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Mr. Leonard Legault
Chairman,
Canadian Section
International Joint Commission
100 Metcalfe Street, 18th Floor
Ottawa, Ontario

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Canadian Commissioner
mc/EAB/A. Mack / MV/P. Bellen
1999
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Dear Commissioner Legault,

We are pleased to transmit the 1998-1999 *Binational Report on Protection of the Great Lakes Water Quality* by the Department of Fisheries and Oceans (Coast Guard), Department of Fisheries and Oceans Canada (Science), Transport Canada Marine Safety, and the United States Coast Guard, submitted in accordance with Annex 6(2) of the Great Lakes Water Quality Agreement. This copy is submitted as a working draft to allow you and your colleagues time to incorporate the information in sufficient time for the IJC Biennial Meeting in Milwaukee. An official copy in both official languages will follow.

As did the last report, this report documents two basic themes. The first is that the above noted Canadian government departments and their counterparts in the United States Coast Guard have embraced as a priority the emerging issue of biological pollution and prevention of the introduction of exotic nuisance species from ships. The second is that all organizations are continuing to work closely, and effectively, together on the more traditional pollution issues such as oil and hazardous chemicals, marine sanitation devices, and cargo residues.

This example of cooperation, coordination and effective action between Canadian federal departments and the United States Coast Guard is a working model that reflects what the Great Lakes Water Quality Agreement is meant to do.

Sincerely,

R.J. Pierce
Regional Director General
Department of Fisheries and Oceans
Central & Arctic Region

Sincerely,

T. Gibson
Regional Director General
Transport Canada
Ontario Region

Encl (1) 1998-1999 Joint Report

Cc: Environment Canada
Foreign Affairs and International Trade

1998-1999 Binational Report on Protection of Great Lakes Water Quality

By the
Department of Fisheries & Oceans Canada (Canadian Coast Guard)
Department of Fisheries & Oceans Canada (Science)
Transport Canada Marine Safety
and the
United States Coast Guard

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Part I: Overview of the Report

§ 100. Introduction and General Developments

§ 110. The Report and the Great Lakes Water Quality Agreement. This report, submitted to the International Joint Commission under the Great Lakes Water Quality Agreement (GLWQA)¹ continues the format of the 1996-97 Report:

(1) This report has been prepared in part by Transport Canada Marine Safety, which has significant responsibilities under Annexes 4, 5, 6, and 8 of the GLWQA for regulation of vessels and marine facilities, and by Department of Fisheries and Oceans Canada Science Branch, which is responsible for the control of exotics in ballast water. The Canadian Coast Guard, which is within the Department of Fisheries and Oceans Canada, retains responsibilities under Annexes 6, 8, and 9 of the GLWQA for response to discharges from vessels and marine facilities. Further, the Science Branch of the Department of Fisheries and Oceans Canada continues to have specific responsibilities under Annex 6 with respect to ballast water. The United States Coast Guard retains its responsibilities for both regulation and response relating to vessels and marine facilities under Annexes 4, 5, 6, 8, and 9. To assist the International Joint Commission in its understanding and review of the respective Annexes for this report, the legislative authority and regulations that each nation and agency utilize to undertake these significant responsibilities are listed in Appendix A. The actual legislation and regulations may be accessed at <http://www.tc.gc.ca> for Canada and <http://www.uscg.mil/hq/g-m/nmc> for US legislation. In this report, where used without further qualification, "the agencies" means the Department of Fisheries and Oceans Canada Science Branch (DFO Science), the Canadian Coast Guard (CCG), Transport Canada Marine Safety (TCMS), and the U.S. Coast Guard (USCG), unless otherwise qualified.

(2) This report, reflects the results of a closely focused, substantive, government-to-government consultation to "provide an interchange of information," "determine the relative importance of problems requiring further study," and "apportion responsibility" for further work in accordance with the mandate of Annex 6 § 2. Other consultations on these issues will be held with our regional partners, marine industry, and other interested organizations at the Canadian Marine Advisory Council, the Great Lakes Marine Community Day, and the Great Lakes Commission ANS Panel and other ongoing forums.

§ 120. Reorganizations and Reductions. Consistent with the general downsizing in government on both sides of the border personnel resources continue to be at premium. As part of a general reorganization of Transport Canada and the Department of Fisheries

¹ See Annexes 4, 5, 6, 8, and 9 of the Great Lakes Water Quality Agreement of 1978, signed at Ottawa November 22, 1978, as amended by Protocol signed November 18, 1987.

and Oceans, the Canadian Coast Guard and Transport Canada have reduced the staff available to supervise environmental regulatory policy on the Great Lakes to one staff officer and one scientist. As part of a general streamlining of the United States Coast Guard, the Ninth U.S. Coast Guard District has reduced the staff available to supervise environmental regulatory policy on the Great Lakes to one staff officer.

Despite these reductions, all of the agencies continue to have a strong commitment to Great Lakes environmental issues. Transport Canada, DFO Science, the Canadian Coast Guard, and the U.S. Coast Guard continue to work closely together on ballast water, marine sanitation devices, and other regulatory issues. The Canadian Coast Guard and the U.S. Coast Guard continue their longstanding tradition of close cooperation in pollution response operations on the Great Lakes. Consistent with both governments desire to utilize technology to maximize resources and disseminate the spread of information, this report will cite internet resources when possible.

§ 130. Pollution Response. The Canadian Coast Guard and the U.S. Coast Guard continue to develop the exercises, training, and coordination procedures necessary to insure effective binational responses to significant discharges of oil or hazardous substances.

Part II: Major Issues

§ 200. Exotic Organisms in Ballast Water

Exotics in ballast water are a high priority issue for the agencies in the Great Lakes, and work continues on a number of fronts. In addition to the specific issues and initiatives discussed below, the agencies continue to maintain a close working relationship with other regional, national, and international organizations working on the issue of exotics. Personnel from these agencies actively participate in such forums as the U.S. Federal Aquatic Nuisance Species Task Force, the Great Lakes Commission Aquatic Nuisance Species Panel, the Annual Zebra Mussels and Other Aquatic Nuisance Species Conference, and the International Maritime Organization Marine Environmental Protection Committee.

Canadian outreach programs dedicated to getting information to the public on ballast water include an internet web site, (<http://www.dfo-mpo.gc.ca/regions/central/ca-e.htm>), a video, brochures, support for the Ballast Water Workshop at the 9th Annual Zebra Mussel and Aquatic Nuisance Species Conference, and a compact disk to allow access to a bibliography of scientific papers on Ballast Water as it pertains to the Great Lakes. Indeed DFO Science will be the host of an expanded Aquatic Nuisance Conference in Toronto in the year 2000.

