

Arctic Emergencies: Current and Future Risks, Mitigation, and Response Cooperation

Emergency Prevention, Preparedness and
Response Working Group

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FORWARD

This report represents a review of EPPR's past work on Arctic emergencies and a look ahead to the new risks inherent in increased development and marine activity precipitated by the climactic changes taking place in the Arctic. The creation of the Task Force on Arctic Oil Spill Preparedness and Response at the 2011 Nuuk Ministerial meeting of the Arctic Council, provided a new focus for the report from that which was originally envisioned. EPPR's goal is to support the work of the Task Force by providing a snapshot of Arctic preparedness and response capabilities, existing and emerging risks, infrastructure deficits, and the mitigation strategies which Arctic states have begun to implement. This report is thus intended to provide a contextual reference for the Task force as it begins its deliberations.

INTRODUCTION: EMERGENCY PREVENTION, PREPAREDNESS, AND RESPONSE WORKING GROUP (EPPR)

The mandate of the EPPR Working Group (EPPR) is to deal with the prevention, preparedness and response to environmental emergencies in the Arctic. Members of the Working Group exchange information on best practices and conduct projects (e.g. development of guidance and risk assessment methodologies, response exercises, training etc.). EPPR is not a response organization. The work focuses mainly on oil and gas transportation and extraction, and on radiological and other hazards. In 2004, EPPR was directed by the Arctic Ministers to expand its mandate to include natural disasters. Looking forward as globalization and changing environmental conditions open the Arctic seas to increased marine traffic and activity, EPPR recognizes the need to address the challenges created by the changing nature of potential Arctic environmental emergencies.

A. BACKGROUND

In 1996 EPPR was requested to analyze the effectiveness of existing international agreements and other arrangements in the Arctic within EPPR's area of expertise. The analysis was conducted in order to determine whether existing international, bilateral, and regional agreements provided a legal framework for mutual assistance to protect the environment in the event of pollution emergencies in Arctic waters. EPPR reviewed existing bi-lateral and multi-lateral arrangements in order to evaluate the adequacy of the geographical coverage of the Arctic regions by cooperative arrangements; and considered and recommended the necessary system of cooperation within the EPPR mandate.

That study, referred to as "The Gap Analysis,"¹ indicated that there were no significant gaps, (the 2000 Gap Analysis). EPPR also conducted an inventory and assessment of the risks posed by human activities that could potentially have trans-boundary releases in the Arctic environment² (referred to as "the Risk Analysis").

This report was originally intended to update EPPR's report on the sufficiency of the existing legal framework, and to evaluate current and future risks in the Arctic in order to gauge the adequacy of existing arrangements. EPPR undertook that endeavour before the advent of Deepwater Horizon³ oil rig explosion and well blow-out (DHS), and the Fukushima Dai'ichi Nuclear Power Plant⁴ in Japan (Fukushima). While neither event took place in the

¹ Emergency Prevention, Preparedness and Response (EPPR) Working Group of the Arctic Council, "Analysis of the Adequacy and Effectiveness of Existing Arrangements and Agreements" (August 2000)

² Emergency Prevention, Preparedness and Response (EPPR) Working Group of the Arctic Council, "Environmental Risk Analysis of Arctic Activities, Risk Analysis Report No. 2" (1998)

³ An oil platform explosion and well blow-out in the deep waters of the Gulf of Mexico (~5,000ft/1,500m) killing 11 people and spilling between 172 – 185 MB of crude which flowed from April 20, 2011 for 3 months in the summer of 2010. The impact of the spill and mitigation efforts, including record release of dispersants, continues since the well was killed in September 2010. It is the largest accidental marine oil spill in the history of the petroleum industry.

⁴ A series of reactor failures and release of radioactive material at the Japanese Fukushima Dai'ichi Nuclear Power Plant following the 9.0 Tōhoku earthquake and powerful tsunami on March 11, 2011. The earthquake struck in the sea just off the coast from the Fukushima Prefecture in Japan. The location of the quake's epicenter was 38° 6'N and 142° 51'E. The epicenter had a depth of 24km. The earthquake was quickly

Arctic, these two catastrophic events transformed the worst case scenarios for oil and nuclear emergencies. In both events, the operational difficulties of dealing with catastrophic equipment failure and the devastation of a nuclear complex wrought by two natural disasters of unforeseen magnitude, tested preparedness and response capacity as had never occurred before.

Since the advent of the Deepwater Horizon (DWH) incident April 20, 2010, the lessons learned from that incident have infused the response community with a sense of urgency to protect against, prepare, and mount an effective response. If such an oil spill were to occur in the Arctic, international cooperation and assistance would likely be required. Thus EPPR quickly focused on understanding the operational requirements for mounting a coordinated international response. While legal arrangements for international cooperation in the Gulf of Mexico existed, these proved insufficient to overcome some of the administrative and other deficits that prevented seamless international cooperation. EPPR concluded that the same would be true in the Arctic, and proposed a project to develop an arrangement among the eight Arctic Council member nations to facilitate the making and acceptance of offers of assistance during a response. Senior Arctic Officials not only approved the concept, but recommended to the Nuuk Ministerial that the Ministers establish a Task Force to “develop an international instrument on Arctic marine oil pollution preparedness and response”.⁵ Thus the original focus of this report has been overtaken by events, as the Arctic oil pollution emergency preparedness and response Task Force will now be examining preparedness and response gaps as part of its work.

Accordingly, this report will focus on providing a snapshot of the changes affecting Arctic preparedness and response capability, existing and emerging risks, response infrastructure deficits, and mitigation strategies being implemented, as a means of providing a context within which the Task Force begins the conduct of its deliberations. The report also features an update to the annotated list of applicable international, multi- and bi-lateral agreements to which many of the Arctic nations are a party (Appendix 1).

In addition to the above events, this report was also informed by a number of Arctic Council publications having a bearing on preparedness and response: *The Arctic Climate Impact Assessment* (2004) (the rapid and severe climate change ongoing in the Arctic; a key finding was that “reduced sea ice is very likely to increase marine transport and access to resources”), the *Arctic Council Arctic Oil and Gas Assessment* (2008) and the *Arctic Marine Shipping Assessment* (2009) (AMSA Report) (Arctic states should continue to develop circumpolar environmental pollution response capabilities and oil spill contingency plans; recommendation to accomplish this goal through circumpolar cooperation agreements was referred to EPPR); and *Opening the Arctic Seas: Envisioning Disasters and Framing*

followed by a tsunami that overwhelmed the Fukushima Dai’ichi Nuclear Power plant with an estimated wave of more than 14m, setting off a chain of events that resulted in the release of ionizing radiation into the atmosphere. Although Fukushima is a recent event, the lessons learned from this incident have begun to be determined, following several concerted international efforts. In response to a Ministerial Conference convened by the International Atomic Energy Authority (IAEA) in June, 2011, an action plan on nuclear safety was endorsed by the Board of Governors and the IAEA General Conference, both held in September, 2011. The IAEA had previously approved an Action Plan to strengthen emergency management through the adoption of the “International Action Plan for Strengthening Preparedness and Response System for Nuclear and Radiological Emergencies” in March, 2011.

⁵ “Nuuk Ministerial Declaration,” May 12, 2011, *Arctic Council Declarations*.

Solutions (2009) (detailing the results of a workshop sponsored by the U.S. National Oceanographic and Atmospheric Administration (NOAA)).

The report titled *Opening the Arctic Seas: Envisioning Disasters and Framing Solutions*, summarizing the proceedings of an AMSA workshop which was held in March 2008 at the Coastal Response Research Center of the University of New Hampshire, contributed significantly to this report. The goal of the workshop was to identify key strategies, action items and resource needs for preparedness and response to potential Arctic marine incidents, predicated on the risks associated with increased marine activity. International participation in the workshop included the U.S., Canada, Denmark, Russian Federation, Norway and Finland. The workshop focused on the qualitative risk factors for five plausible incidents⁶ which bore some significance to incidents that had already occurred in polar waters. The incidents were designed to explore spill response, search and rescue, firefighting and salvage, communications, governance and jurisdiction, and legal issues. The questions for each scenario elicited discussions about the nature of a response should this incident occur in the Arctic. The five incidents were:

- Cruise ship grounding near the west coast of Greenland
- Bulk carrier trapped in ice in the central Arctic Ocean
- Fire and collision in offshore operations in the Beaufort Sea
- Oil tanker and fishing vessel collision in the Beaufort Sea
- Tug and barge grounding on St. Lawrence Island in the Bering Sea

The workshop identified key areas of data and research needs, two of which are specifically relevant to EPPR

- The updating of weather data and updating of navigational charts for Arctic regional seas, ports and waterways
- Studies on the behavior of oil in cold water and technologies for spill response (including the detection of oil under ice as well as cleanup measures for oil in ice)

An overarching result of the conference was that the Arctic states need to foster and enhance their cooperation to improve joint contingency plans and multinational agreements, as well as to agree to develop mandatory safety regulations for Arctic marine operations.

These major initiatives influenced EPPR's decision to revise the Gap Analysis in many significant ways and deliberations at the EPPR meeting in Vorkuta, Russia in June 2010 reinforced this decision. Discussions focused on both the adequacy of the existing legal framework and the operational conditions for response. The AMSA Report is of particular importance because of concern about whether the existing capability and capacity to respond in cold, harsh, remote and often dark climate conditions with little infrastructure is sufficient to meet increased activities in shipping and other anthropogenic activities.

