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Cruise Ship Discharge Assessment Report

Section 6: Hazardous Waste

December 29, 2008

Section 6: Hazardous Waste

Hazardous waste is a subset of "solid waste," and is a waste that contains hazardous constituents that can be liquid, solid, semisolid, or contained gas. On most cruise ships, the hazardous waste generated onboard is stored onboard until the wastes can be off-loaded for recycling or disposal. Hazardous waste that is off-loaded for disposal in the United States is handled in accordance with RCRA requirements, and must be sent to a licensed hazardous waste Treatment, Storage, and Disposal Facility.

This section discusses the current state of information about hazardous waste, the laws regulating hazardous waste from vessels, how hazardous waste is managed on cruise ships, the potential environmental impacts of cruise ship hazardous waste, and federal actions taken to address hazardous waste from cruise ships. The conclusion of this section lists a wide range of options and alternatives that could be considered when addressing hazardous waste from cruise ships.

6.1 What is RCRA hazardous waste and how much is landed by cruise ships to the United States?

Under federal law, "hazardous waste" is a subset of "solid waste." The regulations implementing the Resource Conservation Recovery Act (RCRA) establish the criteria for defining "hazardous waste" with two basic approaches: a solid waste is a hazardous waste if it is either a waste that appears on one of the four hazardous waste lists (i.e., F-List, K-List, P-List, or U-List); or the solid waste exhibits at least one of four hazardous characteristics (ignitability, corrosivity, reactivity, or toxicity). Once a waste is identified as a hazardous waste, any person who generates or manages the hazardous waste must comply with all applicable state and federal regulations regarding its management. Hazardous wastes need to be stored, treated, and disposed in a manner so as to minimize the risks to human health and the environment.

The universe of hazardous waste is diverse – it is a waste that contains hazardous constituents that can be liquid, solid, semisolid, or contained gas. The universe of wastes generated as a result of daily cruise ship activities is diverse as well. Cruise ship activities such as photo processing, dry cleaning, and equipment cleaning can produce hazardous waste containing a wide range of substances such as water with perchlorethylene from dry cleaning machines, hydrocarbons, chlorinated hydrocarbons, heavy metals, and solvents. Additional wastes generated on cruise ships that may be hazardous include paint waste, aerosol liquid waste from the crushing of aerosol cans, some incinerator ash, fluorescent and mercury vapor light bulbs, various types of batteries, and unused or outdated pharmaceuticals. Table 6-1 identifies different types of wastes generated on cruise ships that are, or may be, hazardous. This is only a list of typical wastes, and ultimately it is the responsibility of the person generating the waste (i.e., ship owner and/or operator) to make this determination and to comply with all applicable environmental requirements.

Table 6-1. Types of Potentially Hazardous Waste Generated Aboard Cruise Ships

Waste Type	Description
Photo Processing Waste (including X-ray development fluid waste)	Spent fixer, spent cartridges, expired film, and silver flake. The fixer removes unexposed silver compounds from the film during the developing process. Though silver-bearing waste is typically hazardous waste under RCRA due to silver content, RCRA regulations at 40 CFR 266.70, which apply to materials recycled to recover economically significant amounts of certain precious metals, including silver, do not include all of the requirements applicable to other types of hazardous wastes generally.
Dry Cleaning Wastes	Dry cleaning units produce a small volume of waste from the bottoms of the internal recovery stills and filter media. This waste comprises dirt, oils, filter material, and spent solvent. The spent solvent is a chlorinated solvent called perchlorethylene (perc) and must be managed as a hazardous waste.
Print Shop Wastes	Printing solvents, inks, and cleaners may contain hydrocarbons, chlorinated hydrocarbons, and heavy metals.
Photocopying and Laser Printer Cartridges	Spent or discarded cartridges, inks, and toner materials are not typically defined as hazardous under the federal RCRA program, but may be hazardous waste under some authorized state programs.
Used Cleaners, Solvents, Paints, and Thinners	Degreasing materials are a common element of maintenance onboard vessels; tetrachloroethylene is used for metal-degreasing.
Used or Outdated Pharmaceuticals	Cruise ships have pharmaceuticals based on the ship's itinerary and the demographics of the passenger base. Inventory that is discarded because it is off specification or has exceeded shelf life may qualify as hazardous waste.
Incinerator Ash	Incinerator ash may contain constituents, such as heavy metals, in concentrations that would classify the ash as hazardous waste under RCRA.
Fluorescent/Mercury Vapor Bulbs	These bulbs contain small amounts of mercury, and therefore lamps containing these types of bulbs might qualify as RCRA hazardous waste when discarded. To promote the safe recycling and disposal of certain used lamps, EPA classifies these lamps as Universal Waste (40 CFR 273.5). For more information, see www.epa.gov/epaoswer/hazwaste/id/univwast/lamps/lamps.htm.
Batteries	Large batteries are used on tenders and standby generators; small batteries are used in flashlights and cameras. Other equipment on board may also require batteries. Four types of batteries typically used onboard cruise ships are: • Lead-acid – Batteries that are wet, rechargeable, and usually six-celled typically contain a sponge lead anode, a lead dioxide cathode, and a sulfuric acid electrolyte that is corrosive. • Nickel Cadmium (Nicad) – Batteries that are usually rechargeable and contain wet or dry potassium hydroxide as an electrolyte. The potassium hydroxide is corrosive; cadmium is a characteristic hazardous waste. • Lithium – Batteries used for flashlights and portable electronic equipment. Some spent lithium batteries (specifically, lithium metal-sulfide batteries) may constitute hazardous wastes based on the "reactivity" criterion (D003). • Alkaline – Batteries used for flashlights and other personal equipment. Though spent alkaline batteries are not considered hazardous waste under federal regulations, some alkaline batteries might be defined as hazardous waste under some authorized states' more stringent (or broader in scope) hazardous waste regulations (e.g., some states include tests, such as bioassay tests, to define hazardous waste, and some alkaline batteries may fail this test).
Spent Explosives	Explosives are used occasionally in small quantities for celebratory (e.g., theatrical productions, parties, etc.) and/or emergency purposes (e.g., lifeboat flares). Discarded explosives are managed as hazardous waste (ADEC, 2002).

