



## Research and Development Priorities: Oil and Ice Workshop Anchorage, Alaska November 4- 5, 2003

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**Sponsoring Agency:** Prince William Sound Oil Spill Recovery Institute - OSRI

**Contractor:** DF Dickins Associates Ltd.

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### SYNOPSIS BY OBJECTIVE

**FIRST OBJECTIVE** Identify a short list of practical R&D ideas and related projects, which will really make a difference to oil in ice response.

The group proceeded through a four-step process to screen ideas, develop some broad parameters for specific programs and identify examples of specific projects associated with a final set of priority R&D programs. The process and results associated with each step are summarized below:

- 1. Highlight ideas, which cannot strictly be viewed as research and development in the engineering and scientific sense of the word; (working with the initial suite of ideas generated by Dickins Associates and adding additional ideas based on group input and public comments)*

As a result of this initial screening, a number of "ideas", although important in their own right, were considered to fall outside of the definition of R&D: for example developing international standards for spill response in ice, developing realistic scenarios, conducting risk analysis, deriving lessons from experiences with historical spills, developing a dedicated cold climate facility for oil spill response testing.

Three all encompassing ideas were considered to better represent recommended elements of any R&D program:

1. Working towards more flexible regulations to facilitate the application of all response tools.
2. Developing long-term education programs to explain the trade-offs and relative benefits and drawbacks of different response strategies.
3. Applying biological sciences as part of net environmental benefit analysis to assess relative merits of different response strategies.

Public comments confirmed general views of participants, for example: emphasizing the importance of burning for oil in ice response, utilizing local knowledge to enhance response activities such as tracking and monitoring, and applying a systems approach to evaluating the optimum mix of response strategies in different situations.

Field spills were identified as an important future initiative that would involve a wide range of R&D and operational projects (Refer to summary of separate discussion on this issue). The following "new" ideas were introduced at the meeting:

*Charlene Owens, ExxonMobil:* Chemical Herders to Increase the Window of Opportunity for ISB, Use of Icebreakers or other Vessels to Facilitate the Use of Dispersants in Ice Covered Waters, Dispersants for Viscous Oils (more likely in cold temperatures), Pneumatic Diversion Booms to Separate Oil from Ice. These ideas were described and illustrated in a handout.

*Ken Lee, Fisheries and Oceans Canada:* Oil Mineral Aggregates as a natural dispersant mechanism (not sinking!).

Several of these ideas were selected as a new program area (e.g., chemical herders) and others were assigned as projects under an existing program/idea (e.g., pneumatic booms as a project under Oil and Ice Deflection).

2. *Assess individual preferences for remaining 16 R&D ideas or programs (subjective combination of responses to questions such as "Would it make a difference?" "Is it technically feasible?" and "Is it cost effective?" (Each participant had six votes to apply to any idea(s))*

Ten programs or ideas received three or more votes. These are in order from high to low: Field Spills, Dispersant, Oil and Ice Deflection, Remote Sensing, Mechanical, Chemical Herders, Simulants, Oil/Ice Mixtures, Nearshore Oil and Ice Issues, and Transfer of Icy/Oily Mixtures.

3. *Scope out a number of program parameters for ten ideas and their related projects receiving three or more votes (need, baseline state of knowledge, political sensitivity, confidence in some positive research outcome, timescale and cost).*

As a result of this exercise the following ideas were dropped from the priority listing (or in the case of Field Spills, elevated to another level of discussion):

- Field Spills: viewed as a broad-based concept with important applications to most other R&D projects. Discussed as a larger, separate topic (see below)
- Multi-purpose Oil and Ice Skimmer: combination of off-the-shelf, proven components has merit but concept is not considered R&D. Applied engineering needs to be driven by potential users working with manufacturers.
- Direct Recovery of Oily Ice: Not considered R&D - operational strategy using a mix of existing equipment. Assessed as having low overall effectiveness regardless of any possible improvements.
- Nearshore Oil and Ice Interactions: Viewed as an issue where existing knowledge of the special conditions existing at break-up (primarily) have not been adequately addressed by existing response strategies (issues of access, safety, oil redistribution on flood waters etc.). Scope of an associated R&D project(s) on this topic not clear to the group.