The U.S. Coast Guard has an active public outreach program that includes an Internet web site, www.uscg.mil/hq/g-m/mso4/safety.htm, brochures and various slide shows. The Ninth Coast Guard District has actively supported the Great Lakes Panel on Aquatic Nuisance Species Information and Education Committee by ensuring the Committee's August 1998 "Biological Invasions" pamphlet had been distributed at various venues throughout the Great Lakes. Additionally, the Ninth Coast Guard District has been active in framing research priorities in consultation with the Great Lakes Commission's Aquatic Nuisance Species Panel Research Committee.

All agencies are working in conjunction with the International Joint Commission towards a successful "Exotic Policy Workshop" at the next biennial meeting in Milwaukee, Wisconsin.

§ 210. Enforcement of the Great Lakes Regime

The 1995-1998 ballast water enforcement statistics provided in Appendix B from the U.S. Coast Guard indicate that compliance with the current Great Lakes ballast water regime continues to be good. As has been the case since the beginning of the Great Lakes regime imposed by U.S. regulations in 1993, the active assistance of Transport Canada

Marine Safety has been essential to achieving the current level of compliance from the marine industry. The two Seaway authorities, the St. Lawrence Seaway Authority and the St. Lawrence Seaway Development Corporation, also provide valuable assistance to the U.S. Coast Guard as part of our general coordination of port state control in Montreal and Massena, New York. The United States regime is not legally effective until the incoming vessel reaches United States waters in Massena, after already passing through five Canadian locks between Montreal and Massena.

§ 220. New Legislation

§ 221. *In General.* Until recently, serious interest in the problem of ballast water and exotic organisms was largely limited to Canada, the Great Lakes region of the United States, and Australia. (Australia is in a sense the salt water analogue to the Great Lakes region, because the relatively isolated coastal salt waters of Australia have a unique ecosystem which has been severely affected by invasions.) Australia has taken over the chair at IMO for the issue from the United States.

§ 222. *U.S. Legislation.* In October of 1996, the United States Congress enacted the National Invasive Species Act of 1996 (NISA).² This is a deliberate expansion of both the form and substance of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA).³

The old NANPCA created a two-phased regime for the Great Lakes, (1) two years of voluntary ballast water guidelines, 1991-1992, (2) followed by mandatory ballast water regulations in 1993. Under NANPCA, both the guidelines and the regulations emphasize exchange as the primary means for control of ballast water. NANPCA also (3) authorized federal support for state programs for control of the dispersion of exotics inside the United States, (4) authorized a set of government studies, and (5) mandated a high level of interagency coordination among U.S. Federal agencies and the Great Lakes States. (Neither the Federal ANS Task Force nor the Great Lakes Commission ANS Panel mandated by NANPCA provided for Canadian participation, but they have been invited as observers to the GLC ANS Panel.)

NISA takes the basic pattern of NANPCA and applies it to all ports of the United States. It mandates (1) nation-wide voluntary guidelines, which went into effect 1 July 1999 (see, <http://www.uscg.mil/hq/g-m/mso4/bwrule.htm> for the full rule) (2) to be followed, after three years, unless the voluntary guidelines are deemed to be adequate, by mandatory regulations, (3) along with further support for state efforts to prevent internal dispersion, and a special study of the Chicago Rivers Ship and Sanitary Canal by the Army Corps of Engineers, and (4) more extensive interagency and international cooperation. As before,

² U.S. Public Law 104-332 (26 October 1996), codified at 16 U.S.C 4701 *et seq.*

³ U.S. Public Law 101-646 (29 November 1990), codified at 16 U.S.C 4701 *et seq.*

both phases of the nation-wide regime mandated by NISA emphasize the use of exchange. However, NISA takes account of the now widely acknowledged concern about the safety of exchange on larger vessels calling at other ports of the United States by providing more explicit exemptions from the exchange regime based on safety.

§ 223. *Canadian Legislation.* Canada remains committed to replacing the current voluntary ballast exchange guidelines with a regulatory system of controls.

Statutory authority for a ballast water management program was contained in recent amendments to the Canada Shipping Act. Bill C-15 received Royal Assent on June 11, 1998 and Governor in Council Authority to regulate ballast water came into force on Oct 31, 1998

Regulations will be written to require effective ballast water management techniques. However, significant research is required to study both the safety aspects and effectiveness of any ballast water management techniques (including ballast water exchange) prior to such regulations coming into force. There is also a requirement to study the effects of ships coming into Canadian waters (specifically the Great Lakes) that are not in a ballast condition.

As a first step in this process, a working group on Ballast Water was established Nov 4, 1998 under the aegis of Canada's Marine Advisory Council (CMAC). This working group will be the primary focal point in the development of any new ballast water regulations. CMAC is a long standing body with representation from federal departments, the transportation industry, labour associations, recreational boaters, environmental groups, and other interested marine stakeholders.

It is expected that as an initial step, redrafted guidelines, reflecting the Great Lakes experience of the past 10 years, and the resolutions of the International Maritime Organization as well as those of the USCG will be put in place in the fall of 1999. These guidelines will apply across the country. An important component of the guidelines will be the input of regional ballast water working groups. It is anticipated that the Great Lakes Regional Working group will have identified specific provisions for the protection of the Great Lakes.

§ 224. *International Legislation.* The International Maritime Organization Marine Environmental Protection Committee meets in London biannually. Both Canada and the United States are represented, Canada by Transport Canada, and the United States by the United States Coast Guard. This Committee is expected to propose draft regulations to deal with ballast water with final rules to be considered in 2001.

§ 230. Current Ballast Water Studies

International Aquatic Nuisance Species and Zebra Mussel Conference

<http://www.zebraconf.org>

Smithsonian Research Center

<http://www.serc.si.edu/invasions/ballast.htm>

Northeast Midwest Institute

<http://www.nemw.org/biopollute.htm#ballastproject>

Department of Fisheries and Oceans

<http://www.dfo-mpo.gc.ca/regions/central/ca-e.htm>

MIT Seagrant

<http://massbay.mit.edu/exoticspecies/ballast/index.html>

United States Coast Guard

<http://www.dot.gov/dotinfo/uscg/hq/g-m/gmhome.htm>

The U.S. Coast Guard Research and Development Center has just initiated a general study of ballast water indicators, which may look at a number of chemical or biological indicators.

