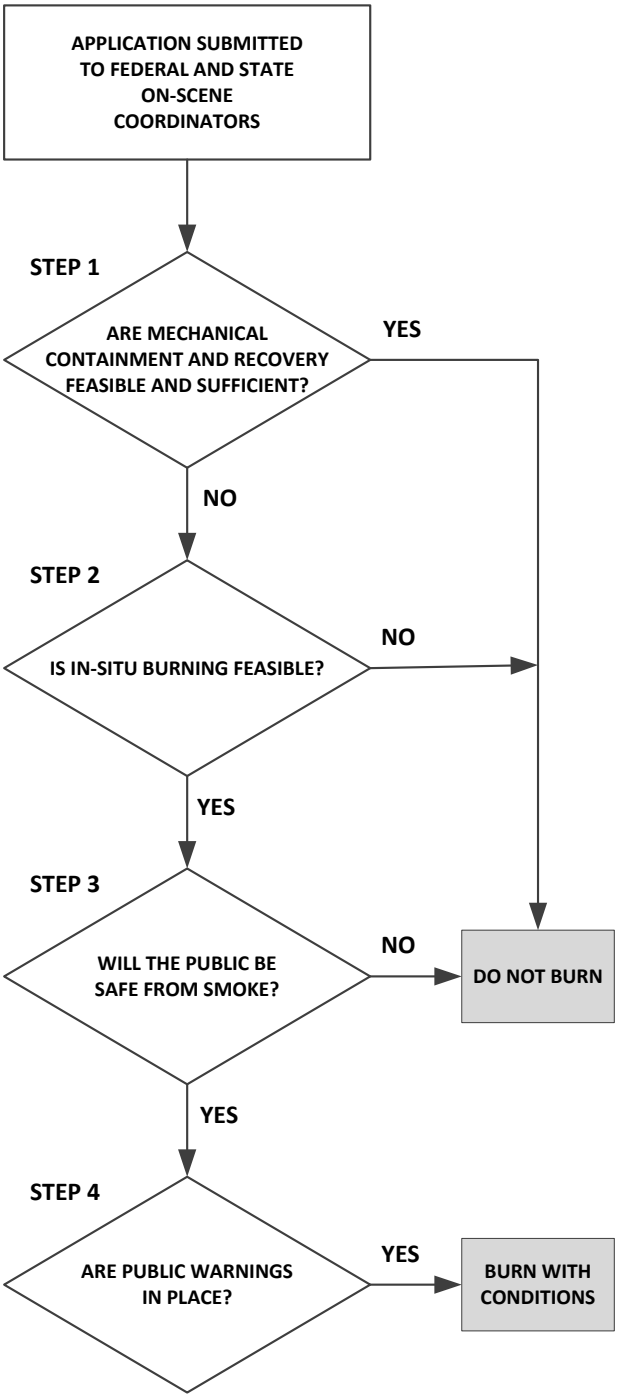

Figure 2: ISB Decision Tree (source: ACS Technical Manual, Vol 1, 3/12)

Once these guidelines and burn plans have been approved for a specific operating period, resources are deployed to assist with containment of oil to thicknesses that will support combustion. Such containment may be achieved with fire boom and/or with the help of ice floes, pits, or other natural barriers. Ignition of contained oil is designed to limit any potential flashback and prevent ignition of the spill source if it is not already burning. Throughout a burn, the size and duration of the fire is monitored and documented; the condition of the fire boom is observed both from the surface and the air; and aerial observers watch for any potential safety hazards or impacts to wildlife in the region. Upon completion of each burn, every effort is made to recover any remaining burn residue.

The Alaska guidelines do not presently address the use of herding agents to thicken oil for ignition and burning. Since two herding agents specifically designed for ISB in pack ice are now listed on the EPA National Contingency Plan Product Schedule, consideration should be given to approaching the ARRT to include these in their ISB Guidelines.

