

The report further emphasized a need for better training, education, communication, and the development of codes of practice in which all those who are potentially responsible for spills of chemicals into the Great Lakes should acknowledge the importance of preventative aspects.

It is likely that within programs such as MISA, strenuous efforts will be devoted to ensuring that the Best Available Technology includes efforts to conduct operations in such a way that spills are avoided, and even if they do occur, they will not reach vulnerable waterways. The recent million gallon (3 785 412 dm³) diesel oil spill into the Monongahela and Ohio Rivers in the U.S. is a clear example of an incident which need not have occurred, had the tank been properly bermed. The design of such facilities should build in the requirement that failure of the vessel will not result in spillage to the environment. A second "fail-safe" line of defence is needed.

Conclusions

There has been a tendency in recent years for most environmental protection efforts to be devoted to monitoring, treating and regulating chronic emissions. Whereas this devotion to chronic emission reduction is desirable, it is also important to ensure that there is consistency between efforts to regulate chronic emissions and those applied to episodic emissions or spills. It appears that most present regulatory enthusiasm is being applied to control chronic emissions, but relatively little effort is being devoted to measuring and reducing spill frequency, or to cleaning up or mitigating the spills. We do not know the relative contributions of each source, but it is certain that as chronic emissions are reduced, spills will become, in relative terms, a much more significant source of contaminants to the environment.

Regrettably, the resources devoted to spill prevention and clean-up seem to be controlled more by the intensity of public outcry and indignation after periodic spill incidents. Fortunately for society (but unfortunately for spill researchers) there have been very few recent disastrous spill incidents. We would be foolish to assume that there will never be another Mississauga chlorine incident, or "Arrow" tanker grounding. What we need is a consistent, balanced, long-term program of research into all aspects of chemical emissions, including continuing scrutiny of relative magnitudes of all sources, including water quality modelling, to link the emission rates to concentrations in water, fish, and wildlife.

Finally, "spillers" should take heart; if the "chroniclers" do a fine job they will put themselves out of business and the importance of spills and "spillers" will again become appreciated.

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EVALUATION OF A WATER JET BARRIER IN ICE CONDITIONS

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Introduction

Limitations of conventional barriers for containment and deflection of oil spills in currents of more than 0.514 m/s (1 knot) stimulated the study of alternative systems which function by generating a horizontal surface current to oppose the movement of floating oil. Air jets were tested at the United States Environmental Protection Agency's (EPA) OHMSETT facility (Cohen, Lindenmuth, 1979) but it was shown that a large pressure drop in the duct would preclude the development of an operational barrier.

Plunging water jets were also tested at the same facility (Nash, Farlow, 1984). Used with low pressure (150 kPa) and high water volume (5.0 L/s), they showed good efficiency in a deflection configuration. Unfortunately, the logistics increase rapidly with the deflection distance and current strength.

Flat-fan high-pressure water jets, placed horizontally above the surface of the water, which showed potential in tank testing at OHMSETT, were used in an array configuration in rivers and canals (Meikle, Whittaker,