§ 231. Recent Work on Control Measures

§ 231.1. *Filtering.* A project led by the Northeast-Midwest Institute and the Lake Carriers' Association, under the name of "The Great Lakes Ballast Technology Demonstration Project," has been organized to "test ballast technology options of national and international interest. Its initial focus is on filtration as a primary treatment technology which could be coupled with secondary treatment enhancements that could have effectiveness against pathogens."⁴ A filtering system has been put in place on one upper wing ballast tank of the Canadian laker, *M/V Algonorth*. Biological samples are being taken from both the filtered tank and a control tank. The intent is to test the results of various levels of filtering from 100 to 25 microns. Up to date progress may be viewed

⁴ Allegra Cangelosi and Richard W. Harkins, "Great Lakes Ballast Technology Demonstration Project: Project Description for International Maritime Organization Meeting" (10 May 1996).

on the Northeast Midwest web site. One subset of the Demonstration Project was a specific study to examine whether pathogens were a factor in terms of ballast water coming into the Great Lakes. The study found both fecal coliform and Cholera were present in the ballast water of some ships. It also confirmed that gene probe technology might be an appropriate examination tool. The authors of the study caution, however, that further work needs to be done in regards to the risk that is posed to the quality of the water in the Great Lakes from pathogens.

§ 231.2 *Biocides*. Although there has been a tendency to categorically reject biocides because of concern about collateral damage to the environment, specific non-oxidizing biocides are currently being explored specifically as a method to treat the NOBOB (No Ballast On Board) vessels which represent the majority of vessels entering the Great Lakes.

To this end, DFO Science contracted a preliminary study of periacetic acid to RNT technology. The results were promising enough that follow on studies are being carried out both in house and via a joint Canada/U.S. collaborative study between University of Buffalo and ESG International of Guelph, Ontario.

The University of Michigan is also continuing their examination of gluteraldehyde in a study supported by the State of Michigan Department of Environmental Quality. An interim report given at the "Ninth International ANS and Zebra Mussel Conference" in Duluth, Minnesota last April suggests promise from a technological and economic point of view.

§ 231.3. *Hydrocyclone/UV*. A recent development that shows considerable promise is the use of oil industry technology. A private Canadian firm (Velox technology) has married hydrocyclone technology used to separate oil and water, with state of the art ultra violet disinfection technology. Tests have been done on the unit in Norway, at the National Research Council in Ottawa and at the Institute for Ocean Science in Vancouver at flow rates of up to 1000 cubic meters of water an hour. So far the results look promising. The technology has been demonstrated at IMO and plans are underway to compare the unit with the technology used in the "Great Lakes Demonstration Project". It still remains to place a hydrocyclone unit on a vessel for sea trials.

§ 231.4. *Secondary Treatments*. One of the corollaries of the research that has been done to date on technological solutions to the ballast water issue is that no single method by itself offers a satisfactory treatment solution. As a result, considerable research has been conducted to explore secondary treatments that could be combined with primary treatment technologies such that the two technologies together would provide better protection. The, hydrocyclone/UV unit described above is an example of the marriage between primary and secondary treatment technologies. Currently various studies are underway to examine secondary treatment methods such as ultra violet light,

electrostatic shock, and heat to name just a few. Most secondary treatment procedures are still in development; several interim reports on secondary treatment were provided at the "Ninth International Aquatic Nuisance Species and Zebra Mussel Conference".

§ 232. The Safety of Exchange – M.V. FLARE

There is cause for concern about the safety of exchange on the open ocean. The current design of most ballast tanks requires the ship to pump down a set of tanks (usually port and starboard pairs) before pumping them up again with the open ocean water. This operation creates a stress on the hull for which the ships were not originally designed. The extent of this problem can vary significantly with the type of vessel and the design of a specific ship, but generally becomes a matter of increasing concern with increases in the size, length, and length-to-breadth ratio of a ship.

However, as we noted in previously published reports on the Great Lakes regime, this is an issue that could use more study.⁵ The recent Canadian study on ballast water inputs also raises an important cautionary note about the safety of exchange:

“While the safety implications of ballast water exchange continue to be debated internationally the emphasis appears to be placed on larger ships, bulk carriers over forty thousand tons deadweight, which are too large to enter the Great Lakes. However, the bulk carriers built specifically for the lakes trade and designed to a length to breadth ratio of 10:1 have a history of structural cracking on North Atlantic passages. This condition could be further aggravated by the exchange of water ballast, particularly as these ships age, and change ownership and/or management. Over a period where the majority of entries have been in a loaded condition [NOBOB], it is easy to be lulled into a false sense of security.”⁶

On January 16th 1998, the Cypriot flagged *M.V. Flare* inbound in ballast to Montreal to load grain, broke in two in the Gulf of St. Lawrence. Twenty-one sailors died in the zero degree Centigrade waters. The *Flare*, when she sank, was subject to the Canadian voluntary guidelines with respect to ballast exchange for vessels proceeding to St. Lawrence and Great Lakes ports.

⁵ Katherine Weathers and Eric Reeves, "The Defense of the Great Lakes Against the Invasion of Nonindigenous Species in Ballast Water," *Marine Technology*, vol. 33, no. 2, pp. 92-100, p. 94 (April 1996), and M. Eric Reeves, "Techniques for the Protection of the Great Lakes from Infection by Exotic Organisms in Ballast Water," in Frank M. D'Itri, *Zebra Mussels and Aquatic Nuisance Species*, pp. 283-299, p. 289 (Ann Arbor Press: Chelsea, MI, 1997).

⁶ Aquatic Sciences, *Examination of Aquatic Nuisance Species Introductions to the Great Lakes through Commercial Shipping Ballast Water and Assessment of Control Options, Phase I & Phase II*, ASI Project E9225/E9285, Phase II, p. 12 (Aquatic Sciences, St. Catherines, Ontario, March 1996).

The loss of the *Flare* is now under investigation by the Transportation Safety Board of the Canadian government and Lloyds Register. A press release may be found at <http://bst-tsb.gc.ca> identified as TSB #M 07/98. While the *Flare* sinking is still under investigation, two documentaries in the media have suggested a tie between the *Flare* loss and ballast exchange. Additionally, a number of experts have suggested a requirement to further examine the wisdom of requiring ships to conduct an operation that has clear safety implications.

The USCG has recently completed a safety study involving Panamax sized container ships. It concluded that there were safety implications to the process of ballast exchange. It is important to note that further work is required on this matter especially in regards to dynamic stability and hull corrosion factors; the intent is to continue the study to examine bulk carriers. The full Panamax report can be found at www.uscg.mil/hq/g-m/mso4/safety.htm.

§ 233. North American Ballast Water Reporting Forms & Record Keeping

Canadian and U.S. authorities, and researchers, have used a variety of reporting forms for attempting to track the amounts and sources of ballast entering the Great Lakes and other areas. In the Great Lakes, U.S. Coast Guard enforcement of the United States regulations has largely depended on the Canadian "Ballast Water Exchange Report" created for the Canadian voluntary program as the basis for the initial screening of vessels to be boarded and tested. With the development of the U.S. national regime, a reporting form is now in place that is consistent with the International and Canadian forms.