In summary, both environmental and economic forces have accelerated the pace of development and shipping activity in the Arctic much more rapidly than was anticipated

⁶ While none of the scenarios contemplated a DHW type of blow-out, the analysis of the scenarios are nevertheless instructive regarding the state of Arctic operational deficits.

when the last Gap Analysis was conducted in the year 2000. Recent Arctic marine accidents and events such as the 2010 blow-out of the Deepwater Horizon oil rig deep in the waters of the Gulf of Mexico underline the potential risk associated with such activities. The 2011 Tōhoku earthquake and tsunami and the associated nuclear crisis at the Fukushima Dai'ichi Nuclear Power Plant in Japan demonstrate the need to more fully consider risks associated with natural disasters. Thus, it has become more important than ever to examine activities in the Arctic, both current and projected, to better understand the risks posed by such activities and the state of preparedness necessary for mitigation. It is also essential to develop a strategy for responding to the types of emergencies that can be expected to arise as the pace of development activities quicken.

As used in this report, an environmental emergency refers to emergencies caused by anthropogenic activities including those resulting in the release of pollutants, and environmental impacts resulting from natural events (storms, floods, earthquakes, volcanic eruptions, etc.).

B. APPROACH

The overall approach that EPPR uses to evaluate the sufficiency of the legal framework for addressing emergencies in the Arctic includes:

- identifying activities posing increased risk in the Arctic (*e.g.*, Environmental Risk Analysis of Arctic Activities, EPPR Report No. 2, 1998);
- determining which existing arrangements and agreements relate to the activities that pose increased risk;
- identifying coverage each agreement provides and any gaps via consultation with the Arctic states, and
- identifying activities posing increased risk not covered by existing arrangements and agreements.

Recent incidents, burgeoning plans for development, and expectations that loss of sea ice will open Arctic sea lanes to more frequent marine traffic inevitably pose increased risks in the region which cannot be ignored. Many of these new activities and associated risks have already been identified in the three major Arctic Council assessments and the deliberations of the New Hampshire workshop noted above. The particular challenges of operating in an Arctic environment have been duly recognized as compounding the difficulties associated with preparedness and response. It is now an imperative to focus on mitigation strategies and agreements among Arctic nations to respond effectively by strengthening operational readiness.

C. IDENTIFIED RISKS

Occurring simultaneously with the globalization of the Arctic, marine access in the Arctic Ocean has been changing in unprecedented ways, driven by global climate change and economic forces. Arctic sea ice is undergoing an historic transformation which includes thinning, extent reduction in all seasons, and substantial reductions in multi-year ice in the central Arctic Ocean. This has significant implications for longer seasons of navigation and new access to previously difficult to reach coastal regions. These changes present increased demands on the existing legal and regulatory structures needed for enhanced marine safety and environmental protection associated with increasing Arctic marine activity. Such challenges will require unprecedented levels of cooperation among the eight Arctic states and broad engagement with many non-Arctic stakeholders within the global maritime industry.⁷

Both the *Arctic Council Arctic Oil and Gas Assessment* and the AMSA Report point to significantly increased development and marine activity including, but not limited to, oil and gas development, tourism, fishing, marine transport related to natural resources such as oil/gas and hard minerals, marine support of Arctic communities, and nuclear activities. The activities vary in type and extent from country to country. The accidental release or illegal discharge of oil into the Arctic environment is the most significant environmental threat to the region.⁸ Although the impacts from oil spills are generally local, they can have widespread and trans-boundary effects. A study by the United States Geological Survey⁹ suggests that about 20 percent of the world's oil and gas resources could be located in the Arctic.

The blow-out of the Deepwater Horizon oil rig deep in the waters of the Gulf of Mexico drew attention to the potential repercussions of offshore oil development. Such a scenario occurring in Arctic waters would provide even greater challenges than that which occurred in the Gulf of Mexico because of extremely harsh and variable environmental conditions, including shifting and often unstable sea ice, extreme cold temperatures, wind, high seas, storms, fog, and darkness. Insufficient infrastructure and safe access compound the potential problems associated with preparedness and response. Notwithstanding these challenges, many countries have ongoing plans for increased oil exploration and development throughout the Arctic.

Increased shipping activity related to tourism, fisheries, and marine transport present risks with respect to groundings, collisions, foundering and release of hazardous substances.¹⁰ Several incidents in 2010 illustrate the potential and the risks of enhanced use of Arctic waters. The potential is demonstrated by the voyage taken by the bulk carrier, the MV Nordic Barents, which safely carried over 40,000 tons of concentrated iron ore from Kirkenes, Norway by using the Northern Sea Route to reach a Chinese port.¹¹

⁷ Arctic Council, *Arctic Marine Shipping Assessment 2009 Report* (2009) <http://www.nrf.is/news/15-2009/60-arctic-marine-shipping-assessment-report-2009> (accessed September 19, 2011).

⁸ Arctic Council, *Arctic Marine Shipping Assessment 2009 Report* (2009).

⁹ Bird et al. *Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle* (Washington, DC: USGS, 2008).

¹⁰ Coastal Response Research Center at the University of New Hampshire, *Opening the Arctic Seas: Envisioning Disasters and Framing Solutions* (2009).

¹¹ Revkin, Andrew C., "Arctic Shipping Gets Boring," *New York Times*, Sept. 16, 2010, under "Dot Earth," <http://dotearth.blogs.nytimes.com/2010/09/16/arctic-shipping-gets-boring/> (accessed September 19, 2011).

The significance of this passage is that it shows that the Northern Sea Route can be an economical alternative sailing route even for relatively low value cargoes as iron ore concentrate. It provides resource companies (minerals and metal but also energy, re. *(sic)* Sovcomflot, SCF Baltica, passage earlier in August) in the normally disadvantaged remote regions of Northern Scandinavia and the Kola Peninsula (even North West Europe) a freight advantage to the fast growing markets in the Far East during a period of the year of between 2-4 months¹²

The need for effective emergency prevention, preparedness and response is shown by the grounding of two cruise ships,¹³ the collision of two tankers,¹⁴ and the evacuation of a scientific research station.¹⁵

EPPR's report *Behaviour of Oil and Other Hazardous Substances in Arctic Waters* (2011) synthesizes current knowledge and expertise on the behavior of hazardous substances in Arctic waters to promote the development and use of technologies and working methods that improve the ability to respond to accidents involving such substances. BoHaSa points out that the greatest risk to the Arctic comes from shipments that are passing through Arctic waters. The latter is particularly problematic because ships that are simply passing through are not obligated to report the nature of their cargo to any of the countries where they do not make a stop.

In addition, there are hazardous materials waste sites, several nuclear sites and radioactive waste sites in the Arctic. Nuclear sites, although assessed as less of a threat overall, pose the potential of circumpolar impact. A major release of radioactive contaminants could require emergency response by all the Arctic states to address human health and environmental impacts.

Finally, the interrelationship between pollution incidents and the need for search and rescue operations must be recognized and become a factor in preparing for and responding to

Also details use of Northern Sea Route to transport construction equipment and materials from South Korea to European ports; and to transport 100,000 tons of gas condensate from Murmansk to China.

¹² Ibid.

¹³ Tobi Cohen, "Canadian rescue capacity questioned in wake of Arctic ship grounding," *Postmedia News*, August 29, 2010, <http://www.canada.com/news/Cruise+ship+runs+aground+Arctic/3457291/story.html> (accessed September 19, 2011).

Describes the August 27, 2010, grounding of the Clipper Adventurer in the waters of western Nunavut with 200 passengers on board. Also see report from USCG Amver Maritimes Relations (Jul. 3, 2010).

(Polar Star cruise ship runs aground off Svalbard with 67 passengers and 46 crew on board.

¹⁴ Maritime Bulletin, "Tankers collided in Northern Sea Route, Russian Arctic," *Maritime Bulletin*, <http://www.odin.tc/eng/articles/451-Tankers-collided-in-Northern-Sea-Route-Russian-Arctic.asp> (accessed September 19, 2011).

Two oil tankers transiting Northern Sea Route in ice convoy, West-East direction, collide in heavy ice with restricted visibility; no oil spill reported; damage to one vessel did not prevent continuation of voyage; both tankers had nuclear icebreaker escorts.

¹⁵ "USCG Assists Evacuation of Arctic Russian Research Camp," *MarineLink.com*,

<http://www.marinelink.com/news/evacuation-assists334493.aspx> (accessed September 19, 2011).

Fifteen scientists from the Russian research Station North Pole 37, a temporary station located on floating ice in the Arctic Ocean about 550 miles northeast of Barrow, Alaska; Russian nuclear-powered icebreaker sent from Murmansk to carry out the evacuation.

environmental emergencies. Nations must be ready to deal with both simultaneously, as pollution events frequently threaten people as well as the environment.

D. IDENTIFIED NEEDS

Cooperation

The AMSA Report made several recommendations with respect to international cooperation, including identifying areas of common interest and developing unified positions and approaches with respect to international organizations such as the International Maritime Organization (IMO), the International Hydrographic Organization (IHO), the World Meteorological Organization (WMO), and the International Maritime Satellite Organization (IMSO) to advance the safety of Arctic marine shipping. In addition AMSA recommended that the Arctic states develop and implement a comprehensive multi-national Arctic SAR instrument including aeronautical and maritime SAR. This agreement was signed in Nuuk, Greenland on May 12, 2011.