2.2 Status of ISB in Canada

The legislative requirements in Canada for the approval or disapproval of ISB are not clear, and in most parts of the country the issue has not received serious study until recently. Although the requirements are unclear, there is an expectation on the part of Environment Canada (EC), Canadian Coast Guard (CCG), and the Department of Fisheries and Oceans (DFO) that the party responsible for a spill would request permission to conduct a burn through the Regional Environmental Emergency Team (REET). The REET is composed of representatives of EC, CCG, and DFO among others and is convened at the time of a spill for the purpose of providing scientific advice to the government on spill response matters. Three regions within Canada that have addressed the issue of ISB approval are 1) the Quebec regions of EC and CCG; 2) the Pacific regions of DFO and CCG in conjunction with the provincial environment ministry; and 3) CCG with respect to the joint Canada/United States contingency plan for the waters of Dixon Entrance.

An evaluation procedure for the potential use of ISB in Quebec waters was developed jointly by Provincial authorities, EC, CCG, DFO, and Eastern Canada Response Corporation (REET 2003). The procedure sets out the following steps:

- The requesting party or the CCG must notify the coordinator of the REET of the intention of the responder to use ISB. This can be done verbally or by presenting its preliminary analysis.
- The coordinator of REET must immediately notify the members of REET.
- The members of REET must, wherever possible, provide the information required for a decision on the use of ISB within a maximum time period of 8 hours.
- The information must be sent to the coordinator of REET.
- REET holds a meeting devoted exclusively to making a decision on the use of ISB. This meeting can be held by conference call.
- The decision of REET will rest on the evaluation of the environmental gains obtained by the use of ISB.
- The maximum time period between a request to use ISB and a decision of REET is 10 hours.

The request must contain relevant details of the spill, including:

- Spill location;
- Spill volume and dimensions;
- Description of the oil, including density and likely or observed changes due to weathering and emulsification;
- Estimated slick thickness;
- Distance to shore;
- Water depth;
- Trajectory forecast;

- Location and distance of potentially sensitive elements re: smoke plume;
- Met/ocean conditions; and,
- Summary of potential effects, with and without burning.

Guidelines for the use of ISB have also been developed for the waters off British Columbia by DFO Pacific Region, EC Pacific & Yukon Region, and the Ministry of Environment, Lands, and Parks (Province of British Columbia). The guidelines state an ISB policy as (DFO 2001):

> *Under the circumstances specified in this document, it is the regional policy of the Government of Canada (represented by Fisheries and Oceans Canada, Environment Canada) and the Government of British Columbia (represented by BC Ministry of Environment, Lands, and Parks) to either use or encourage the spiller to burn an accidental spill of oil.*

The guidelines describe the basis upon which pre-approved areas would be defined, those upon which a case-by-case determination would be made, and those areas where ISB would not be allowed. Specific guidance is described:

> *Pre-approved areas have been established whereby a burn may be undertaken at minimum, specified distances offshore. The distances vary depending on the type and amount of oil being proposed for burning. Pre-approved areas are necessary to expedite the decision-making process. The offshore distances range from 3 nautical miles (5.5 km) for heavy crude-like oils to 5 nautical miles (9.3 km) for light diesel-type oils. All distances exceed the calculated safe distances needed to protect public health. The calculated safe distances are derived from real field data obtained during numerous test burns and scientific studies. Approval to burn is not automatic, there are steps required, such as: submission of an in situ burn application, a feasibility analysis, supporting meteorological and sea conditions, and a burn plan. The type of information and how it is used are described in the British Columbia/Canada in situ Oil Burning Policy and Decision Guidelines.*

The requirements for ISB approval are also addressed in the Canada-United States joint contingency plan for the Dixon Entrance, those waters that straddle the Canada-U.S. border in northern British Columbia (March 2006). The plan, known as Canus-Dix, acknowledges there is no formal process to submit a request for a governmental recommendation for ISB (or for dispersant use) to the REET in Canada. Until a formal Canadian process is established, the Alaska guidelines and checklist are followed as an interim process. The Canus-Dix contingency plan essentially sets out a procedure for consultation, and provides a suggested list of key resources that should be considered when evaluating the potential effects of a spill and potentially, of an in situ burn of that spill. Direct reference is made to the Alaska checklist in the plan:

> *There is no formal process to submit a request for a recommendation for dispersant use to the Regional Environmental Emergency Team in Canada. Until such time that a formal Canadian process is established, the interim process will include receipt of a completed "Oil Spill Response Checklist: Dispersant Use in Zones 2 and 3 and in Undesignated Areas" for a dispersant request. [A copy of this checklist is available on the Internet at: http://www.akrrt.org/UnifedPlan/F-Annex.pdf]*

> *For an in situ burning request, the procedure will include receipt of an "In Situ Burning Application Form," Parts 1 to 4 from the draft BC/Canada In Situ Oil Burning Policy and Decision Guidelines, which must be completed, approved, and signed by the Incident Commander of the applicant company or agency.* (CCG 2006).

