



Waste Reduction at Sea: Pollution Prevention Strategies on Miami-Based Cruise Lines

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Introduction

South Florida is a center of national and international tourism. Millions of people visit the region to enjoy its sub-tropical weather, expansive coastline, and diverse natural and cultural resources. A growing tourism attraction in South Florida, particularly Miami, is the cruise line industry. With 15 vessels based at its port, Miami is often considered the “cruise capital of the world.”¹ Every year, three million passengers travel on these cruise liners, generating revenue and employment for the local economy.²

However, the cruise liners also create large amounts of waste that need to be disposed while at sea, at a port of call, or back at the home port. Economic concerns dictate that the limited space on each vessel is best allocated to the passengers and support facilities; there are also health concerns if waste is stored on a vessel over the length of a voyage. Therefore, the cruise industry must balance its economic and health interests with the protection of the marine environment. Because of stricter legislation, greater public scrutiny, and an increased industry awareness, the Miami-based cruise industry is adopting pollution prevention techniques that reduce or eliminate disposal at sea.

Waste Generated by Cruise Vessels

The cruise industry typically operates vessels that carry a large number of passengers. An average cruise vessel usually accommodates 1,400 passengers and crew of 600.³ The largest cruise liner, Carnival Cruise Line’s *Destiny* (based in the Port of Miami), can carry 2,642 passengers as well as a crew of 1,086.⁴ Because of their capacities, cruise vessels can generate a tremendous amount of waste. A 1990 study determined that each passenger on board a cruise vessel generates an average of 0.32–3.5 kilograms of waste per day.⁵ A

large vessel, of 2,500 passengers, generates one ton of garbage per day. Because the average length of a cruise is 5.8 days, a single trip can generate several tons of garbage. The total cruise line industry, which is active throughout the year, produces an estimated 13,347 metric tons of waste annually.⁶

If debris waste is not securely contained on board a cruise vessel or disposed of carefully at sea or in a port, it can cause several deleterious effects in the marine environment. The most notorious of these are direct biological impacts caused by entanglements and ingestion.⁷ Marine debris can also reach distant coastlines and interfere with coastal marine life, or it can sink and accumulate on the seafloor, where it may smother bottom fauna.⁸ Waste also causes negative economic effects if it washes up on beaches, damages their aesthetical qualities, and lowers tourism revenues. To prevent such marine pollution from cruise ships and other vessels, the United States and several Caribbean cruise destination countries have either adopted existing international conventions (namely MARPOL) or passed pertinent national legislation.

Regulations

The *London International Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 Relating Thereto*, or MARPOL 73/78, was developed under the auspices of the International Maritime Organization (IMO), a United Nations specialized agency which oversees treaties and conferences related to marine safety.⁹ The convention addresses pollution from vessels in its five annexes:

- Annex I: oil
- Annex II: noxious liquid substances
- Annex III: packaged goods
- Annex IV: sewage
- Annex V: garbage from ships

All MARPOL contracting parties, of which there are 88 signatory countries, must adhere to Annexes I and II, and they have the option of ratifying the other annexes. Once a nation ratifies an additional annex, compliance with the annex becomes mandatory.

Annex V, which entered into force on December 31, 1988, concerns the disposal of solid waste generated during normal vessel operations.¹⁰ Solid waste components include domestic garbage (galley waste and food packaging), operational waste, and cargo-related garbage, such as dunnage, lining and packing materials. Specifically, the annex determines where waste discharges are allowed at sea. Under Annex V :

- It is illegal for any vessel to discharge plastics or garbage containing plastics into any waters.
- Within three nautical miles, it is illegal to dump any garbage.
- From three to 12 nautical miles, vessels are allowed to discharge all garbage, except plastics, dunnage¹¹, lining, and packing materials that float, and all other trash (unless ground to less than an inch).
- Between 12 to 25 nautical miles, vessels are not allowed to release plastics, dunnage, lining, and packing materials that float.
- Outside 25 miles offshore, vessels can discharge all garbage except plastics.
- Port states must provide adequate garbage reception facilities.¹²

Additionally, Special Areas, as designated by the IMO under Annex V guidelines, impose stricter disposal regulations within their boundaries.¹³ Such areas are recognized as being particularly vulnerable to pollution. The Wider Caribbean region, where a majority of the Miami cruise liners operate, was designated a Special Area in 1993 after several Caribbean nations in 1990 requested that the region be protected from ship-generated waste.¹⁴ Of particular concern to the nations that requested the designation were cruise vessels, which contribute 77 percent of the total ship-generated waste in the Wider Caribbean region.¹⁵ Under the Special Area designation, vessels in the region are only allowed to discharge comminuted (ground) food waste three nautical miles from shore. Dumping of dunnage, lining, or packing material is prohibited.