As previously discussed, the 2011 Nuuk Ministerial also established the Task Force to negotiate an international instrument on oil spill preparedness and response, thus further enhancing prospects for additional cooperation on Arctic emergencies.¹⁶

Infrastructure

In addition to the marine infrastructure deficits indentified in the AMSA Report,¹⁷ other infrastructure deficits for response include roads, airfields, launch points, salvage capabilities, and adequate and effective response equipment and facilities, particularly with respect to oil spill response.

From the point of view of responders, the Arctic environment presents difficult challenges. A strategic approach must include management and operational measures to deal with the extreme environmental conditions of the Arctic such as light and temperature variations, short summers, extreme weather (including fog, high winds, storms, and extreme cold), extensive snow and ice cover, transitional ice, and large areas of permafrost as well as remoteness. Response needs to be timely to mitigate effects on a fragile Arctic biological community.

The ability to access infrastructure among nations depends on adequate international agreements. While there are some regional and local agreements, there are no agreements governing circumpolar environmental response. The processes for planning and responding to an environmental emergency in Arctic conditions need to evolve as plans for new development and industry (including travel and tourism) increase in response to globalization and decreasing sea ice. There are complexities associated with coordinating any international response and uncertainties about whether cooperative measures would be effective and

¹⁶ “Nuuk Ministerial Declaration,” May 12, 2011, *Arctic Council Declarations*.

¹⁷ *E.g.*, Improvements are needed in ice navigation training, hydrographic charts, communications systems (real time data sharing), port services, accurate and timely weather and ice information, places of refuge and upgrading of response equipment and icebreaker fleets.

sufficient. EPPR noted¹⁸ in its initial risk analysis that domestic, regional, and international instruments cover emergency response in the Arctic, but the capability to prevent, prepare for, and respond to pollution incidents can vary considerably among the Arctic states due to technical, social and economic factors. That assessment today holds true, if for no other reasons than the well-documented rapidly changing climate conditions which are spurring commercial activity, and the lessons learned from the DWH disaster, as well as from smaller incidents in the Arctic region.

Existing Agreements

Spills and Other Emergencies

With regard to response to spills and other emergencies threatening the marine environment, EPPR identified agreements and arrangements that relate to activities posing increased risk in the Arctic. These agreements are: in force; cover at least part of the Arctic; pertain to emergency prevention, preparedness or response; and address at least one of the risks identified in the Risk Analysis. Types of risks included are: accidental discharge or release of oil and/or hazardous noxious substances, including tailings; release of contained materials available for trans-boundary transport; volcanic ash, with respect to health effects and interaction with aircraft; destruction of infrastructure, disruption of activities and loss of life as a result of earthquakes, tsunamis, storm surge and other natural disasters; spills and accidental discharges release of stored materials from abandoned vessels.

These international, multi-lateral, bi-lateral and regional agreements are listed and in some cases, described, in the EPPR publication titled *The Arctic Guide* (2009)¹⁹. EPPR will be updating *The Arctic Guide* in the months ahead, however, as an aide to the Task Force, the lists of agreements and arrangements identified by EPPR has been updated and provided as Appendix 1 to this document.

Nuclear Emergencies

All eight Arctic nations are signatory to two key conventions under the International Atomic Energy Agency: the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. These nuclear emergency response conventions are actively supported through biennial meetings of competent authorities under the conventions. The competent authorities, often radiation protection institutions, are registered with the IAEA's Incident and Emergency Center (IEC), the focal point for emergency management and cooperation in the IAEA system. The IEC manages the Response and Assistance Network. Known as RANET, the network consists of emergency response assets registered by member states for international use in the event of an emergency. In addition, the IEC conducts training and develops guidelines and similar documents for member state use in improving national emergency management capabilities.

¹⁸ "Environmental Risk Analysis of Arctic Activities" (Risk Analysis No. 2 1998).

¹⁹ Emergency Prevention, Preparedness and Response (EPPR) Working Group of the Arctic Council, *The Arctic Guide* (2009), http://eppr.arctic-council.org/content/arctic_guide.htm (accessed September 19, 2011).

Existing agreements provide sufficient legal coverage to cover trans-boundary nuclear emergencies. However, legal arrangements are not enough. Legal arrangements must be supported by an operational infrastructure to ensure effective response. The IAEA, through the establishment of the Incident Emergency Center and the Response Assistance Network has recognized this need, and with the assistance of Member states is actively engaged in strengthening response capacity.²⁰

Mitigation Strategies

At the 2009 EPPR meeting in Copenhagen in November 2009, several presentations concerning efforts to improve or assess mitigation strategies were discussed. Examples include discussion of needs related to natural disasters presented by Norway, the Barents Project 2009 exercises conducted in cooperation with the Russian Federation, Finland, Norway, and Sweden, and improvements in contingency planning by various countries including Iceland and Canada. As previously noted, EPPR's report titled *Behavior of Oil and Other Hazardous Substances in Arctic Waters (BoHaSa)* (2011) is a compendium of knowledge and expertise on the behavior of hazardous substances in Arctic waters aimed at promoting the development and use of technologies and working methods for responding to accidents involving such substances. According to the BoHaSa report, particular focus must be given to shipments that are passing through Arctic waters because these ships are not obligated to report the nature of their cargo to any of the countries where they do not make a stop.

Bilateral and multilateral agreements exist (eg., the Bonn Agreement for the North Sea, HELCOM for the Baltic Sea, and the Copenhagen Agreement between Nordic States), however there is not a common understanding of the geographic, functional, and administrative boundaries of each agreement as they relate to each other. For example, some agreements have clear geographical coverage, while others do not. Canada presented information on several bi-lateral agreements between itself and the US, Denmark, and Russia. The arrangements facilitate cooperation and have similarities in terms of notification process, but differ greatly on the legal structure, operational command and control, and funding/reimbursement. Participants at the 2009 EPPR meeting noted that as the risks in the Arctic have changed, it was not known whether existing agreements effectively cover the entire Arctic. The 2010 events surrounding international cooperation in response to the Deepwater Horizon well blow-out, amply demonstrated that even in a non-Arctic setting, the existence of international agreements of cooperation were not sufficient. It became evident that developing circumpolar response capacity, as first suggested by the AMSA report and referred to EPPR for further action, should become a priority. In May 2011, the Arctic Council's created a Task Force on oil spill preparedness and response to ensure that these issues are addressed expeditiously.

Under the auspices of EPPR, the United States and Russian Federation have engaged in close collaborative activities aimed at preventing nuclear or radiological accidents by implementing sound environmental management systems for chemical and radiological hazards into industrial operations, upgrading equipment, improving emergency operations center

²⁰ For example, the IAEA hosted a Ministerial Conference on Nuclear Safety as part of the process of learning lessons to strengthen nuclear safety, emergency preparedness, and radiation protection for people and the environment worldwide, and is taking steps to further strengthen global nuclear safety and emergency response in the wake of Fukushima.

capabilities, improving communications with the public, and providing training for personnel involved in emergency prevention, preparedness, and response.

This long-term EPPR collaboration has included a series of exercises at nuclear facilities in the Arctic, some of whose scenarios have included the release of nuclear material into the atmosphere. EPPR representatives have been invited to observe and to share in the lessons learned from these activities. Lessons learned have also yielded additional opportunities for improving preparedness and response, leading to identification and adoption of new projects for this ongoing collaboration. Additional information is found in EPPR reports: *The Source Control Project: 10 Years of Cooperation 2000-2010* (2011); and *10 Years of Exercises* (2011).

Through ongoing EPPR activities, much progress has been made to improve prevention, preparedness, and response to radiological emergencies, and work in these areas continue to identify other areas for improvement. Post-Fukushima assessments by the international nuclear community, however, will inform future EPPR nuclear collaborative activities.

In April 2009, the Tromso Ministerial established a Task Force to negotiate a Search and Rescue (SAR) agreement to govern SAR cooperation among the Arctic Council member states. Signed in during the Nuuk 2011 Ministerial, the SAR agreement represents the first binding agreement developed under the aegis of the Arctic Council. The SAR agreement is the first pan-Arctic, multi-lateral binding instrument to provide for cooperation in aeronautical and maritime Arctic search and rescue activities. Implementation of this agreement will require enhanced collaboration, which EPPR will support.

In May 2010, EPPR approved the “Arctic Region Oil Spill Response Resource and Logistics Guide,” a pilot project whose goals are to improve oil spill response by identifying the available resources and the logistical constraints that need to be accounted for in the Arctic; to conduct a survey of the type and location of oil spill response equipment, logistical facilities, and personnel in participating Arctic countries; and to develop and disseminate the Arctic Oil Spill Response Maps and Guides electronically. The U.S. National Oceanographic Atmospheric Administration is developing an Open Source geospatial decision-support tool (the Environmental Management Response Application (ERMA) to prepare for Arctic oil spill response, assessment, and restoration. The U.S. has offered ERMA as a platform to host the data gathered under the Arctic Response Resource & Logistic Guide pilot project. The U.S.-Canada project team is considering the ERMA as the web-based platform upon which to build a comprehensive, Arctic-wide electronic data base to support EPPR’s pilot project, thus addressing an infrastructure gap in the Arctic region.