4. *Confirm priority of remaining 7 ideas/programs by individually ranking each idea according to two general criteria: Technical Merit- in terms of expected degree of response enhancement if the research succeeded, and the Reality of Constraints and Uncertainties - such as cost, political sensitivity and the degree of confidence in a successful outcome. A tally was made under each criterion heading for each program according to the number High, Medium, or Low rankings. Totals were derived separately under the Technical and Reality headings by summing 3H + 2M + L.*

PROGRAM	TECHNICAL				REALITY CHECK			
	H	M	L	TOTALS	H	M	L	TOTALS
Dispersants	15	1	0	47	5	10	1	36
Deflection of Oil	6	8	2	36	9	7	0	41
Remote Sensing	8	7	1	39	5	9	2	35
Mechanical Recovery Enhancements	2	11	3	31	3	6	7	28
Chemical Herders	5	8	3	34	1	12	3	30
Simulants	5	7	4	33	0	8	8	24
Transfer Icy Oily Waste	4	11	1	35	7	9	0	39

Care needs to be taken not to place too much significance in the actual numerical rankings. It is interesting to note that regardless of whether projects are judged from a technical or non-technical point of view the groupings of top 4 and bottom 3 are the same in each case. Herding, mechanical enhancements and simulants were ranked consistently lower in priority than the other projects (largely related to a general lack of confidence in the R&D outcome).

5. *Identify examples of representative projects for each of the final seven priority programs.*

Dispersants in Ice

- Mixing with icebreakers (or other vessels)
- Developing a dispersant for viscous (cold) oils
- Evaluating potential for long-term retention
- Oil Mineral Aggregates (OMA)
- Effectiveness in fresh/brackish water
- Fate/Behavior and Effects

Remote Sensing of Oil (under, in, among and on top of ice)

- Gas sniffing
- Optical sniffing
- Evaluate proven sensors in a broken ice field

Oil Deflection (to separate oil from ice and increase encounter rates)

- Propeller wash
- Pneumatic diversion booms
- Airjet blowers

Transfer of Icy/Oily Waste

- Processing viscous emulsions with small ice chunks. Integrated study encompassing all processing phases (collection, pumping, storage, offloading)

Chemical Herders

- Validate herding action in ice. Primary purpose is to enhance in situ burning by thickening oil.

Enhance Capabilities of Existing Mechanical Systems in Ice

- Research means to expand operating window for mechanical recovery with ice present (could be linked to projects in oil deflection, and herding) and employ some aspect of ice management.

Simulants

- Develop a surrogate oil for experiments and responder training at sea, which is environmentally acceptable (low-toxicity, non-sticky, rapidly broken down)

**SECOND OBJECTIVE:** Identify potential leadership and funding resources with the ability to launch new projects

The following example funding sources were identified (not intended to be all inclusive):

- Congressional funding channeled through OSRI (board wants to become more involved with applied research - potentially several hundred K per year)
- University of New Hampshire/NOAA - funding restricted to US not for profit or academic institutions (cap on profit and overhead rules out most commercial enterprises).
- DEC Charter agreement between DEC, BP and ConocoPhillips - must have a US Beaufort Sea application.
- NASA Cryospheric Program - may be able to fund remote sensing research
- MMS - traditional source of oil spill research funds
- Fisheries and Oceans Canada - focusing on the Centre for Offshore Oil and Gas Environmental Research (COOGER)
- Finnish Government programs in conjunction with VTT (primary Baltic focus)
- European Commission programs focusing on precautionary measures to improve maritime safety - see also Helsinki Commission (Helcom), PIANC - Maritime Working Group in Brussels (current chair is US Army Corps of Engineers), and Northern Dimension Forum. Not clear how effective it would be to pursue individual R&D projects through these very large bureaucratic umbrella groups.
- Norwegian NOFO program to look at developing spill response in darkness
- Industry (e.g., ExxonMobil, BP/ACS, BP TNK, Agip, SEIC, Statoil)

**THIRD OBJECTIVE:** Consider potential mechanisms to create an ongoing "virtual" workshop to carry on the work started here.