The U.S. signed MARPOL Annex V in 1987 and adopted the regulations into federal law with the passage of the Marine Plastic Pollution Research and Control Act (MPPRCA) of 1987.¹⁶ This legislation provides for domestic implementation of MARPOL Annex V. Regulations that implement the MPPRCA also require that (1) vessels greater than 26 feet in length post one or more placards that explain Annex V discharge restrictions and (2) ships 40 feet or more develop and carry a waste management plan. Each waste management plan must contain collection, processing, storage, and discharge procedures; these procedures must meet Annex V requirements.¹⁷ Both U.S. regulations have been adopted in a modified form by the IMO and entered into effect as an amendment to MARPOL Annex V on July 1, 1997.¹⁸

The MPPRCA is enforced in U.S. navigable waters and its Exclusive Economic Zone (EEZ), a 200-nautical-mile band that extends along the coastline.¹⁹ Both U.S.-registered and foreign-flag vessels (i.e., vessels registered in other countries) are subject to U.S. penalties for non-compliance. The civil penalties may result in \$25,000 per day per violation and a criminal fine of up to \$250,000 for an individual and up to \$500,000 for an organization and/or a six year prison term.²⁰ The *Guidelines for the Implementation of Annex V of MARPOL 73/78* delegate enforcement mechanisms to flag states and port states; they also recommend that governments identify appropriate enforcement agencies with legal authority and provide adequate training, funding, and equipment to incorporate Annex V regulations into their duties.²¹

The primary enforcement agency for MPPRCA regulations in the U.S. is the Coast Guard.²² The Secretary of Transportation, through the Coast Guard, has the sole authority to enforce Annex V. However, the Coast Guard does need to cooperate with other agencies in order to fulfill Annex V objectives. For instance, the Coast Guard must consult with the U.S. Environmental Protection Agency (EPA) to establish standards for shipboard equipment. Both the Coast Guard and the EPA must consult with the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce in reporting the effects of marine debris. If the Coast Guard enforces the MPPRCA on foreign-flag vessels, it must cooperate with the Department of State's Office of Ocean Affairs.

Another agency that has an important, port-based role in MPPRCA enforcement is the Animal and Plant Health Inspection Service (APHIS), under the Department of Agriculture.²³ Although APHIS performs quarantine inspection and disposal of food-contaminated garbage from vessels arriving from foreign ports as a function independent from that of the MPPRCA, it does assist in the overall implementation of the act.

The Coast Guard enforces MPPRCA regulations while at sea and inspects returning vessels periodically at port. The agency has the authority to board vessels that are suspected of illegally dumping waste into the marine environment, and it can also enforce those regulations while a vessel is at port. By comparing the off-loaded garbage from a ship and its incinerator capacity with the estimated amounts of ship-generated waste, the Coast Guard can determine whether a vessel has disposed waste at sea.²⁴

The Coast Guard conducts four on-board inspections annually of the cruise lines in Miami.²⁵ The major inspection, the Annual Control Inspection, includes a complete examination of a vessel's structures, maintenance and fire equipment, safety standards and equipment, and waste management and containment systems. During this inspection, the Coast Guard also simulates safety procedure drills to determine responses of the ship and crew. The other three inspections are spot examinations on safety and waste-management and containment systems. Thus, the Coast Guard effectively examines a vessel's waste management and containment systems during each inspection. Problems within the systems are reported for remediation; if the systems are not corrected, the Coast Guard can fine the vessel.²⁶