At the June 2011 meeting EPPR agreed to develop an In Situ Burn (ISB) of Oil Spills on Water and Broken and Solid Ice Conditions for the Arctic Region in conjunction with an ISB project that the International Marine Organization (IMO) is conducting. The U.S. and Canada will co-lead the project. The purpose is to assist response planners, responders and government officials in evaluating a situation to determine if ISB is an appropriate response method for an oil spill response in Arctic waters both near coastlines and the high seas in open water, broken ice and solid ice conditions. The project will address environmental factors to be considered when using ISB, identify equipment that can be used, describe tactics, discuss environmental monitoring during an ISB, provide methods of residue

collection and provide nation-specific approval processes. The information will be made available to Arctic responders electronically and in hard copy.

Other ongoing mitigation strategies include efforts by the IMO to implement the Safety of Life at Sea (SOLAS) recommendation for the improvement of ship monitoring through an Automatic Identification System (AIS) and Long Range Identification & Tracking systems (LRIT).²¹ In the absence of a fully operational world-wide AIS or LRIT system, EPPR approved, a pilot project to link existing vessel reporting systems currently operated by Arctic Council member states. The Arctic Automated Vessel Emergency Reporting Network (AAMverNet) pilot project has surveyed existing Arctic vessel reporting systems, will devise, test, and evaluate a vessel position information sharing network between Arctic region ship reporting systems and Amver, the vessel reporting system that the United States Coast Guard has been operating since 1958. Participation in the vessel position information sharing network is voluntary.²² AAMverNet is meant to supplement and not replace existing national systems, and the information can be accessed at little or no cost to participating countries.

E. HIGHLIGHTS OF RISK MITIGATION MEASURES IN EPPR COUNTRIES AND INTERNATIONAL ORGANIZATIONS

This section identifies some of the steps that Arctic Council member countries have taken to reduce or mitigate risk and highlights best practices that are innovative or particularly interesting examples of mitigation.

- Both Russia and Canada have procedures in place in their respective Arctic regions for mandatory reporting on Arctic ships, mandatory regulations for polar class ships, and mandatory routing if required.
- The Barents Rescue Exercises: a series of large-scale international exercises that have been implemented in the Arctic under existing cooperation between Arctic states in the Barents region, involving the Russian Federation, Finland, Norway and Sweden is a worthy example of how Arctic Council countries collaborate on response to emergencies. General objectives of the exercises are to validate the functional use of procedures, improve information exchange, exercise levels of coordination, and gain practical insight into coordination and rescue services in the Barents region. The exercise conducted in 2009 included 5 scenarios, dealing with a radioactive emission due to destruction of a waste container, an emergency at sea, a large traffic accident with the threat of radioactive contamination, a large forest fire in a bordering area, and a fire onboard a ship with an oil spill in the sea.

²¹ For a similar recommendation, see Arctic Council, *Arctic Marine Shipping Assessment 2009 Report* (2009) <http://www.nrf.is/news/15-2009/60-arctic-marine-shipping-assessment-report-2009> (accessed September 19, 2011).

²² Amver is a computer-based, and voluntary global ship reporting system used worldwide by search and rescue authorities to arrange for assistance to persons in distress at sea. With Amver, rescue coordinators can identify participating ships in the area of distress and divert the best-suited ship or ships to respond. Prior to sailing, participating ships send a sail plan to the Amver computer center. Vessels then report every 48 hours until arriving at their port of call. This data is able to project the position of each ship at any point during its voyage. In an emergency, any rescue coordination center in the world can request this ship position data to determine the relative position of ships, tracked by Amver, that are located near the distress location.

- The National Energy Board, Canada's oil and gas regulator in the North, is currently carrying out a "Public Review of Arctic Safety and Environmental Offshore Drilling Requirements" for the offshore. The results of the review are expected to be made public in early 2012. This public review may include recommendations pertaining to the timing (seasonal) of offshore drilling activities and on methods to ensure that drilling is carried out safely in the Beaufort Sea.
- Canada Coast Guard is working on improving contingency plans including a strategy to train local communities to be first responders, and the distribution of community-sized kits with equipment to improve community response capacity to more frequent, smaller-scale spills.
- Canada has also begun aerial surveillance using, among others, two Dash-8 and a Dash-7 Arctic Surveillance airplanes with advanced detection technologies which are being used for near-time reporting. The surveillance program is credited with reducing the number of spills, as these programs have been shown to be effective deterrents to illegal discharges.
- Greenland and Canada (Greenland Bureau of Minerals and Petroleum and Canada National Energy Board) have concluded a Memorandum of Understanding (MOU), to facilitate cooperation in the field of oil spill prevention, for example by sharing information on regulatory approaches and current events, including possible project specific agreements allowing to observe and share inspection practices.
- Greenland has developed an oil spill sensitivity atlas for offshore waters and coastal areas particularly sensitive to oil spills, covering the areas 58° N-75° N West Greenland. The atlas provides oil spill response planners and responders with tools to identify resources at risk, establish protection priorities and identify appropriate response and clean-up strategies. Shoreline sensitivity maps shows index values for coastal sensitivity and has a description of biological resources and human use of the area. Physical environment and logistic maps shows coast types, logistics and proposed methods to oil spill response for each area.
- Iceland has identified risks associated with rapidly increasing oil tanker traffic and cruise ships (not designed for ice and travel in uncharted areas). They have improved contingency plans for responding to pollution incidents, and have identified hazardous and sensitive areas from which vessel traffic is excluded.
- In 2011, Finland acquired a multipurpose state-of-the vessel for responding to marine oil and chemical spills. It can operate in a chemical cloud without exposing the crew to any risk, and can operate in higher seas than was possible with previous craft.
- Finland's preparedness to respond to oil spill will be reviewed during 2011 through an IMO audit and inspections of Finnish implementation of European Union legislation.
- Norway, Sweden, Finland, and Russia entered into an Agreement on Emergency Prevention, Preparedness, and Response in 2009, which addresses cross-border cooperation in rescue operations in the Barents Region. The terms of the agreement were part of the exercise scenario in the Barents Rescue 2011 exercise.
- Norway is working to identify areas and possible threats caused by natural disasters liable to harm human life, infrastructure, biodiversity and nature in the Arctic.
- Norway has implemented regulations concerning the use of heavy fuel oil (HFO) in the protected areas of Svalbard. These regulations became effective January 1, 2010.
- As a result of the DWH explosion and oil spill in the Gulf of Mexico, Norway has prepared a report analyzing various scenarios from the DWH explosion and oil spill

and describing what Norway's response would be if such an incident were to occur within its territory.

- Sweden has added a KBV 003 Amfitrite vessel to its Coast Guard fleet.
- Sweden conducted an exercise with a Fukushima-like scenario for which the emergency response lasted uninterrupted for 36 hours – an endurance test for responders and participants. The second phase involved long-term recovery needs, followed by a workshop on achieving long-term recovery.
- Sweden is hosting the next large-scale Barents Rescue exercise in September 2011 in Norrbotten. The exercise scenarios includes Sweden's request for assistance to deal with an emergency caused by very serious flooding. A serious train derailment and a chemical spill requiring coordination of the emergency services of various countries will also be exercised. A number of pre-exercises were held earlier in 2011. In addition to Sweden, Norway, Finland and Russia will participate.
- Sweden is also hosting a third exercise in September 2011, BOILEX. The Swedish Civil Contingencies Agency, together with the Swedish Coast Guard and eight rescue services will conduct an international response to an oil spill.
- The Russian Federation is developing 10 new rescue center locations based on infrastructure and risk assessments. Some specific challenges specialists are addressing include emergency forecast and notification to the public, and fire fighting using non-aqueous solutions.
- The Russian Federation and Norway conducted an international exercise involving search and rescue of people caught in a disaster and then responding to an oil spill. The realistic scenario included the re-deployment of a vessel from the oil spill to the search and rescue operations.
- The United States Geological Survey Arctic Offshore Oil and Gas Guidelines (approved April 2009) include several provisions that are relevant to EPPR, such as guidelines for the following operating practices: waste management, use and discharge of chemicals, specific guidance on emergency preparedness and response (best practices for contingency planning and requirements for emergency response plans with specific elements of the plans outlined in the Guidelines).
- The United States' North Slope Science Initiative (NSSI), a consortium of federal, state and local governments, is working to identify and implement science based recommendations, including a response database, for use by EPPR and other entities.
- Several Arctic states have developed industry/government consortia to facilitate rapid oil spill response and to improve effectiveness of oil spill response (*e.g.*, Joint Industry Program on Oil Spill Contingency for Arctic and Ice-Covered Waters - SINTEF)
- The Arctic Council's SAR Task Force successfully negotiated the Arctic Council's first pan-Arctic, multi-lateral binding agreement. Executed during the Nuuk 2011 Ministerial, the agreement provides for cooperation in aeronautical and maritime Arctic SAR.
- IAEA Response and Assistance Network, RANET, is a global emergency response network of teams suitably qualified to respond rapidly to nuclear or radiological emergencies. The teams generally reside within the national structures of member countries and are voluntarily registered with the Incident and Emergency Center, the focal point for emergency response at the IAEA.
- The IMO Maritime Safety Committee (MSC), at its eighty-sixth session, agreed to include an item on development of a mandatory code for ships operating in polar

waters (Polar Code) in the work program of the Sub-Committee Design & Equipment (DE). The work is planned to be completed in 2012. EPPR technical experts serve on the IMO's DE Sub-Committee. The IMO is considering action on the recommendation by the Safety of Life at Sea (SOLAS) for the development of the monitoring of ships by Automatic Identification System (AIS) and Long Range Identification & Tracking systems (LRIT).