§ 240. A Binational Ballast Water Research Strategy and Plan

This strategy has been in place for two years. Much has been accomplished in terms of research to support the knowledge required to put an effective and safe regime in place to protect the Great Lakes. However, much is still required. To this end a summary of progress to date and unmet needs is provided. The following is a listing of the research undertaken:

I. RESEARCH STRATEGY - EXCHANGE

A. SAFETY OF EXCHANGE

1. Large Vessels, greater than Seaway size:
 - a.) USCG: "Panamax Container Study"
 - b.) Lloyds/International Association of Classification Societies: Variety of internal studies on ballast exchange dynamics.

2. Seaway Sized Vessels:
 - a.) Lloyds/TSB: “Investigation of *M.V. Flare* Loss.”

3. Flow Through Exchange:
 - a.) “Three Quays” Study for the Institute of Marine Engineers. Report includes computer simulations presented to IMO on flow through exchange specifically for bulk carriers. Brazil also presented similar simulations to IMO regarding tankers and results of a full scale trial aboard the *M.V. Lavras*.

4. Cost of Exchange:
 - a.) Report from InterTanko/International Chamber of Shipping to IMO.

5. Confirmation of Exchange:
 - a.) Real time for Operators/Regulators: Not addressed.
 - b.) Scientifically Reliable / Enforceable: Not addressed.

II. RESEARCH STRATEGY – NOBOBS

A. RISK ANALYSIS

1. Residual Slop:
 - a.) Preliminary study as part of “Great Lakes Demonstration Project” indicated evidence of pathogens in slop, however, this issue needs to be further examined to better identify and quantify risk.

2. Residual Sediment:
 - a.) Preliminary unfunded study in Welland Canal, no results to date. Issue needs to be further addressed.

B. OPERATIONAL MEASURES

1. Swish and Spit/Partial Exchange:
 - a.) Not Addressed

2. Heat/Shore-side:
 - a.) Proposals submitted for research but not yet addressed.

3. Biocides:
 - a.) Glueraldehyde – University of Michigan.
 - b.) Periacetic Acid – RNT Technology/University of Buffalo/ESG International.
 - c.) Other Biocides – DFO Science Burlington.

§ 250. Economic Issues Associated with Ballast Water

There appears to be a growing chasm between the scientific community and the marine industry regarding the appropriate balance to be struck between shipboard safety, cost, secondary effects on the environment and a desire to eliminate ANS in ballast water. The scientific community has a strong understanding of the life cycles of the various ANS as well as approaches to eradicate them. However, these solutions often inadequately address the impact on ship's operations and the cost to the vessel owners. If workable solutions are to be reached that address tough ANS issues such NOBOB's, the marine industry and the scientific community must work much more closely together. Failure to get early buy-in from vessel owners and operators in any scientific project that addresses elimination of ANS in ballast water may be seen as divisive by the marine industry. It is doubtful that any ANS solution will be supported by the marine industry if it fails to address the operation or economics of waterborne transportation.

Transportation of freight is a very competitive business. The St. Lawrence Seaway competes with other North American waterways for transoceanic cargoes. Additionally, railroads have become highly efficient in the last decade and are poised to compete head-on with Seaway and Great Lakes vessels for freight that traditionally has been moved exclusively by these vessels. Commodities such as grain, wood pulp and potash already have experienced a modal shift from vessel to rail. While the reasons for such modal shifts are often complex, higher operating costs passed on from the shipper to the customer does play a significant role. In the competitive transportation environment all costs, whether regulatory, labor, maintenance, etc., are viewed as the "enemy". Too many costs in the transportation business results in reduced competitiveness and a potential loss of market share to other means of transport. Vessel owners and operators view the ANS problem as an issue that must be addressed, however, they seek a solution that has the smallest impact on the effectiveness of their operations.

Significant effort has been expended examining the cost of ANS to sports fishermen, utility companies and the ecological infrastructure. There needs to be more focus on the cost of solutions to the ANS problems to commercial vessels that operate in our region. The economics of shipping freight by water needs as much attention as scientific research in the battle against ANS on the Great Lakes. To accomplish "win-win" solutions to the ANS problem on the Great Lakes the scientific community must view the marine industry as a partner. Likewise, the marine industry must provide ample opportunities for scientists and researchers to observe operations on their vessels to better understand the

nature of the marine transportation business. The Great Lakes Demonstration Project is an excellent example of a partnership between the marine industry and the scientific community that should be emulated for future ANS projects. Without cooperation between the marine industry and the scientific community, solutions to ANS problems will be mired in debate about cost and viability instead of quickly being implemented. As stated in our last report, rigorous, credible and consistent economic analysis of the competing options is essential to the development of any real-world regulatory regime.

Part III: Other Issues and Activities

§ 300. Marine Sanitation Devices and Graywater

The concern about the possible importation of exotic pathogens in a fresh water system used for drinking water, as well as bathing, prompts attention to other obvious vectors for pathogens such as marine sewage and graywater. At this time we do not have any reliable, scientific information upon which to base a threat assessment. To date our emphasis has been on (i) encouraging the Great Lakes scientific community to develop better information for us on both sewage and graywater and (ii) insuring full, operationally effective compliance with the existing binational regulations on commercial marine sanitation devices.

§ 310. Cargo Residues

In September 1993, the Ninth Coast Guard District implemented an enforcement policy that allowed lake carriers to discharge dry cargo residues in specific parts of the Great Lakes. The policy stood in contrast to the Act to Prevent Pollution from Ships and Coast Guard regulations, which prohibit the discharge of any garbage (defined to include cargo residues) into the navigable waters of the United States. The Coast Guard envisioned the policy being in place for a short period of time while a change to governing legislation was sought. Although the legislation sought was never enacted, the interim enforcement policy remained in place and was ultimately published in the Ninth Coast Guard District's Special Notice to Mariners. In the summer of 1997 the Ninth Coast Guard District Commander announced that the policy could not be continued indefinitely. Shortly thereafter, legislation was proposed for inclusion within the Coast Guard Authorization Act of 1998. The Ninth District did not publish the policy in the 1998 edition of its special notice to mariners.

When enacted, the Coast Guard Authorization Act of 1998 included a provision that required the Secretary to continue implementing the Coast Guard's 1997 enforcement policy for cargo residues on the Great Lakes. The law stipulates that the policy ceases to have effect on 30 Sept 2002 unless alternate legislation is enacted and implementing regulations are issued before then. The Coast Guard's concerns with the policy have been addressed. Anyone who discharges dry bulk cargo residues outside the zones described in the Ninth District's Notice to Mariners' violates the law's requirements. Coast Guard Headquarters is considering the need to solicit public comments on this issue.

Transport Canada has initiated the process to amend the current Canadian *Garbage Pollution Prevention Regulations* to implement Annex V of MARPOL. It is intended

that the new regulations will address cargo residue discharges on the Great Lakes in a manner consistent with the U.S. Coast Guards 1997 enforcement policy.