APHIS employs Department of Agriculture maritime compliance officers who inspect waste off-loaded from vessels arriving from foreign ports.²⁷ Officers inspect what is commonly referred to as "wet garbage": any food matter or packaging that has been in contact with food. The food items may have originated from the U.S., but because the vessels travel beyond U.S. waters, these food wastes are considered foreign substances.²⁸ In the case of cruise lines at the Port of Miami, the bags of garbage containing such food waste are inspected as they are transferred from the cruise vessel into large containers belonging to one of several waste management companies.²⁹ The Department of Agriculture and the cruise lines have a Compliance Agreement, which states that the cruise lines must comply with APHIS

regulations.³⁰ This agreement is independent of the waste management companies with whom cruise lines contract. If a cruise line fails to comply, compliance officers may require the line to mitigate the damage by cleaning up any foreign wastes that overflow onto the port, using chemicals to disinfect the entire area if necessary. In other circumstances, compliance officers may assess penalties on the cruise line and/or the waste management company. In extreme cases, the officers can revoke the Compliance Agreement.

Although enforcement agencies deter waste dumping via monitoring at sea and periodic inspections at ports, they cannot attain complete compliance through enforcement mechanisms alone. The Coast Guard cannot effectively monitor cruise lines because of logistical constraints and other duties on the part of the agency and also because the lines travel such large distances and often call at foreign ports outside the agency's jurisdiction. Therefore, other methods — citizen awareness and participation, cruise line industry education and training, and compliance incentive systems — are important in establishing effective levels of compliance.

Citizen awareness and participation are important means of including the public into the enforcement framework and thus improving compliance. Citizens are often educated on marine pollution issues by government agencies such as the Coast Guard and environmental groups such as the Center for Marine Conservation. CMC's efforts to impede illegal ocean dumping include the distribution of various educational pamphlets and brochures, as well as specific guidelines on how passengers can observe and report illegal dumping actions.³¹ Consequently, citizens often act as "whistle-blowers" who gather much of the evidence necessary to penalize the offending parties. As an additional incentive to recruit citizen participation, the MPPRCA states that a citizen who assists governmental agencies in the collection of information that leads to a criminal penalty or civil fines can be awarded up to 50 percent of the funds recovered.³²

In 1995, Regency Cruises, Inc., was fined \$250,000 for two separate violations off the coast of Tampa, Florida, in the Gulf of Mexico.³³ The latter violation was reported by a passenger who photographed crew members dumping dozens of trash-filled bags over the side of the vessel. Although the cruise line may not have been significantly impacted by the magnitude of the fine, its image was definitely tarnished by the negative publicity

and the court's decision that the cruise line must publish full-page advertisements in St. Petersburg and Tampa newspapers apologizing for its actions.³⁴

Because of the constant turnover in cruise lines' crew, ongoing training and education programs in waste management and disposal are very important. The MPPRCA requires that large vessels (as defined above) display MARPOL placards and that the vessels have a written waste management plan. These placards and plans increase crew awareness of dumping regulations. Many cruise lines have voluntarily initiated crew education programs. Princess Cruises educates its personnel on company waste management practices and penalizes them for noncompliance.³⁵ Additionally, companies such as the Royal Caribbean Cruise Line and Holland America Line have instituted comprehensive environmental programs that address both crew training and other pollution prevention measures.³⁶

Compliance incentive systems include measures by which governments and ports can facilitate vessel activities and, thereby, increase compliance. *Guidelines to Annex V of MARPOL 73/78* outline governmental assistance via tax incentives, loan guarantees, business preferences, special funds, subsidies, and technical assistance as means for greater vessel compliance.³⁷ Finally, they state that ports can assist vessels by improving reception facilities and infrastructures.³⁸

Pollution Prevention on Cruise Lines

The pollution prevention hierarchy, as defined by the EPA, recommends that industries employ source reduction as the most desirable means of waste abatement. Recycling and reuse is the next preferred disposal method, followed by controlled treatment, and, in the case of no other option, disposal. Cruise lines utilize these various pollution prevention methods in reducing the wastes that their activities generate. The National Research Council describes these methods, when effectively and concurrently implemented, as integrated waste management.³⁹

The most important step in integrated waste management is the development of a source reduction strategy. Cruise vessels can drastically reduce packing materials, leave excess material on shore, discontinue use of disposable items, and utilize large reusable storage containers.⁴⁰ Princess Cruises employs many of these techniques by replacing individual plastic packets of

cream, preserves, and other such items with larger, reusable containers.⁴¹ The company has also replaced aluminum cans with soda fountains. Similarly, Royal Caribbean Cruise Line (RCCL) has replaced aluminum cans with a multi-flow beverage syrup system that the company estimates saves more than two million cans per year.⁴² RCCL has also replaced on-deck plastic plates and utensils with reusable plastic or china dishes and steel cutlery.