F. POTENTIAL IMPACTS OF RECENT AND FUTURE ARCTIC DEVELOPMENTS

During 1996 EPPR developed a risk analysis as a means of systematically analyzing the level of protection afforded to the Arctic from trans-boundary pollution incidents. To assess the level of protection for each activity occurring in the Arctic, EPPR categorized and then inventoried the activities, and the potential threats and impacts of discharges from the activities which might have a trans-boundary impact. Each Arctic nation then determined the level of risk for each activity in their respective country. The results of this effort were used to create a Risk Assessment Matrix (1998). Identified in this effort were three major gaps:

- management of hazardous substances;
- control of vessel traffic in the Arctic seas; and
- abandoned ships and wreck removal

Subsequently, two recent Arctic Council reports (*AMSA 2009* and the Arctic Council *Arctic Oil & Gas Assessment 2008*) highlighted a number of new Arctic activities relevant to EPPR (e.g., increased ship traffic associated with natural resource exploration/ development and maritime trade; coastal erosion and other effects of melting and thinning ice; plans for new oil and gas exploration and drilling in the Arctic; and especially insufficient infrastructure for responding to emergencies in most of the Arctic). The Risk Assessment Matrix was updated on the basis of this information in July 2010. During this process it became apparent that there were additional categories that should be included. Accordingly EPPR revised and re-circulated the revised Risk Assessment Matrix in 2011. The updated Risk Matrix will be incorporated into the Arctic Guide which is currently being revised.

The coming years will see a need for Arctic states to adjust to the risks associated with increased activity in the Arctic. These adjustments will likely include attempts to improve both the scope and effectiveness of contingency plans, improve the infrastructure necessary for effective prevention, preparedness and response, and development of both regional and comprehensive international cooperative agreements that address gaps in current arrangements. At the EPPR meeting in Vorkuta, Russia in June 2010, representatives from Indigenous communities, including the Indigenous People's Secretariat, emphasized the need to include local communities in planning and training and to address issues from an Indigenous perspective.

G. CONCLUSION

As a result of globalization and sea ice changes associated with climate change, among other issues, the future of the Arctic will likely include significant increases in development and marine traffic. These changes are anticipated to not just involve volume of activity, but also increased diversity in the type of activities. Several Arctic states have imminent plans for both near-shore and off-shore oil and gas development. The Arctic is experiencing increasing marine traffic associated with marine transport of natural resources, support of off-shore industry, supply to Arctic communities and marine tourism. This trend is expected to intensify. With the increased volume and diversity of marine activity will come additional risk of accidents and incidents involving release of hazardous materials and threat to the environment and to humans. Arctic states, already active in creating mitigation strategies, are faced with a need for more effective contingency plans closely coordinated with respect to response to spills with trans-boundary impacts, or occurring in international waters, and cooperative arrangements for an ever increasing suite of risks.

The work of other Arctic Council Working Groups also point to serious deficiencies in infrastructure necessary for effective response to incidents in the Arctic. Infrastructure inadequate for response operations, coupled with the unique environmental difficulties present in a polar environment, provide real challenges to risk assessment and mitigation. EPPR continues to consider the issues surrounding the lack of sufficient marine infrastructure in the Arctic in its work.

All eight Arctic states participate in international emergency cooperation as members of the United Nations and its specialized organizations such as the International Atomic Energy Agency (IAEA) and the International Maritime Organization (IMO). However, as the Deepwater Horizon highlights, international stakeholder planning and coordination is an important pathway to ensuring maximum resource availability and utilization during a catastrophic oil spill or hazardous substance event. During the DWH spill, several nations stepped forward to assist the United States. These offers included equipment, technical expertise, and general assistance. However, it quickly became apparent that a seamless process to effectively handle the numerous administrative issues required to coordinate and implement international assistance, among other things, was lacking. Given today's robust worldwide oil exploration initiatives and transportation patterns, the international community must be prepared to address the challenges faced by responders under a myriad of conditions.

The practical implications of mounting and sustaining an effective response remain a challenge that broader agreements do not generally address in detail. The lessons learned from the DWH incident indicated a need to develop regional cooperative agreements for processes that facilitate cooperation in handling international response to oil spills in the Arctic.

The Oil Spill Preparedness and Response Task Force will likely be discussing the mechanisms which must be in place to prepare for and mount an adequate response in the Arctic environment, including identifying common terminology, ensuring equipment is compatible, assessing how much equipment and the number of human resources are needed, where, and how these should be deployed. Issues related to customs and trade, transport logistics, categories for offers, costing, invoicing, payment for resources provided, mobilization, and demobilization, will also need to be addressed.

It is also important for the new Task Force to assess regional agreements in light of expectations of future Arctic activities and risks. Since local communities are often the first affected and may be among the first responders to emergencies in the Arctic, the Task Force should consider the perspective of Arctic indigenous communities during their deliberations.

EPPR will continue to work in the area of preparedness and response and will support the work of the Task Force, focusing on fostering multi-national comprehensive cooperation aimed at achieving effective levels and utilization of resource and improving communications for responding to environmental emergencies.

Appendix 1: INTERNATIONAL AGREEMENTS

This section comprises lists of international multi- and bilateral conventions and agreements related to EPPR activities. EPPR's search for information on existing arrangements was aimed at including as much information as the resources at our disposal made possible. Information about the status of the conventions was obtained from:

<http://www.imo.org/About/Conventions/StatusOfConventions/Pages/Default.aspx>

or

http://www.iaea.org/Publications/Documents/Conventions/jointconv_status.pdf

or as noted under individual entries.

EPPR attempted to eliminate gaps in the information so that to the greatest extent possible, the entries contain the official title of the instrument, when it entered into force or became effective, status of ratification by the Arctic states and links to appropriate websites with additional details. In addition to these citations, the Arctic Marine Shipping Assessment (2009) summarizes all of the key marine shipping agreements in the chapter entitled Governance of Arctic Shipping, pages 50-63.

A. International Conventions and agreements related to activities posing risk to the environment include:

- **United Nations Convention on the Law of the Sea (UNCLOS)¹:** *wide in scope, UNCLOS provides a framework within which the other conventions and customary laws work. In the area of EPPR it deals with cooperation, contingency planning and assistance.*
 - Entered into force 16 November 1994
 - Ratified by 7 Arctic states (not ratified by US)
www.un.org/Depts/los/convention.../texts/unclos/closindx.htm
UNCLOS: Status
www.un.org/depts/los/LEGISLATIONANDTREATIES/status.htm
- **International Convention for the Prevention of Pollution from Ships (MARPOL 73/78):** *aims to eliminate marine pollution by oil and other harmful substances, sewage and garbage; certain valuable areas are designated MARPOL-Special Areas; the Arctic has not yet been designated as such an area.*
 - Entered into force on various dates – multiple annexes and amendments
 - Annexes I-II dealing with pollution from oil, noxious liquid substances and harmful substances in packaged form have been ratified by all 8 Arctic states.
 - Annex III – ratified by 8 Arctic states and Faroe Islands
 - Annex IV dealing with sewage; ratified by 6 Arctic States & Faroe Islands [Iceland and the United States have not acceded]
 - Annex V dealing with garbage; ratified by 8 Arctic States & Faroe Islands
 - Annex VI dealing air emissions; ratified by 7 Arctic States [not ratified by Iceland & Faroe Islands]

¹ Article 234 allows the coastal states to implement special rules and regulations for marine safety and environmental protection in ice-covered waters.

[http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-\(marpol\).aspx](http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-(marpol).aspx)

- **International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (1969) and Protocol Relating to Intervention on the High Seas in Case of Pollution by Substances other than Oil (1973):** *aims to confer the right of coastal states to take measures necessary to prevent, mitigate or eliminate danger to coastline or related interests from pollution by oil or other substances following upon a maritime casualty in the high seas; the Protocol of 1973 is an instrument to extend the application of the 1969 Convention to substances other than oil.*
 - Convention entered into force 6 May 1975
 - Ratification, accepted, acceded, or approved by 7 Arctic nations and Farrow Islands [Canada has not taken any action]:
 - Protocol (73): entered into force 30 March 1983
 - Ratified, accepted, acceded, or approved by 6 Arctic States [Canada and Iceland have not taken action]

<http://www.imo.org/about/conventions/listofconventions/pages/international-convention-relating-to-intervention-on-the-high-seas-in-cases-of-oil-pollution-casualties.aspx>
- **International Convention on Oil Pollution Preparedness, and Response and Cooperation (OPRC 1990):** *requires parties to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries, requires ships and offshore units to carry oil pollution emergency plans and to report pollution incidents. The convention discusses contingency planning, training and cooperation in research programmes.*
 - Entered into force 13 May 1995
 - Ratified, accepted, acceded, or approved by all 8 of the Arctic states