§ 320. Oil and Hazardous Chemical Pollution Response

Contingency planning continues to progress with area specific issues being addressed as part of the exercising requirement. In addition to the identification of sensitive areas and booming strategies, and of particular note, the transport of pollution equipment and personnel across the border has been greatly refined with local Canadian and U.S. Customs and Immigration personnel involvement. At this point in time critical staff at each crossing have been notified and the procedures documented.

Numerous local exercises have been completed in the last year including CANUSLAK 98 that is described below. In June of 1999, federal and local agencies from both countries participated in a Shoreline Cleanup Assessment Team (SCAT) exercise and training in Gananoque, Ontario. This was a very beneficial training opportunity and field exercise on the St. Lawrence River in which all agencies shared their knowledge of, and experience in, shoreline assessment. Actual assessments were made and logistical concerns were addressed. The success of this particular event has created interest in future SCAT exercises throughout the region.

§ 330. Oil and Hazardous Chemical Pollution Statistics 1997-1998

U.S. pollution statistics from marine sources from 1989-1998 can be found in Appendix C. Analyzing U.S. spill data from 1997 and 1998 it is important to note the great majority of U.S. oil spills are less than 10 gallons and are classed as "mystery" spills of unknown origin. The U.S. data also showed that the majority of spills over 500 gallons are from non-marine sources such as industrial plants and railroads. Appendix D provides a break out of the spills in Great Lakes U.S. waters for 1997 and 1998.

There was only one incident since the last report that resulted in the invocation of CANUSLAK. On 2 June 1998 the Canadian Coast Guard responded to a sewage/oil spill of approximately 500 gallons on the northwest shore of Fighting Island in the Detroit River. The Canadian Coast Guard initiated cleanup of nearly two miles of Canadian shoreline. The CANUSLAK agreement was invoked because of the potential for impact on U.S. shorelines and the unknown or potentially U.S. source. An Incident Command post was established adjacent to Fighting Island in the Canadian Coast Guard's mobile command trailer. U.S. Coast Guard Air Station Detroit conducted over-flights of the spill in conjunction with extensive harbor patrols that were conducted by U.S. Coast Guard Marine Safety Office Detroit. More than one dozen samples of the spilled substance were

taken for laboratory analysis. The high degree of cooperation and the seamless response to this spill by the Canadian and U.S. Coast Guards demonstrated the benefit of the CANUSLAK agreement.

§ 340. CANUSLAK 98

From September 21-24, 1998, the United States Coast Guard and the Canadian Coast Guard staged a joint exercise to qualify the Operational Supplement to the Joint Marine Contingency Plan for the Great Lakes Region (CANUSLAK). The United States hosted this exercise at Sault Ste. Marie, Michigan. The exercise was conducted in two phases over one and a half days. Phase one was conducted in tabletop format. The tabletop focused on a collaborative international response to an oil spill that affected multiple levels of both the U.S. and Canadian governments. Phase two incorporated U.S. and Canadian resource deployments.

CANUSLAK 1998 simulated a major marine casualty resulting in a major release of oil into the St. Mary's River, a 52 mile long waterway connecting Lake Superior and Lake Huron serving as the international boundary between the United States and Canada. The scenario employed for the exercise was the worst case scenario discharge as characterized in the Northern Michigan Area Contingency Plan (ACP).

The scenario assumed a collision occurred between a 1,000-foot lake freighter and a 375 foot tankship. The U.S. flagged lake freighter was downbound from the Soo Locks with a cargo of 62,000 tons of taconite, and the Canadian flagged tankship was upbound approaching the Soo locks with a cargo of 2,000,000 gallons of #6 fuel oil. At the time of the collision, the vessels were transiting the Sault Ste. Marie Harbor, east of the Soo Locks, in the vicinity of Bayfield Dike. The impact of the collision drove the tanker hard aground onto the rocky shoals of Bayfield Dike in the lower harbor causing a catastrophic breach of the tanker's hull and cargo tanks and subsequent loss of its cargo. The scenario date of the casualty was December 1st, which is normally the beginning of winter weather conditions in the area.

The exercise primarily focused on the ability of the Coordinated Response/Unified Command to develop and function as an operationally effective international spill management team. The Coordinated Response/Unified Command incorporated representatives from the United States, Canada, the Sault Tribe of Chippewa Native Americans, the Garden River and Batchewana First Nations, state, provincial, county and municipal governments. The function and extent of participation on the part of these agencies, taking into consideration the sensitivity of environmental, cultural, and political issues associated with an international response in the St. Mary's River, was the responsibility of the Incident Commanders.

The secondary aspect of the exercise was the staffing of the Incident Command organization. Deciding the “best fit” of agencies and participants was a major objective of the exercise in an effort to ascertain and flesh out a common response management arrangement for future relevance in the St. Mary’s River, and possibly throughout the Great Lakes. A Joint Information Center was also established to manage the public affairs requirements of the exercise.

Participating in the exercise were 120 players from 31 agencies in the United States and Canada. A debrief of the exercise was held the following day at the U.S. Army National Guard Armory in Sault Ste. Marie, Michigan. The lessons learned and recommendations from this exercise are in the final review process and will be distributed following approval by the U.S. and Canadian Co-Chairs of the Joint Preparedness Team.

§ 350. Great Lakes Annex to the Joint Marine Contingency Plan

The Joint Plan still remains in draft status but the regional Great Lakes CANUSLAK Annex has been initially reviewed and edited by the Joint Preparedness Team. The Joint Preparedness Team (JPT) has met twice in the last 12 months and decided their core membership should be limited to the U.S. Coast Guard, the U.S. EPA, the Canadian Coast Guard, Environment Canada and an invitation to Transport Canada, Marine Safety Branch. Any additional personnel from any other state, provincial or local agency needed to assist in preparedness or response actions will be called as necessary. All agencies will be updated through periodic mailings and meetings such as the U.S. Regional Response Team and the Canadian Regional Environmental Emergencies Team meetings. Many of the joint issues have been approved by the JPT, and some, such as Command and Control and Emergency Operations Center location, are still in draft form. Other issues such Alternate Technology usage will be assigned by the JPT to special binational committees for study. The subcommittee will develop a recommended course of action for JPT approval.

The implementation of the Oil Pollution Act of 1990 (OPA 90) and changes to the Canada Shipping Act (CSA) have created a conflict with the provisions of Great Lakes Water Quality Agreement regarding funding issues. Since the enactment of these two laws, both countries subscribe to the “polluter pays” principle, meaning that the costs of the cleanup are borne by the person or persons responsible for the release. However, if the cleanup is not being performed properly or there is no responsible party, the costs of the cleanup are borne by the Oil Spill Liability Trust Fund (OSLTF) on the U.S. side and the Ship Source Oil Pollution Fund (SOPF) on the Canadian side. At this time neither fund’s legislation allows for the payment of foreign entities which appears to be in direct conflict with Annex 9, paragraph 4, of the GLWQA which states that the country where the incident occurs pays for the operations of both parties unless otherwise agreed. Further research needs to be conducted into this provision and an amendment may need to be proposed for the GLWQA.