Beyond these common-sense practices, some cruise lines have utilized existing or innovative technologies to further source reduction as well. Norwegian Cruise Lines (NCL) has an older vessel, the *Norway*, which cannot accommodate as much waste as the newer ships.⁴³ Much of the waste management system on the *Norway* has been retrofitted so the vessel can adhere to Annex V regulations. However, the vessel has old boiler systems that use a variety of fuels. NCL engineers collect much of the used oil sludge from other cruise lines and use it to run the *Norway's* boilers.⁴⁴ The sludge, which would otherwise be disposed of on land, is used as an alternative fuel source.

RCCL uses more innovative technologies to conserve resources. Its vessels utilize a cogeneration water heating system in which the heat from the engines is diverted to the water boiler system to pre-heat the water used aboard the ships.⁴⁵ Also, RCCL vessels collect air conditioning condensation as water to perform on-board laundry.⁴⁶

On-board storage and recycling are two other means by which cruise lines can reduce waste discharges into the marine environment. They do not, however, rank as highly as the source reduction strategy under the pollution prevention hierarchy. These methods are also less desirable to cruise lines because of space limitations and sanitation concerns.⁴⁷

In order to store waste on board and maximize space, cruise vessels use a variety of equipment, including compactors, crushers, and shredders.⁴⁸ Compactors, powered devices used to reduce the volume of waste, are most efficiently applied on high-volume, low-density materials such as plastics, light metals, and paper. Crushers are machines that are used to compact glass. Shredders use rotating blades to grate bones, metal, glass, and plastics. Almost all cruise lines use these and other devices to reduce waste volume. Princess Cruises operates four types of shredders, for bones, paper, glass, and plastics.⁴⁹ Other cruise lines

compact all their aluminum cans and recycle them as large blocks. The items that are put through these volume-reducing devices are mostly recycled on land; however, if the items come into contact with food and the vessel has traveled outside the U.S., the items are considered foreign waste and disposed of according to APHIS guidelines.

Storage and recycling are effective means of reducing waste that may otherwise be discharged into the marine environment or disposed of in landfills. Up to 30 percent of the total waste produced by each vessel is recyclable, and U.S. ports receive 18,000 pounds of recyclables from cruise lines each week.⁵⁰

A majority of cruise lines still perform the final and least desirable form of waste disposal in the pollution prevention hierarchy: controlled treatment and disposal. Incinerators are commonly used onboard to burn waste (including paper, cardboard and certain plastics), and the emissions and residue are discharged to the surrounding air.⁵¹ The IMO implementation guidelines recognize the potential threat of incineration as air pollution and recommend that vessels incinerate away from ports and urban areas.⁵²

Some countries have taken unilateral actions against incineration within their marine boundaries. For instance, Bermuda does not allow cruise ships in its port or its waters to incinerate wastes without a permit, nor to discharge ash in the Bermuda EEZ.⁵³ Incineration technology has improved to the level such that modern incinerators have multiple chambers in order to maximize combustion, retain byproducts, and even reclaim some of the heat for cogenerational uses.⁵⁴ The ash that is formed from these incinerators is stored on-board and disposed of on land.

A majority of the cruise lines also discharge treated water into the marine environment. Wastewater is typically treated chemically before discharge. Some cruise lines, such as Holland America, do not discharge any treated water while in port and are upgrading their vessels to achieve more complete waste treatment.⁵⁵ Finally, most cruise lines also use comminuters, large garbage disposal systems that grind food scraps into a fine residual and rinse out that residual with a steady stream of water.⁵⁶ These food discharges are allowed in the Caribbean Special Area further than three miles from the coast.⁵⁷