Finally, with renewed interest in oil exploration in the Canadian Beaufort Sea, industry and regulators have initiated a process to examine the requirements for approval of both ISB and dispersants as potential spill response options. The intent is to develop a regulatory procedure to be followed at the contingency planning stage, such that relevant issues can be addressed and an adequate Net Environmental Benefit Analysis (NEBA) is can be performed in advance of any spill. In the event of a spill, use of ISB would still require approval from the Chief Conservation Officer of the National Energy Board (the regulator for drilling in the offshore waters of Canada), but this would be implicit in the approval of ISB as a response measure in the contingency planning phase. Where there is Canadian legislation or regulation that could be an impediment to use of ISB, it has been proposed to include a "notwithstanding clause", i.e., notwithstanding the potentially harmful effects of ISB, its use can be considered when it would likely have a NEBA, in the opinion of the REET.

2.3 Status of ISB in Other Countries

Denmark: The use of ISB does not appear to have been seriously considered in Denmark, with no mention of ISB in the national oil spill contingency plan (DK 2012). The primary method for spill response is mechanical recovery and in very few instances dispersants might be used. There is no pre-approval procedure for dispersant use.

Finland: Mechanical recovery is the preferred option, with ISB and dispersant use discouraged given the relatively enclosed nature of the Baltic Sea, the main area of interest for spill contingency planning.

Greenland: In the oil spill contingency plan for Greenland (GL 2007) ISB is not included as an oil spill response method. However, oil companies operating in Greenland have included ISB as a response technique in their contingency plans (Cairn 2011), with the stipulation that any burns be conducted 10 kilometres (6 miles) or more from land. In the event that ISB operations were contemplated, approval would be required from the Greenland Bureau of Minerals and Petroleum (BMP), and would be evaluated on a case-by-case basis. A recommended set of regulations for use of ISB off West Greenland has been proposed by BMP, with the condition that more knowledge about environmental consequences of ISB should be investigated. Particular attention has been paid to the effects of burn residues, smoke production, the fate of the smoke plume trajectory for Greenlandic conditions, better technologies to recover the residue, and investigations about the environmental impact of herders.

Greenland has also recently established a national response organization, Greenland Oil Spill Response A/S, which will supplement license holders' oil spill response capabilities. In the longer term, Greenland Oil Spill Response A/S intends to add ISB capability to their services.

Iceland: The primary response option for use in Iceland is mechanical containment and recovery. A secondary approach could be use of dispersants; however approval is required prior to use (AMAP, 2010). The use of ISB has not been seriously considered.

Japan: Mechanical recovery is the preferred response option and ISB has not been given serious consideration. There is no official position on the use of ISB; however, two sets of fire-resistant boom were acquired in 2011 by the Maritime Disaster Protection Center.

Kazakhstan: The National Oil Spill Contingency Plan for Kazakhstan recognises ISB as a potential response option, and states that response organizations contemplating the use of ISB shall detail, in their contingency plan, the procedures for obtaining a permit and undertaking a burn. The Ministry of Environmental Protection is the authority that would issue a permit for ISB; however, there is no guidance available on the procedures for obtaining such a permit or more explicit criteria on which an ISB decision would be based.

Norway: Both mechanical recovery and use of dispersants are response options that are operational and can be used in spill situations in Norway. Justification regarding response method is to be based on a NEBA evaluation. Emergency response assessment of relevant spill scenarios should be documented in a scenario-based contingency plan, including both consideration of mechanical recovery and use of dispersants. Oil spill response methods giving the best overall benefit for the environment, either alone or in combination, should be documented in the plan. In situ burning is not yet operational as a response option for the oil and gas industry in Norway. ISB in open water will require booming and the general feeling is that, "if the oil is already boomed, the most difficult operation is done and the oil should be recovered". There is also a general feeling that the current state-of-the-art in fire-resistant boom technology is only suitable for harbours and sheltered waters as opposed to the robust conditions of the Northern Seas. It is expected that this strategy will be included in plans and implemented as an operational response strategy as oil and gas activity moves into areas that can be ice-covered.