[http://www.imo.org/about/conventions/listofconventions/pages/international-convention-on-oil-pollution-preparedness,-response-and-co-operation-\(oprc\).aspx](http://www.imo.org/about/conventions/listofconventions/pages/international-convention-on-oil-pollution-preparedness,-response-and-co-operation-(oprc).aspx)
- **Protocol on the Preparedness, Response and Cooperation on Pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS Protocol 2000):** *provides a similar framework for cooperation as OPRC 1990 with respect to Hazardous and Noxious Substances (HNS)*
 - Entered into force 14 June 2007
 - Ratified, accepted, acceded, or approved by Denmark and Sweden

[http://www.imo.org/About/Conventions/ListOfConventions/Pages/Protocol-on-Preparedness,-Response-and-Co-operation-to-pollution-Incidents-by-Hazardous-and-Noxious-Substances-\(OPRC-HNS-Pr\).aspx](http://www.imo.org/About/Conventions/ListOfConventions/Pages/Protocol-on-Preparedness,-Response-and-Co-operation-to-pollution-Incidents-by-Hazardous-and-Noxious-Substances-(OPRC-HNS-Pr).aspx)
- **Convention on the Protection of the Marine Environment in the Baltic Sea Area (The Helsinki Convention) (1992):** *Signed by all the states bordering on the Baltic Sea, and the European Community; covers the whole of the Baltic Sea area, including inland waters as well as the sea, sea-bed, and the whole catchment area of the Baltic Sea to reduce land-based pollution; the governing body of the Convention is the Helsinki Commission - Baltic Marine Environment Protection Commission - also known as HELCOM.*

- Entered into force on 17 January 2000
- Includes Denmark, Finland, Russia and Sweden, as Baltic countries
http://www.helcom.fi/Convention/en_GB/convention/
- **Convention for the protection of the North East Atlantic (OSPAR Convention) 1992 (2000):** *guides international cooperation on the protection of the marine environment of the North-East Atlantic; unifies and updates the Oslo and Paris Conventions*
 - Entered into force in 25 March 1998
 - Denmark, Finland, Iceland, Norway, and Sweden are parties
http://www.ospar.org/content/content.asp?menu=00340108070000_000000_000000
- **Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter (London Convention) 1972 (1979):** *Prohibits dumping requires a prior special permit for the dumping of a number of other identified materials and a prior general permit for other wastes or matter; defines "Dumping" as the deliberate disposal at sea of wastes or other matter from vessels, aircraft, platforms or other man-made structures, as well as the deliberate disposal of these vessels or platforms themselves; Annexes list wastes which cannot be dumped and others for which a special dumping permit is required.*
 - Entered into force in 2006
 - Ratified, accepted, acceded, or approved by 7 Arctic States & the Faroe Islands (the United States has not taken any action)
<http://www.imo.org/About/Conventions/ListOfConventions/Pages/Convention-on-the-Prevention-of-Marine-Pollution-by-Dumping-of-Wastes-and-Other-Matter.aspx>
- **1996 Protocol to London Dumping Convention:** *prohibits the dumping of certain hazardous materials, requires a prior special permit for the dumping of a number of other identified materials and a prior general permit for other wastes or matter. The Protocol represents a major change of approach to the question of how to regulate the use of the sea as a depository for waste materials by taking a precautionary approach which requires that appropriate preventative measures be taken when there is reason to believe that wastes or other matter introduced into the marine environment are likely to cause harm*
 - Convention entered into force 30 August, 1975
 - Ratified, accepted, acceded, or approved by all 8 Arctic states.
 - Protocol entered into force 24 March 2006.
 - Ratified, accepted, acceded, or approved by 5 Arctic states (Canada, Denmark, Iceland, Norway, Sweden)
<http://www.imo.org/About/Conventions/ListOfConventions/Pages/Convention-on-the-Prevention-of-Marine-Pollution-by-Dumping-of-Wastes-and-Other-Matter.aspx>

- **Convention on Early Notification of a Nuclear Accident (Notification Convention 1986)**, together with **Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency**: *creates the necessary systems for notification and radiological assistance that can be provided to support a response to a nuclear accident, or incident.*
 - Convention – Early Notification: entered into force 27 October, 1986
 - Convention – Assistance in Case of Nuclear Accident: entered into force 26 February, 1987
 - Ratified by 5 Arctic states, approved by Finland, signed by Norway and Denmark
 - Convention on Early Notification of a Nuclear Accident
<http://www.iaea.org/Publications/Documents/Conventions/cenna.html>
http://www.iaea.org/Publications/Documents/Conventions/cenna_status.pdf

- **Convention on Nuclear Safety (1994)**: *aims to commit participating states operating land-based nuclear power plants to maintain a high level of safety by setting international benchmarks. It is an incentive instrument based on a common interest to achieve higher levels of safety, developed and promoted through regular meetings of the parties.*
 - Convention entered into force on 24 October 1996 under the International Atomic Energy Agency
 - Ratified by 5 Arctic state, acceptance by Denmark, Finland and Russian Federation
 - Convention on Nuclear Safety
http://aidn-inla.exxoss.net/index2.php?option=com_docman&task=doc_view&gid=12&Itemid=39
http://www.iaea.org/Publications/Documents/Conventions/nuclearsafety_status.pdf

- **Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management**: *applies to spent fuel and radioactive waste resulting from civilian nuclear reactors and applications and to spent fuel and radioactive waste from military or defense programs when such materials are transferred permanently to civilian programs, or when declared as spent fuel or radioactive waste. It also applies to planned and controlled releases into the environment of liquid or gaseous radioactive materials from regulated nuclear facilities.*
 - Convention entered into force on 18 June 2001 under the International Atomic Energy Agency (IAEA)
 - Ratified by 5 Arctic states, acceptance by Denmark and Finland, accession by Iceland
 - Convention on the Safety of Spent Fuels Management and on the Safety of Radioactive Waste Management
http://www.oecd-nea.org/law/chernobyl/TONHAUSER_JANKOWITSCH.pdf
http://www.iaea.org/Publications/Documents/Conventions/jointconv_status.pdf

- **Convention on the Transboundary Effects of Industrial Accidents (ECE Convention (1992)):** *Recognizing the potential trans-boundary effects of industrial accidents and the need for active cooperation among states, the convention applies to the prevention of, preparedness for and response to industrial accidents capable of causing trans-boundary effects, including accidents caused by natural disasters, and to international cooperation concerning mutual assistance, research and development, exchange of information and exchange of technology related to such accidents.*
 - Entry into force: 19 April 2000
 - Ratified by Sweden; Approved by Denmark and Norway (with reservation for Greenland and Faroe Islands); Accepted by Finland and Russia
<http://www.unece.org/env/documents/2010/teia/ece.cp.teia.2010.1.EN.pdf>
http://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-6&chapter=27&lang=en
- **Basel Convention**, about transport of dangerous waste [MARPOL 73/78 (International Maritime Dangerous Goods (IMDG) Code)] : *aims at: reducing hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, regardless of the place of disposal; restricting transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management; and providing for a regulatory system which applies to cases where transboundary movements are permissible.*
 - Entered into force in 5 May 1992
 - Ratified by 4 Arctic nations; Accepted by Finland; Approved by Denmark; Acceded by Iceland; not ratified by the United States.
<http://untreaty.un.org/cod/avl/ha/bcctmhwd/bcctmhwd.html>
http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-3&chapter=27&lang=en
- **International Convention on Salvage (1989):** *provides incentive for salvors to prevent or minimize damage to the environment; damage defined as "substantial physical damage to human health or to marine life or resources in coastal or inland waters or areas adjacent thereto, caused by pollution, contamination, fire, explosion or similar major incidents."*
 - Ratified, acceded, accepted, or approved by 8 Arctic states
<http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-on-Salvage.aspx>
- **International Convention on Maritime Search and Rescue (1979):** *aims to develop an international SAR plan, so that, no matter where an accident occurs, the rescue of persons in distress at sea will be co-ordinated by a SAR organization and, when necessary, by co-operation between neighbouring SAR organizations*
 - Entered into force 22 June, 1985
 - Ratified, Acceded, Approved, or Accepted by all 8 Arctic states
[http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-on-Maritime-Search-and-Rescue-\(SAR\).aspx](http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-on-Maritime-Search-and-Rescue-(SAR).aspx)

- **Safety of Life at Sea (SOLAS):** *Provides for the development of systems to monitor ships by Automatic Identification System (AIS) and Long Range Identification & Tracking systems (LRIT) through the IMO. The AMSA recommendation (29 April 2009) calls for continued development of a comprehensive Arctic marine traffic awareness system to improve monitoring and tracking of marine activity².*
 - Entered into force 25 May, 1980
 - Convention ratified, acceded, approved, or accepted by all 8 Arctic states
 - 1988 Protocol ratified, acceded, approved, or accepted by 7 Arctic states (no action taken by Canada)
[http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-\(SOLAS\),-1974.aspx](http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx)

- **International Convention for the Control and Management of Ships' Ballast Water and Sediments:** *aims to prevent the potentially devastating effects of the spread of harmful aquatic organisms carried by ships' ballast water from one region to another, including the requirement for all ships to implement a Ballast Water and Sediments Management Plan. Includes provisions for technical assistance and cooperation with respect to providing support for those Parties which request technical assistance to train personnel; to ensure the availability of relevant technology, equipment and facilities; to initiate joint research and development programmes; and to undertake other action aimed at effective implementation*
 - Approved Feb 2004 (has not entered into force)
 - Only 3 Arctic states (Canada, Norway, and Sweden) have taken action to ratify, accede, approve, or accept the Convention
[http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships'-Ballast-Water-and-Sediments-\(BWM\).aspx](http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships'-Ballast-Water-and-Sediments-(BWM).aspx)