Because of the increased public awareness and industry accountability, many cruise lines are voluntarily developing comprehensive waste management policies that use preventative and recycling methods wherever possible. The Florida Caribbean Cruise Association (FCCA) reported in 1994 that several of its 14 member cruise lines have adopted a "zero-discharge" rule, which means that their vessels will not discharge any solid waste into the marine environment. Furthermore, these cruise lines have collectively invested more than \$10 million in waste-handling equipment on each of their 50 ships, and each company spends around \$1 million per year to maintain that equipment and to educate its crew.⁵⁸ Two examples of special programs:

- RCCL has established a "Save the Waves" program to ensure that the company responds in its environmental efforts. Voluntarily implementing this program in 1988, the company formed an Environmental Committee to oversee individual department's actions.⁵⁹ An environmental officer on each RCCL vessel is responsible for the maintenance of all environmental practices onboard. He or she has the help of an environmental assurance officer in coordinating specialized crew training⁶⁰; this officer is also in charge of environmental hazard containment and preparation.
- Holland America Line, which operates in the northwest U.S., has developed an "environmental manifesto" outlining the company's environmental policy and objectives.⁶¹ These examples demonstrate that several cruise lines are reacting to citizen awareness and are becoming more accountable for their waste disposal patterns.

A major problem with the cruise line industry's ability to improve waste management is the deficiency of many foreign port facilities. Several Caribbean ports serviced by Miami-based cruise lines suffer significantly in this regard. However, some improvements are occurring. For instance, six countries belonging to the Organization of Eastern Caribbean States have implemented a solid waste management project funded by the World Bank, which will be sustained via an environmental tax levied on visitors.⁶² Other Caribbean nations, such as Jamaica, have begun to address the issue of garbage dumps by replacing them with sanitary landfills.⁶³

These and other improvements should greatly facilitate the cruise lines' waste disposal activities, but they should be implemented carefully, or such ports can end up serving as waste depositories. Some Caribbean

ports have addressed this issue, and the Bahamian government, which leases an island to Norwegian Cruise Line for visitors, does not allow the company to deposit any trash on the island.⁶⁴ Instead, NCL cruise vessels have to pick up the garbage generated on the island and handle it on board or back at port. Similarly, the Cayman Islands declared in 1993 that ships would no longer be allowed to dump garbage in their waters; vessels that are caught can be fined up to \$500,000.⁶⁵ The types of disposal options these ports employ play a role in the overall success of the cruise line industry's efforts to reduce pollution in the marine environment.

Conclusions

To comply with stricter federal and international regulations, greater public awareness, and self-imposed accountability, many cruise lines in Miami are incorporating pollution prevention technology and practices into their daily operations and long-term planning. CMC has long advocated that cruise lines adopt a "zero-discharge" policy⁶⁶, and due to that and other groups' efforts and the Caribbean Sea's Special Area status, cruise lines are moving towards only discharging comminuted waste past the three-mile limit.

Better technology is also assisting the process. Newer vessels have innovative waste compacting devices that increase the amount of space available for storage.

Some vessels also utilize the heat produced from incineration or engines as a cogenerative source for reducing energy in other activities. By doing so, such activities do reduce the overall energy required to operate the vessels.

Other cruise lines are moving towards better management practices, such as replacing disposable items with reusable ones, limiting wasteful activities, and incorporating better training and educational programs for crew and passengers. Like the new technologies, these practices reduce the overall waste on cruise lines.

External recycling, controlled treatment, and the disposal of foreign, food-contaminated waste still represent a majority of the cruise lines' waste management strategies. These strategies are lower on the pollution prevention hierarchy and less acceptable than source reduction. They also represent a potential threat to foreign nations, mostly islands, that accept these types of wastes and do not adequately recycle or dispose of them. Therefore, a comprehensive waste management strategy on Miami-based cruise lines needs to consider not only the fate of wastes in the marine environment but also the fate of these wastes on land, particularly the Caribbean islands that cannot continue to receive such large amounts without the necessary facilities or infrastructure to process, recycle, or dispose of them.

End Notes

¹ Port of Miami, *Passport to Adventure 1997: Passenger Cruise Guide* (Miami: Port of Miami, 1996), 2.

² *Ibid.*

³ International Maritime Organization, *The Caribbean - A Very Special Area: Wider Caribbean Initiative for Ship-Generated Waste* (Port of Spain, Trinidad and Tobago: Media and Editorial Projects Ltd., 1994), 7.