The group identified a number ways in which the group could continue to exert influence (directly and indirectly) over the future of R&D initiatives in this area:

- Technical advisors to OSRI in helping to steer funding commitments.
- Broad distribution of the R&D agenda derived from the workshop findings (e.g., within Washington scientific committees, Arctic Counsel through the EPPR technical working group, International Oil Spill Conference)
- Workshop on Future Field Trials with Oil (e.g., COOGER sponsorship in 2004)

Given the multitude of already established organizations and committees, it was decided not to develop any new formal structure. There are already established personal communications links between many of the participants. The workshop led to several important new international synergies between industry representatives and government agencies, and a consensus that field trials with oil represent the most important future goal - see following.

## FIELD TRIALS WITH OIL

The group strongly endorsed the need for field trials with real oil as the most effective way of advancing spill response in ice. There was considerable discussion about what sort of framework would be needed to make such a project happen. Needs were itemized as:

- Fate and behavior of oil in dynamic pack ice (there have only ever been two field trials with oil in broken ice - 1986 and 1993)
- Validating and proving response strategies
- Training spill responders
- Understanding and overcoming scale effects in moving from observations in laboratory and tank tests to a field environment
- Testing equipment
- Developing operational guidelines for particular technologies
- Building confidence and acceptance among responders and regulators

A field trial with oil is viewed as an essential opportunity to build a comprehensive program, which integrates many complimentary elements from other R&D areas. Key points from discussion are:

- A US location is probably not a political reality in the near-term, given the continuing political constraints on such research in the eyes of EPA and State agencies - pursuing this option is viewed as very high risk.
- Permits can be achieved in Canada and Norway. Both countries have become leaders in the oil spill field through their history of successful experimental spills over the last 27 years.
- Recent Canadian experiences involving local residents in the early planning stages have been very successful, leading for example to recent permits for experimental spills in wetlands (with US EPA participation). A process starting with public and town meetings and large-scale mail outs to local residents leads to a strong base of local support (aided by a "buy local" policy and valuable training opportunities for local responders).
- Important to view field trials as encompassing a broad range of complimentary research and applied technologies, including issues of training responders, developing operational tactics.

- OSRI could potentially help fund reconvening this group (all or in part) to help design aspects of a field trial.
- Although too soon to predict the outcome, recent massive investments in Russia by international oil companies could lead to substantial funding and partnership interest in field trials with oil (e.g. BP TNK and ongoing interest by ExxonMobil and Statoil)
- Ken Lee (COOGER) agreed to look into spearheading a planning effort to achieve a field trial, starting with a workshop in Dartmouth in the New Year. He recommends involving US regulators, NGO's and all other stakeholders in the process from the beginning. Multiple funding sources need to be represented by participants at the workshop.
- Walt Parker wants to submit the concept of field trials to the Arctic Council as the most important aspect of oil spill R&D that they need to consider over the next year.
- Letters of support for field trials with oil need to go to COOGER (Ken Lee) in order to generate broad base of support within management of Fisheries and Oceans Canada. I.D. sources of letters as (OSRI, MMS, Arctic Council, NOAA, ADEC, USCG, Arctic Research Commission, API, NOFO and industry).
- Agreed to submit the topic of field spills with oil for the next International Oil Spill Conference (2005). Abstract describing a proposed position paper to anchor a panel session to be submitted for Joe Mullin to take to the Program Committee (Done)