- **International Convention on the Removal of Wrecks:** *aims to provide the legal basis for States to remove, or have removed, shipwrecks that may have the potential to affect adversely the safety of lives, goods and property at sea, as well as the marine environment. Fills a gap in the existing international legal framework by providing the first set of uniform international rules aimed at ensuring the prompt and effective removal of wrecks located beyond the territorial sea. The new Convention also includes an optional clause enabling States Parties to apply certain provisions to their territory, including their territorial sea.*
 - Adopted 18 May 2007 - not yet in force
 - No action by any Arctic State
<http://www.imo.org/about/conventions/listofconventions/pages/nairobi-international-convention-on-the-removal-of-wrecks.aspx>

² AMVER – volunteer system to provide the US Coast Guard with information on ship position that has been in effect for decades and works to provide information for SAR

- **International Convention on Liability and Compensation for Damage in connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS Convention 1996):** *aims to make it possible for compensation to be paid to victims of accidents involving HNS, such as chemicals. Covers pollution damage, the risks of fire and explosion, includes loss of life or personal injury as well as loss of or damage to property. The 2010 Protocol establishes limits of liability*
 - Not yet in force
 - 2010 Protocol (limits liability): Adopted 30 April 2010
 - Will enter into force 18 months after the conditions for the 2010 Protocol are fulfilled
 - Only the Russian Federation has taken action to ratify, accede, approve, or accept the Convention; no action has been taken on the 2010 Protocol
<http://www.imo.org/about/conventions/listofconventions/pages/international-convention-on-liability-and-compensation-for-damage-in-connection-with-the-carriage-of-hazardous-and-noxious-.aspx>

- **IMO Guidelines concerning “places of refuge” for ships in need of assistance (Resolution A.949 (23) 2003):** *aims to provide guidelines for providing refuge to ships in need of assistance when safety of life is not involved; recognizes that, while providing refuge might expose coastal regions to risk or hazards, leaving a distressed ship at the mercy of the open sea may create greater risks and hazard; recommends establishing procedures, contingency plans, sharing of information, communication and alert procedures and plans for joint assessment*
<http://www.imo.org/OurWork/Safety/Navigation/Pages/PlacesOfRefuge.aspx>

- **IMO Guidelines for Ships Operating in Arctic Ice-Covered Waters (IMO reference. T1/3.02 MSC/Circ.1056 NEPC/Circ.399 23 December 2002):** *intended to address those additional provisions beyond existing requirements of the SOLAS Convention, taking into account the climatic conditions of Arctic ice-covered waters and to meet appropriate standards of maritime safety and pollution prevention. Addresses the impact of additional demands on ship systems imposed by the Arctic’s harsh environment, to include navigation, communication, life-saving, main and auxiliary machinery; requires specific attention to human factors such as training and operational procedures.*
 - Original Guidelines - approved December 2002
 - Non-binding Guidelines updated and extended to also cover the sea area off the Antarctic -approved by the IMO Assembly December 2009
<http://www.imo.org/ourwork/safety/safetytopics/pages/polarshippingsafety.aspx>
http://www5.imo.org/SharePoint/mainframe.asp?topic_id=1787

B. Multilateral and Bi-Lateral Agreements and Arrangements among Arctic States

This section covers multi-lateral and bi-lateral agreements and arrangements as they pertain to EPPR listed by the Arctic countries who are parties to the agreement. To the greatest extent possible, each entry contains the effective date of the agreement or arrangement, a brief description of the agreement, and a link to an appropriate website with additional details.

1. Multilateral Agreements

- All Arctic countries:

Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic (2011): *aims to strengthen aeronautical and maritime search and rescue cooperation and coordination for maritime vessels and passengers in the Arctic region; delimits aeronautical and maritime search and rescue regions without prejudice to “the delimitation of any boundary between States or their sovereignty, sovereign rights or jurisdiction”*; first binding agreement entered into under the auspices of the Arctic Council.

- Executed March 12, 2011
- Executed by 8 Arctic Council countries
- Text of the Agreement at: [http://arctic-council.org/filearchive/Arctic SAR Agreement EN FINAL for signature 21-Apr-2011.pdf](http://arctic-council.org/filearchive/Arctic_SAR_Agreement_EN_FINAL_for_signature_21-Apr-2011.pdf)
- Information on the Agreement at: <http://www.arcticportal.org/news/arctic-portal-news/arctic-search-and-rescue-agreement>

- Denmark, Finland, Norway/Greenland, and Sweden³:

Agreement Concerning Co-Operation to Ensure Compliance with the Regulations for Preventing the Pollution of the Sea by Oil (NORDIC Agreement) (1967): *co-operation to ensure compliance with the International Convention for the Prevention of Pollution of the Sea by Oil and with the national regulations in force.*

[http://iea.uoregon.edu/page.php?query=treaties_lineage&lineage=Nordic Oil Pollution](http://iea.uoregon.edu/page.php?query=treaties_lineage&lineage=Nordic%20Oil%20Pollution)

Agreement Concerning Cooperation in Taking Measures Against Pollution of the Sea by Oil (1971): *co-operation in dealing with any significant pollution of the sea by oil which threatens the coasts or related interests of one of the parties; provides for parties to build up and preposition “stocks of anti-oil material” through mutual consultation and, among other things, to exchange information on equipment on hand to respond to an oil spill and notify each other when a “significant” spill occurs.*

³ Data from Ronald B. Mitchell. 2002-2011. International Environmental Agreements Database Project (Version 2010.3). Available at: <http://iea.uoregon.edu/> (Date accessed: 19 September 2011)

[http://iea.uoregon.edu/page.php?query=treaties_lineage&lineage=Nordic Oil Pollution](http://iea.uoregon.edu/page.php?query=treaties_lineage&lineage=Nordic%20Oil%20Pollution)

- Denmark, Finland, Iceland/ Norway/Greenland, and Sweden⁴:

Agreement Between Denmark, Finland, Iceland, Norway And Sweden On Cooperation In Combating Pollution Of The Sea Caused By Oil Or Other Harmful Substances (Copenhagen Agreement) (revised in 1993):

addresses marine oil pollution; provides for cooperation on surveillance, investigations, reporting, securing of evidence, combating and assistance in combating pollution spills, as well as general exchanges of information in order to protect the marine environment from pollution by oil or other hazardous substances.

<http://oils.gpa.unep.org/framework/region-3-next.htm#copenhagen>

- Denmark, Norway and Sweden (among other non-Arctic countries):

Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances, 1969 (Bonn Agreement) (extended and adapted in 1983 and 1989): *ensures intergovernmental co-operation dealing with pollution and in particular aerial surveillance co-ordination by sharing information.*

<http://oils.gpa.unep.org/framework/region-3-next.htm#bonn>

2. Bi-Lateral Agreements

- Canada and Denmark

Canada/Denmark Agreement for Cooperation Relating to the Marine Environment (with Annexes, 26 August 1983): *applies to the prevention, reduction and control of pollution of the marine environment resulting from activities within the area covered by the Agreement.*

http://untreaty.un.org/unts/60001_120000/12/2/00022093.pdf

- Canada and the United States

Canada/United States Joint Marine Pollution Contingency Plan (2003): *provides a coordinated system for planning, preparedness and responding to harmful substance incidents in the contiguous waters. The purpose of this plan is to outline and define the roles and responsibilities of the various players who would participate in the cleanup efforts of a marine pollution incident occurring in the contiguous waters between Canada and the United-States. A requirement of the Canada-US Joint Marine Pollution Contingency Plan of the plan is to conduct joint regional exercises to ensure that a response would be conducted as effectively and efficiently as possible.*

<http://www.dfo-mpo.gc.ca/Library/343409.pdf>

⁴ Data from Ronald B. Mitchell. 2002-2011. International Environmental Agreements Database Project (Version 2010.3). Available at: <http://iea.uoregon.edu/> (Date accessed: 19 September 2011)

Canada/US Joint Inland Pollution Contingency Plan (the “Inland Plan”) (2009): *sets forth cooperative measures for dealing with a release of a pollutant along the inland boundary of a magnitude that causes, or may cause, damage to the environment or constitutes a threat to public safety, security, health, welfare, or property. The Inland Plan may also facilitate the provision of assistance in the event that only one country is affected, but the polluting incident is of sufficient magnitude to justify a request for assistance from the other country.*

http://www.epa.gov/osweroe1/docs/er/us_can_jcp_eng.pdf

Canadian/US Search and Rescue Agreements (CANUSNORTH Beaufort Sea Operation Supplement to the Joint Marine Pollution Contingency Plan, December 6, 2007): *establishes an international marine pollution contingency plan for the Canada-United States contiguous waters, to implement the provisions of OPRC (1990); provides a coordinated system for planning, preparedness and responding to harmful substance incidents in the contiguous waters; facilitates coordination of response and establishes procedures for consultation. Does not apply to radiological incidents which are covered under Canada/United States Joint Radiological Emergency Response Plan*

<http://www.uscg.mil/d1/response/jrt/plans.asp>

- Finland and Russian Federation

Agreement between the Government of the Republic of Finland and the Government of Russian Federation on Cooperation in the Field of Environmental protection (1992)

No information was located other than title of the agreement.