⁴ Jay Clake, "Destiny at Sea," *Miami Herald*, 8 December 1996, 1J.

⁵ National Research Council, *Clean Ships, Clean Ports, Clean Oceans: Controlling Garbage and Plastic Wastes at Sea* (Washington: National Academy Press, 1995), 47.

⁶ *Ibid.*

⁷ J. Faris and K. Hart, *Seas of Debris: A Summary of the Third International Conference on Marine Debris* (Seattle: NOAA/NMFS, 1995), 16–18.

⁸ *Ibid.*

⁹ National Research Council, 15.

¹⁰ Annex V to MARPOL 73/78, reprinted in *Clean Ships, Clean Ports, Clean Oceans: Controlling Garbage and Plastic Wastes at Sea*, ed. National Research Council (Washington: National Academy Press, 1995), 283; and *International Environmental Law: Basic Instruments and References*, eds. E.B. Weiss, P.C. Szasz & D.B. Magraw. (Irvington-on-Hudson, NY: Transnational Publishers, 1992), 327–331.

¹¹ Dunnage is any padding material that is used to protect other cargo.

¹² Annex V to MARPOL 73/78, Regulation 7(1).

¹³ Annex V to MARPOL 73/78, Regulation 5; International Maritime Organization, 17.

¹⁴ *Ibid.*

- ¹⁵ *Ibid.*
- ¹⁶ U.S. Code, Vol. 33, §1901(b) and note.
- ¹⁷ 33 C.F.R. §151.57, 151.59, 151.61.
- ¹⁸ Lt. Commander Raymond Perry, United States Coast Guard World Wide Web page, 20 November 1996.
- ¹⁹ National Research Council, 18.
- ²⁰ Marine Law Institute, *Dumping of Plastics Prohibited: Requirements of MARPOL Annex V* (Orono, ME: University of Maine Sea Grant Advisory Program, 1990), 6.
- ²¹ "Guidelines for the Implementation of Annex V of MARPOL 73/78," reprinted in National Research Council, *Clean Ships, Clean Ports, Clean Oceans: Controlling Garbage and Plastic Wastes at Sea* (Washington: National Academy Press, 1995), 269, 272–274, 290.
- ²² National Research Council, 21.
- ²³ *Ibid.*, 19-20.
- ²⁴ Marine Law Institute, 6.
- ²⁵ Commander Scott Hartley, U.S. Coast Guard, interview by authors, Miami, 27 March 1996.
- ²⁶ *Ibid.*
- ²⁷ *Ibid.*
- ²⁸ National Research Council, 18.
- ²⁹ Carol Maroaka, Maritime Compliance Officer, Department of Agriculture, phone interview by authors, Miami, 21 March 1996.
- ³⁰ *Ibid.*
- ³¹ S. B. Sheavly, *1994 U.S. National Coastal Cleanup Results* (Washington: Center for Marine Conservation, 1995), 60.
- ³² Marine Law Institute, 6.
- ³³ Sheavly, 61.
- ³⁴ Center for Marine Conservation, "Coastal Connection," Summer 1995, 14.
- ³⁵ Faris and Hart, 29; International Maritime Organization, 9.
- ³⁶ Holland America Line, *Environmental Policies and Objectives*, (Seattle: Holland America Line, 1996); Guillermo Ramos, Manager, Corporate Planning, Royal Caribbean Cruise Line, interview by authors, Miami, April 1996.
- ³⁷ "Guidelines for the Implementation of Annex V of MARPOL 73/78," Guideline 7.2.
- ³⁸ *Ibid.*
- ³⁹ National Research Council, 143-167.
- ⁴⁰ *Ibid.*, 143-144.
- ⁴¹ Faris and Hart, 19.
- ⁴² Royal Caribbean Public Relations, "Royal Caribbean Cruise Line's 'Save The Waves' Program: Environmental Efforts," Miami, 1995.
- ⁴³ Willie Gomez, Ship Operations, Norwegian Cruise Line, interview by authors, Miami, 4 March 1996.
- ⁴⁴ *Ibid.*
- ⁴⁵ Royal Caribbean Public Relations.
- ⁴⁶ *Ibid.*
- ⁴⁷ National Research Council, 144–145.
- ⁴⁸ *Ibid.*, 147–150.
- ⁴⁹ *Ibid.*, 149.
- ⁵⁰ International Maritime Organization, 23.
- ⁵¹ Arne Grenning, Mechanical Engineer, Marine Operations Department, Carnival Cruise Line, interview by authors, Miami, 28 February 1996.; National Research Council, 150.
- ⁵² "Guidelines for the Implementation Annex V of MARPOL 73/78," Guideline 5.4.
- ⁵³ National Research Council, 153.
- ⁵⁴ *Ibid.*, 150.
- ⁵⁵ Holland America Line.
- ⁵⁶ National Research Council, 148-149.
- ⁵⁷ MARPOL Annex V, Regulation 5(2)(c); International Maritime Organization, 19.
- ⁵⁸ Ernest Blum, "Environmentally Correct Sailings: A Zero-Discharge Policy," *Travel Weekly* 4 (1 March 1994), 46.
- ⁵⁹ Ramos, interview.
- ⁶⁰ Mike Williams, Environmental Assurance Manager, Royal Caribbean Cruise Line, interview by authors, Miami, 5 January 1996.
- ⁶¹ Holland America Line.
- ⁶² International Maritime Organization, 13.
- ⁶³ *Ibid.*
- ⁶⁴ Gomez, interview.
- ⁶⁵ R. McManus, "Pollution at Sea is a Luxury We Can't Afford." *Forum for Applied Research and Public Policy* 9, no.1 (Spring 1994): , 47.
- ⁶⁶ Kate Hinch, Center for Marine Conservation, interview by authors, Washington, 18 August 1996.