Part IV: Assessment of Shipping on the Great Lakes

§ 400. Indicators of the Effect of Shipping on the State of the Lakes

The things that vessels and marine facilities may discharge into the Great Lakes, which the agencies are responsible for controlling, are (1) ballast water, (2) sewage and gray water, (3) oil and hazardous chemicals, (4) garbage, and (5) cargo residues. Table 1, below, provides a summary of the status of each the relevant categories. There is continuing work to be done on all these discharges, and each type of discharge presents a unique set of issues. However, the agencies can continue to generally report that the impact on the Great Lakes from all these discharges or potential discharges is extremely low, and existing regulatory programs are adequate to the threat, with the sole exception of ballast water. In the case of ballast water, on which there is clearly much work that needs to be done and improvements that need to be made in the regulatory regime, we can say that our work is proceeding at a good pace.

Table 1. Marine Pollution Threats to the Great Lakes and Status of Programs

<i>Type of Discharge</i>	<i>Threat Evaluation</i>	<i>Adequacy of Regulatory Programs</i>
Exotics in ballast	High threat. Good understanding of threat, but more work to be done on evaluating gaps in exchange regime and threat from pathogens.	U.S. regulatory programs in place and will be monitored. Improvement of control measures is being given priority. Existing legal authority (U.S.) is adequate to support current control measures, but may need to be augmented in the future that identifies a response that adequately addresses environmental factors with economic reality.
Sewage and Graywater	Apparently low threat from commercial vessels, but more information is needed on pathogens.	Regulatory programs are in place, supported by minimal legal authority on both U.S. and Canadian sides, and appears sufficient to address the threat.
Oil and Hazardous Chemicals	Threat is moderate, and very well understood.	Regulatory programs are comprehensive and effective in controlling threat. Legal authority is very strong
Garbage	Threat from commercial marine sources is extremely low.	Regulatory programs are effective in controlling threat. Legal authority is strong
Cargo Residues	Threat is low, but some more information needed.	Regulatory programs need rationalization because of disparity between U.S. and Canadian laws. Process in place to rationalize.

§ 410. Exotics in Ballast Water

Our programs for controlling ballast water is still in its infancy, but is maturing quickly and the agencies are responding to this threat with all possible effort within the limits of their resources.

§ 420. Sewage and Graywater

Sewage and graywater discharges from vessels remain an extremely small portion of the input to the Great Lakes in comparison to land-side sources. Sewage from vessels is required to be treated before it is discharged into the Great Lakes. It is difficult to say whether or not sewage and graywater discharges present a threat as a vector for the introduction of pathogens. No such infections have been identified. The low ambient temperatures in the Great Lakes and the lack of a shellfish industry (a common vector for human infection) are often cited as reasons for believing that the threat to the Great Lakes is very low.

Recreational vessels continue to present a different problem in the Great Lakes. They are likely to be a much larger source of untreated or poorly treated sewage being discharged into the Great Lakes, although still small in comparison to land sources and not a potential source of exotic pathogens. Recreational vessels on the Great Lakes are primarily regulated by the various states and the Province of Ontario.

§ 430. Oil and Hazardous Chemicals

The great majority of U.S. oil spills on the Great Lakes are less than 10 gallons and are classed as “mystery” spills of unknown origin. The U.S. data also showed that the majority of spills over 500 gallons are from non-marine sources such as industrial plants and railroads. Oil and hazardous chemical discharges from both commercial and recreational vessels in the Great Lakes are very low, and have had a minimal impact on Great Lakes resources. The marine transport of oil and chemicals is very tightly controlled by comprehensive and closely comparable U.S. and Canadian regimes in the Great Lakes. Also, in cooperation with the states, the provinces, and other federal authorities (especially Environment Canada and the U.S. EPA), the two Coast Guards have developed a highly refined, well-exercised, joint response system which is second to none in either North America or the rest of the world.

§ 440. Garbage

We have no indication that garbage is being discharged into the Great Lakes from commercial vessels, which simply have no economic incentive to do so. This year the U.S. Coast Guard Ninth District Marine Safety Analysis and Policy Branch conducted a detailed review of all the physical evidence available from beach cleanup projects around the Great Lakes and the United States. We found that:

(1) Nationwide, it is impossible to delineate land based garbage from marine based garbage since land based sources deposit a large share of marine debris into our waters and onto our beaches. Among the varied land based sources are beach goers, construction sites, and above all, sewer and storm drain systems. Every time it rains, water escapes streets through storm drains, carrying with it all sorts of trash from the roadways.⁷ Nationwide, the percentage of wastes that the Center for Marine Conservation believes can be attributed to marine sources is about 7.75% of total garbage. However, the actual percentage originating on vessels may be higher than that because a number of the larger categories cannot be attributed to either land or water, and may well be coming in part from recreational vessels. These include cigarette butts, bottles and associated goods, fragments of plastic and plastic foam, food bags and wrappers, pieces of paper, and pieces of glass.

(2) The Great Lakes seem to be less severely impacted by garbage. This is consistent with the fact that we do not allow offshore dumping of any form of garbage anywhere in the Great Lakes, and that our commercial marine fleets operate much closer to shore and in common with high densities of recreational traffic, thus making it much more likely that any large scale discharge of garbage would be observed and reported. Appendix E provides data on the total amount of garbage collected in each of the Great Lakes states in 1996 and 1997. This data was provided in raw form to the U.S. Coast Guard by the Center of Marine Conservation. The Center of Marine Conservation has an excellent web site at www.cmcocean.org. The data of Appendix E must be examined *with caution* since the garbage that was collected is not from the same beach each year and each year the number of people involved in the cleanup changes. The data at best provides an overview of the types of garbage removed from Great Lakes beaches.

Since the implementation of MARPOL V by the U.S. Coast Guard, which was accompanied by a strong emphasis on policing and penalizing any discharge of garbage, we have not received one report of a discharge of garbage from a vessel in the Great Lakes.

In spite of our belief that garbage from marine sources is not a threat, we still have an active enforcement and education program in place. Commercial vessels are checked for garbage upon entry through the Seaway, and we have a public education program called

⁷ Center for Marine Conservation, *1998 National Coastal Beach Cleanup Results*

"Sea Partners". The "Sea Partners" campaign is an environmental education and outreach program focused on communities at large to develop awareness of maritime pollution issues and to improve compliance with marine environmental protection laws and regulations. Each U.S. Coast Guard Marine Safety Office on the Great Lakes has a very active "Sea Partners Program". The "Sea Partners Program" focuses on three areas:

- 1.) Education and information on the effects of oil, hazardous chemicals, waste and debris on the marine environment.
- 2.) How marine environmental protection laws and regulations apply to various marine users.
- 3.) Ways groups and individuals can take action to protect the marine environment.