Russia: There are currently no national regulations in force regarding ISB. Previously, there was regulation RD 31.04.25 – 86, "Application of burning promoter MIG 3 for ISB of oil", developed in 1986, but it was canceled. According to the Russian Maritime Institute (CNIIMF), consideration is being given to developing new regulations on ISB with anticipated completion in 2014. CNIIMF states that there is some interest in considering ISB, and representatives took part in the development of "IMO Guideline for Oil Spill Response Offshore In Situ Burning" adopted by the OPRC/HNS Technical Group last year.

Sweden: Mechanical recovery is the preferred option, with ISB and dispersant use discouraged given the relatively enclosed nature of the Baltic Sea, the main area of interest for spill contingency planning.

2.4 Summary

Table 1 summarizes the present status of acceptance of ISB as a response technique in the countries surveyed, as well as listing the key agencies that are likely to be part of an ISB decision.

As described above, Alaska in the United States is the only Arctic jurisdiction in which ISB is regarded as a primary countermeasures technique with a specific approval process presently in place. Alaska is useful as an example for not only the documented guidelines but also as a roadmap for how to achieve acceptance of ISB and how to develop an approval process. As noted above, their development of ISB guidelines required several years of work, involving research studies and workshops, and involving a concerted effort on the part of regulators,

industry, and potentially affected native communities. In most other jurisdictions, ISB has not been given serious consideration and will require a similar effort to overcome general concerns over:

- The relative merits of ISB compared with the presently preferred approach of mechanical recovery;
- The safety implications if ISB;
- The potential effects of smoke produced for a burn;
- The likely fate and potential effects of burn residue;
- The likely fate and potential effects of herding agents; and,
- The suitability of ISB techniques and presently available technologies to local conditions.

Table 1: Summary of ISB regulatory status and key agencies involved in ISB decision-making

Country	Present status of ISB	Key agencies involved in ISB decision-making
Canada	No formal process exists; however, two regions have established guidelines. Work presently underway to establish guidelines for proposed Arctic development projects.	Environment Canada Department of Fisheries and Oceans Canadian Coast Guard
Denmark	ISB has not been seriously considered.	Environmental Protection Agency Ministry of the Environment Navy – Danish Admiral Fleet Emergency Management Agency
Finland	ISB not encouraged given relatively enclosed nature of the Baltic Sea.	Finnish Environment Institute (SYKE), Ministry of the Environment
Greenland	ISB has been accepted as an option in recent contingency plans; more information on effects on burning required before a comprehensive acceptance as a response technique.	Bureau of Minerals and Petroleum Environment Agency for the Mineral Resources Area (newly established) Joint Arctic Command
Iceland	ISB has not been seriously considered.	Environment Agency of Iceland National Energy Authority Ministry for the Environment and Natural Resources
Japan	ISB has not been seriously considered.	Maritime Disaster Protection Centre Japan Coast Guard Natural Resources and Energy
Kazakhstan	ISB has not been seriously considered until recently. Work presently underway to establish guidelines for acceptance as a potential response technique.	Ministry of Environmental Protection Ministry of Oil and Gas Kazakh Institute of Oil & Gas
Norway	ISB is currently not implemented for off-shore locations without ice. Increased focus on ISB as the oil and gas industry is moving closer to areas where a spill can reach the ice edge.	Norwegian Environment Agency Ministry of the Environment, Norwegian Coastal Administration
Russia	ISB has not been seriously considered. There are no regulations presently in force related to ISB but regulations are under consideration.	Russian Maritime Institute (CNIIMF) State Marine Pollution Control, Rescue and Salvage Administration (MPCRSA), Ministry of Transport Ministry of Natural Resources Ministry of Health
Sweden	ISB not encouraged given relatively enclosed nature of the Baltic Sea.	Swedish Civil Contingencies Agency (MSB) The Swedish Coast Guard
United States	Recognized as a primary response option in certain conditions. Documented procedure in place for Alaskan waters.	Alaska Department of Environmental Conservation U.S. Coast Guard National Oceanographic and Atmospheric Administration Environmental Protection Agency

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