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33 C.F.R. §151.57, 151.59, 151.61.

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The mission of the NPPC is to promote sustainable development by educating students, faculty, and professionals about pollution prevention; create educational materials; provide tools and strategies for addressing relevant environmental problems; and establish a national network of pollution prevention educators.

In addition to developing educational materials and conducting research, the NPPC also offers an internship program, professional education and training, and conferences.

The NPPC provides educational materials **free of charge** on the World Wide Web: see <http://www.umich.edu/~nppcpub/> Please contact us if you have comments about our online resources or suggestions for publicizing our educational materials through the Internet.

Discussion Questions

1. What factors work for and against adoption of pollution prevention by the cruise line industry? Consider issues such as the size of the vessels, the economic goals of the industry, the role of environmental groups, and governmental and international regulations.
2. What roles could environmental groups, like the Center for Marine Conservation, play in the adoption of pollution prevention techniques by the cruise line industry?
3. Rank the cruise lines' various pollution control technologies according to the pollution prevention hierarchy.
4. What are some other technological introductions or common-sense practices that cruise lines can employ in order to reduce waste?
5. The Florida Caribbean Cruise Association, a 15-cruise line member group, reported in 1994 that several of its members had adopted a "zero-discharge" rule, whereby vessels would not discharge any solid waste into the marine environment. Does this action represent pollution prevention?
6. In December 1996, the U.S. Justice Department handed down a ten-count indictment that accused the Miami-based Royal Caribbean Cruise Line on the following charges: Five of its vessels routinely dumped oily bilge water in the marine environment from 1990 to 1994; its employees deliberately hid the violations by falsifying documents; one employee obstructed justice by removing an illegal bypass pipe from an RCCL vessel; and two employees ordered crew members to lie to the Coast Guard and a federal grand jury. If RCCL is found guilty on all counts, it could be fined up to \$5 million.
 - a. Based on this event, what actions can the following groups and organizations undertake to prevent such violations from recurring:
 - i. Coast Guard
 - ii. Royal Caribbean Cruise Lines
 - iii. Environmental groups
 - iv. Florida Caribbean Cruise Association
 - b. How may Royal Caribbean be affected by this federal action? Consider the MPPRCA fines, the company's public relations and corporate image, and future scrutiny from government agencies, environmental groups, and citizens.
 - c. Royal Caribbean may argue that it has a strong environmental policy which includes a "Save the Waves" program, numerous recycling programs, and several environmental achievements. Does this policy lessen the company's culpability? Should the entire company be tarnished because of the actions of a few employees?