Similarly, on the Canadian side, the enforcement of Canada's *Garbage Pollution Prevention Regulations* do not indicate any problems with the discharge of garbage into the Great Lakes from Shipping sources.

§ 450. Cargo Residues

The U.S. Coast Guard continues to enforce protective zones, applicable to U.S. vessels and U.S. waters of the Great Lakes, which are designed to prevent any possible injury to sensitive areas of the Great Lakes from cargo residues. The only exceptions are those areas specifically exempted by the Coast Guard Authorization Act of 1998, which is discussed in § 310 above.

§ 500. Acronyms

ANS	Aquatic Nuisance Species
ANS Panel	Aquatic Nuisance Species Panel, Great Lakes Commission
CCG	Canadian Coast Guard
DFO	Canada Department of Fisheries and Oceans
DFO (Science)	DFO Science Branch
DWT	Deadweight Tonnes
GLWQA	Great Lakes Water Quality Agreement of 1978
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act
NISA	National Invasive Species Act
NOBOB	"No Ballast on Board," or a vessel reporting such
TCMS	Transport Canada Marine Safety
USCG D9	U.S. Coast Guard Ninth District

Appendix A

U.S. and Canadian Legislative Authority/Regulatory Regime

Annex 4: Oil/Chemicals

United States

Ports and Waterways Safety Act

Port and Tanker Safety Act of 1978

Act to Prevent Pollution from Ships

Clean Water Act

Comprehensive Environmental Response
Compensation and Liability Act (CERCLA)

Oil Pollution Control Act of 1990

Coastwise Loadline Act

Inland Navigation Act

Emergency Planning and Community
Right-to-Know Act

Regulations for the Construction of
Tank Vessels; 46 CFR Subchapter D

Regulations for Dangerous Cargoes;
46 CFR Subchapter N

Regulations for Certain Bulk Dangerous
Cargoes; 46 CFR Subchapter O

Canada

Canada Shipping Act Part XV

Oil Pollution Prevention Regulations

Dangerous Chemicals & Noxious Liquid
Substances Regulations

Pollutant Discharge Reporting Regulations

Pollutant Substances Regulations

Response Organizations & Oil Handling
Facilities Regulations

Dangerous Goods Shipping Regulations

Crewing Regulations

Marine Certification Regulations

Training standards for Tanker Safety, Inert
Gas and Crude Oil Washing and
Supervisor of Oil Transfer
Operations Personnel

Guidelines for Reporting Incidents
Involving Dangerous Goods,
Harmful Substances and / or
Marine Pollutants – 1995
(amended)

Standards and Guidelines for the
Construction, Operation and
Operation of Barges that carry oil
in Bulk

Appendix A, cont'd

Annex 4: Oil/Chemicals (continued)

United States

Canada

Regulations for the Construction of
Cargo and Miscellaneous Vessels;
46 CFR Subchapter I

Marine Certification Regulations

Regulations for Merchant Marine
Officers and Seamen;
46 CFR Subchapter B

Response Organizations Standards – 1995

Regulations for the Construction of
Passenger Vessels;
46 CFR Subchapter H

Oil Handling Facilities Standards – 1995

Regulations for the Construction of
Small Passenger Vessels Carrying
More than 150 Passengers or
With Overnight Accommodations
For More Than 49 Passengers;
46 CFR Subchapter K

Canadian Watchkeeping Standards

Regulations for the Construction of
Small Passenger Vessels;
46 CFR Subchapter T

Pollution Prevention Regulations;
33 CFR Subchapter O

Annex 5: Vessel Wastes

United States

Canada

Refuse Act

Canada Shipping Act Part XV

Ports and Waterways Safety Act

Great Lakes Sewage Pollution Prevention
Regulations

Clean Water Act

Response Organization and Oil Handling
Facilities Regulations

Pollution Prevention Regulations;
33 CFR Subchapter O

Marine Certification Regulations

Response Organizations Standards – 1995

Appendix A, cont'd

Annex 6: Review/Ballast Water

United States

Nonindigenous Aquatic Nuisance
Prevention and Control Act
Of 1990

National Invasive Species Act of 1996

Regulations for Ballast Water
Management for Control of Nonindigenous
Species;
33 CFR Part 151 Subpart C

Canada

Voluntary Guidelines for the Control of
Ballast Water Discharges from Ships
proceeding to the St. Lawrence River and
Great Lakes

Marine Transportation Safety and
Environmental Protection
MOU between TC & DFO

Annex 8: Discharge from Onshore/Offshore Facilities

United States

Oil Pollution Act of 1990

Clean Water Act

Comprehensive Environmental Response
Compensation and Liability Act (CERCLA)

Pollution Prevention Regulations;
33 CFR Subchapter O

Canada

Canada Shipping Act, Chapter 36

Response Organization & Oil Handling
Facilities Regulations

Ship Source Oil Pollution Fund Regulations

Annex 9: Joint Contingency Plan

United States

None

Canada

CANUSLAK
United States Wreckers Act

Appendix A, cont'd

Annex 10: Hazardous Polluting Substances

United States

Canada

Clean Water Act

Canada Shipping Act Part XV

Comprehensive Environmental Response
Compensation and Liability Act (CERCLA)

Dangerous Chemicals and Noxious Liquid Substance
Regulations

Pollution Prevention Regulations;
33 CFR Subchapter O

Pollutant Substances Regulations

Designation, Reportable Quantities,
And Notification of Release of
Hazardous Materials;
40 CFR Part 302

Guidelines for Reporting Incidents
Involving Dangerous Goods,
Harmful Substances and/or
Marine Pollutants – 1995
(amended)

Appendix B

Compliance Rate With U.S. Ballast Water Regulations 1995-1998

	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>
Transoceanic Entries	455	529	574	579
Vessels NOBOB	335	437	481	476
Vessels with Ballast	120	92	93	103
Percent of Vessels with Ballast	26.4%	17.4%	16.2%	17.8%
Percent of Vessels in Compliance	88.3%	84.8%	94.6%	97.1%
Vessels in Noncompliance (Retained Ballast)	8	12	5	1