<http://www.ymparisto.fi/default.asp?node=7030&lan=en#a3>

Action Programme on the Reduction of Pollution and the Implementation of the Protection of the Marine Environment in the Baltic Sea and in other Areas close to the Common borders of the Republic of Finland and the Russia Federation (1992)

No information was located other than title of the agreement.

<http://www.ymparisto.fi/default.asp?node=7030&lan=en#a3>

- Norway

NORBRIT Agreement: Agreement between Norway and United Kingdom on on procedures to be followed during joint Norway/United Kingdom:

provides for counter-pollution operations at sea joint counter pollution operations in the zone extending 50 miles either side of the median line separating the UK and Norwegian continental shelf; furthers the Bonn Agreement with bilateral cooperation.

http://www.dft.gov.uk/mca/mcga07-home/emergencyresponse/mcga-dops_cp_environmental-counter-pollution_and_response/mcga2007-ncp/mcga2007-ncp-appendixb.htm

- Norway and Russian Federation

Joint Contingency Plan for Combatment of Oil Pollution in the Barents Sea between Norway and The Russian Federation (1994): *promotes practical joint activities, in which the oil pollution protection authorities from the two countries share experience and hold joint exercises both in Norway and in Russia on a regular basis.*

http://arctic-council.org/workarea/the_arctic_meetings_tromso_april_2009/filearchive/arctic_guide.pdf

- Russian Federation and United States

The Russian-USA agreement on cooperation in combating emergency oil spills in the Bering and Chukchi Seas (1989): *provides for coordinated and combined responses to pollution incidents in the Bering and Chukchi Seas to develop appropriate preparedness measures and systems for discovering and reporting the existence of a pollution incident, provide the means to institute prompt measures to restrict the further spread of oil or hazardous substance; and provides a mechanism by which adequate resources may be employed to respond to an incident. Under the agreement the two countries meet on a biannual basis.*

Note: This agreement is due to be re-executed in November, 2011. The 1989 agreement is available at:

http://eppr.arctic-council.org/content/arctic_guide.htm

Joint Contingency Plan of Russian Federation and the United States on oil spills combating in Bering and Chukchi Sea (2001 and to be updated in 2011): *plan and its operational appendixes provide for coordinated and combined responses to pollution incidents in the Bering and Chukchi Seas and augments pertinent national, State, republic, regional, and local plans of the two Nations.*

http://www.au.af.mil/au/awc/awcgate/nrp/other_plans.pdf

Memorandum of Understanding and Cooperation Between The State Marine Pollution Control, Salvage, and Rescue of the Russian Federation and the United States Coast Guard (to be executed in 2011): *text is not yet publicly available.*

Appendix 2: SUMMARY OF RELEVANT ARCTIC COUNCIL PRODUCTS

The Arctic Climate Impact Assessment (ACIA) (2004) - An international project of the Arctic Council and the International Arctic Science Committee (IASC), to evaluate and synthesize knowledge on climate variability, climate change, and increased ultraviolet radiation and their consequences.

Arctic Marine Shipping Assessment (AMSA) (2009) - a document produced by the Protection of the Arctic Marine Environment (PAME) working group of the Arctic Council that represents a four-year effort to consider and review all aspects of Arctic shipping. It includes documentation of shipping activities from a baseline year (2004) and future projections in key areas such as environmental protection, marine infrastructure, human dimensions, and governance. The Assessment shows that increased shipping activities will occur in the Arctic in the next two decades and beyond. The AMSA report developed a series of Arctic marine shipping assessment recommendations. The AMSA report recognizes that implementation of recommendations would likely come from the Arctic states, industry and public-private partnerships. The following AMSA recommendations have relevance to EPPR:

- Oil Spill Prevention: That the Arctic states decide to enhance the mutual cooperation in the field of oil spill prevention and, in collaboration with industry, support research and technology transfer to prevent release of oil into Arctic waters.
- Circumpolar Environmental Response Capacity: That the Arctic states decide to continue to develop circumpolar environmental pollution response capabilities that are critical to protecting the unique Arctic ecosystem. This can be accomplished, for example, through circumpolar cooperation and agreement(s), as well as regional bilateral capacity agreements.

Arctic Offshore Oil and Gas Guidelines (2009) - The Protection of the Marine Environment (PAME) working group of the Arctic Council produced and updated the 2002 Arctic Offshore Oil and Gas Guidelines. These guidelines recommend voluntary standards, technical and environmental best practices, management policy and regulatory controls for Arctic offshore oil and gas operations. EPPR contributed the chapter on emergency response.

Arctic Council Arctic Oil and Gas Assessment 2008 - The objectives of this report were to provide an assessment of the environmental, social and economic, and human health impacts of oil and gas development in the Arctic and to evaluate the likely direction and impact of oil and gas development in the near future. The report summarizes that extensive oil and gas activities have already occurred in the Arctic with much more exploration and development likely to occur in the next two decades and beyond. The unique characteristics of the Arctic mean that development of oil and gas activities face a number of challenges or considerations that do not apply elsewhere in the world. As with all production activities, risks from these activities cannot be eliminated and because of the Arctic's harsh environment and are further complicated by the remoteness of the Arctic, especially if response to an accident or a disaster is required. Tanker spills, pipeline leaks and other accidents are likely to occur, even under the most stringent control conditions. Transportation of oil and gas entails risks beyond production regions. Pollution can be reduced by strict adherence to regulations and sound engineering practices. However, physical impacts and disturbance are inevitable wherever industry operations occur. The AOG report provided a number of

recommendations, that while under the purview of individual National governments, are relevant to EPPR activities. These include:

Oil and gas activities and their consequences for the environment and humans should be given increased priority in the future work of the Arctic Council, focussing in particular on:

- Research, assessment and guidelines to support prevention of oil spills and reducing physical disturbances and pollution;
- Governments and industry should be encouraged to provide better information on infrastructure related to oil and gas activities, marine shipping and tourism
- Governments and industry should provide the Arctic Council with improved access to relevant and appropriate data to enable the Arctic Council to establish an inventory of facilities and infrastructure with potential for release of spills associated with oil and gas and compile and maintain an updated inventory of accidental release from oil and gas activities in the Arctic as a basis for conducting periodic risk assessments.
- Undertake new research and continue existing research to provide better information on the behaviour and fate of oil in ice-covered water.
- Continue existing research necessary for developing effective techniques for dealing with oil spills in areas of sea ice, and with large spills on land.
- Continue existing research and where necessary conduct more studies using oil spill trajectory models to determine areas most at risk from oil spills and set priorities for response strategies, in particular in sensitive areas.
- Continue existing research and where necessary, conduct new research and monitoring to better understand short-and longer-term effects on the ecosystem, focusing on risk associated with oil spills, including prevention, clean-up, and response.

Behaviour of Oil and other Hazardous Substances in Arctic Waters (2011) (BoHaSa) - The report outlines some of the risks present in the Arctic associated with oil and HNS shipping activities as well as the international transportation protocols and conventions which apply to these substances, describes past incidents involving these substances, and summarizes shipping trends. The main body of the report contains a summary of what is known about the behaviour of various spilled substances, HNS and oil, in Arctic conditions.

Guidelines and Strategies for Oily Waste Management in the Arctic Region (2009) - The report describes key components of the decision process for oil spill waste management in the Arctic. The focus of the study is on those considerations that are integral to the selection of practical and feasible strategies and tactics for arctic regions and, in particular, for remote areas. The project also includes describes an interactive, graphic-oriented, automated *Waste Management Calculator Job Aid* that has been developed to assist managers and decision makers understand and compare basic response options. The stand alone software was developed for use by non-technical (or technical) managers and decision makers. This Job Aid provides comparative waste volumes that potentially would be generated by different cleanup techniques and using different treatment endpoint standards.

The Arctic Guide (2008) – Summarizes the risks in the Arctic from different human activities, identifies the key response organizations in each of the Arctic Council countries, summarizes organization roles and responsibilities, including the roles of indigenous people, and

identifies the emergency point of contact for each nation. *The Arctic Guide* also provides a listing with a brief description of international, bi- and multilateral agreements which are in force, cover at least part or a portion of the Arctic, and pertain to emergency prevention, preparedness or response. EPPR is working to issue an updated version of the this publication.

Appendix 3: ACRONYMS

AAMverNet - Arctic Automated Vessel Emergency Reporting Network

AIS - Automatic Identification System

AMSA - *Arctic Marine Shipping Assessment Report*

BoHaSa - *Behavior of Oil and Other Hazardous Substances in Arctic Waters*

DHS - Deepwater Horizon oil rig explosion and well blow-out

DWH - Deepwater Horizon

EPPR – Emergency Prevention, Preparedness and Response Working Group

ERMA - Environmental Management Response Application

NOAA - U.S. National Oceanographic and Atmospheric Administration

NSSI - U.S. North Slope Science Initiative

IAEA - International Atomic Energy Agency

IEC - Incident and Emergency Center

IHO - International Hydrographic Organization

IMO - International Maritime Organization

IMSO - International Maritime Satellite Organization

LIRT - Long Range Identification & Tracking systems

SAR - Search and Rescue

SOLAS - Safety of Life at Sea

WMO - World Meteorological Organization

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