Appendix E

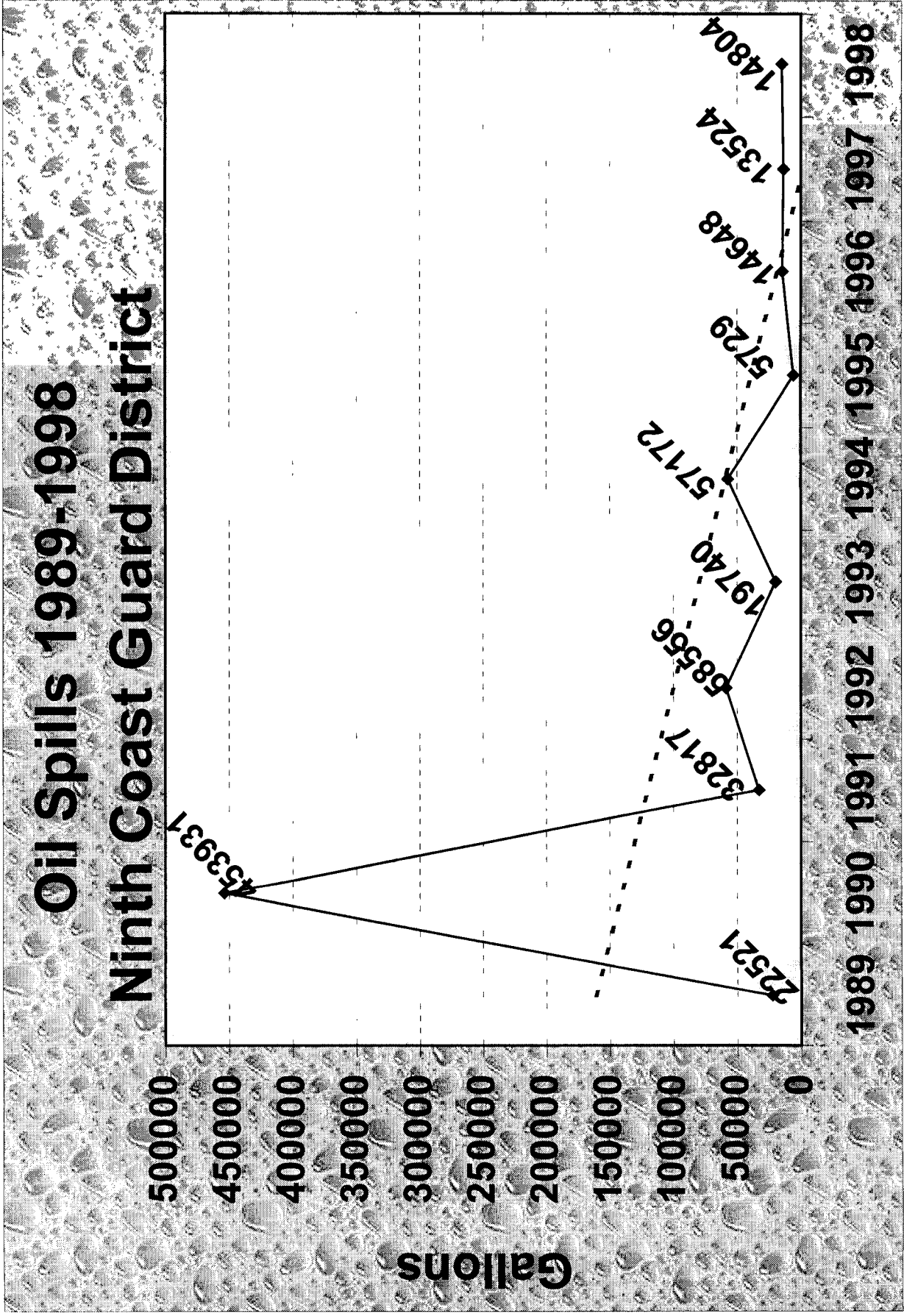
Great Lakes U.S. Garbage Data 1996 & 1997 Tabulated by Pieces Collected

State:	1996	1997	
Illinois	3,129	54,499	
Indiana	666		
Michigan	77,211	25,791	
Minnesota	27,830	62,110	
New York	93,976	48,210	(Lake Erie/Ontario)
Ohio	14,953	40,553	
Wisconsin	8,694	13,763	
TOTAL Pieces:	226,459	244,926	

Top 7 Articles of Trash Collected by Piece:

	1996	1997
Paper pieces	11,268	15,887
Cigarette butts	78,785	82,437
Caps, lids	26,986	15,334
Plastic pieces	41,598	35,996
Straws	22,283	12,101
Plastic bags/wrappers	25,954	12,504
Foamed plastic pieces	33,084	24,648

Note: There was no garbage collected off Pennsylvania's Great Lakes shoreline in 1996 or 1997. Also, 1998 garbage statistics will not be available until December 1999.



Appendix D

Number of Spills in Each USCG Marine Safety Office Region 1997 and 1998

Buffalo		
Spill Size	1998	1997
1-10	55	52
11-50	8	7
51-100	3	0
100-1000	1	3
>1000	3	2
Total Spills	70	64
Total Gallons	2127	6681

Cleveland		
Spill Size	1998	1997
1-10	30	21
11-50	7	3
51-100	1	0
101-1000	0	2
>1000	0	0
Total Spills	38	26
Total Gallons	414	1136

Great Lakes Overall		
Spill Size	1998	Percent
1-10	214	76%
11-50	41	14.50%
51-100	9	3%
100-1000	14	5%
>1000	4	1.50%
Total Spills	282	100%
Total Gallons	14804	

Toledo		
Spill Size	1998	1997
1-10	21	21
11-50	5	2
51-100	0	3
101-1000	3	2
>1000	0	1
Total Spills	29	29
Total Gallons	1684	1301

Detroit		
Spill Size	1998	1997
1-10	31	58
11-50	5	7
51-100	1	3
101-1000	5	2
>1000	1	2
Total Spills	43	72
Total Gallons	3102	1475

Great Lakes Overall		
Spill Size	1997	Percent
1-10	224	79%
11-50	28	10%
51-100	16	6%
100-1000	9	3%
>1000	6	2%
Total Spills	283	100%
Total Gallons	13524	

SSM		
Spill Size	1998	1997
1-10	21	18
11-50	4	2
51-100	2	5
101-1000	0	0
>1000	0	0
Total Spills	27	25
Total Gallons	1366	626

Duluth		
Spill Size	1998	1997
1-10	5	7
11-50	0	0
51-100	0	0
101-1000	2	0
>1000	0	1
Total Spills	7	8
Total Gallons	561	1692

Milwaukee		
Spill Size	1998	1997
1-10	24	18
11-50	5	3
51-100	2	3
101-1000	0	1
>1000	0	0
Total Spills	31	25
Total Gallons	3657	139

Chicago		
Spill Size	1998	1997
1-10	27	29
11-50	7	4
51-100	0	2
101-1000	3	1
>1000	0	0
Total Spills	37	36
Total Gallons	1893	474