Sources: ADEC, 2000 and ADEC, 2002

Limited information is available on the amount of hazardous waste that a cruise ship might generate. Table 6-2 presents estimates of the hazardous waste generated in one week by the Holland America Lines fleet, consisting of 11 vessels in 2000, and by the Royal Caribbean Cruises Ltd. fleet, consisting of 17 vessels in 1999. The information provided in Table 6-2 identifies specific hazardous waste materials that result from cruise ship activities. It is possible that these estimates may not be representative of the cruise ship fleets at this time. According to the U.S. General Accounting Office (GAO) Report (2000), some of the larger cruise ship companies reported taking actions to reduce the amounts of hazardous waste onboard. These cruise ship companies reported replacing hazardous chemicals with non-hazardous ones, and implementing procedures to improve the collection and disposal of waste from hazardous materials that cannot be replaced and must still be used. Table 6-3 presents more current estimates of waste measured across all of Carnival Corporation's operating lines and ships according to their reports.

Table 6-2. Estimates of Hazardous Waste Generated Per Week Onboard Cruise Ship Fleets

	Holland America Lines Fleet (11 Vessels)	**Royal Caribbean Cruises Ltd Fleet (17 vessels)**
Waste Type	**Amount Generated in 2000**	**Amount Generated in 1999**
Photo wastes	2262 gallons/week	1300 gallons/week
Discarded and expired chemicals	1735 lbs/week	2050 lbs/week
Medical Waste	45 lbs/week	80 lbs/week
Batteries	75 lbs/week	580 lbs/week[1]
Fluorescent Lights	153 lbs/week	270 lbs/week
Explosives	6 lbs/week	12 lbs/week
Spent paints and thinners	213 gallons/week	225 gallons/week

Source: The information above is the hazardous waste production per week by Holland America Lines Fleet, as reported in their 2000 Environmental Report (ADEC, 2002), and by Royal Caribbean Cruises Ltd as reported in their 1999 Environmental Report "*Save the Waves*" (Royal Caribbean Cruises Ltd, 1999).

[1] Total amount of batteries includes alkaline/carbon zinc, alkaline/mercury, lead acid, NiCad, mercury, and lithium.

Table 6-3. Estimates of Hazardous Waste and Solid Waste Generated Onboard as Reported by Carnival Cruise Lines

Parameter	2006 Measurement	2005 Measurement	Notes
Solid and Hazardous Waste (to shore)	0.0066 tonnes/ALBD	0.0077 tonnes/ALBD	(1) and (2)
Solid Waste (to sea or incinerated)	0.0079 tonnes/ALBD	0.0083 tonnes/ALBD	(1) and (2)

Source: Carnival Corporation & PLC, *Environmental Management Report*, Fiscal Year 2006

NOTES:

1. Rather than refer to measurements as Passenger Berth Days to normalize data by ship size/capacity, the more commonly referenced cruise industry indicator ALBD (Available Lower Berth Day) is used to normalize data by ship size/capacity.
2. This parameter measures solid and hazardous waste disposal normalized by ALBD. Hazardous waste disposal is normally less than 1% of total waste disposal. Hazardous waste is landed to shore facilities. There are three methods for solid waste, namely disposal ashore, at sea, or incinerated waste. According to Carnival Cruise Lines, the "at sea" or "incinerated waste" is discharged/disposed in accordance with MARPOL and applicable laws and regulations; plastic is not disposed at sea. Incinerated waste includes dry garbage, food waste, and sludge.

In 2003, the California Environmental Protection Agency (Cal/EPA) convened a multi-agency Cruise Ship Environmental Task Force to evaluate the environmental practices and waste streams of large passenger vessels (cruise ships). After gathering information from the cruise industry, the Task Force prepared a report to the California legislature. Regarding hazardous waste implementation issues, the Task Force highlighted the differences between stationary hazardous waste generators operating in California, and cruise ships that can operate in California but also off-load hazardous waste in other states or countries. The Task Force stated that it would be impossible for inspectors to track the disposal path of all onboard-generated hazardous waste without the cooperation of the cruise line. While the Task Force did not recommend any specific additional requirements for cruise ships related to managing or tracking hazardous waste, they did suggest additional information gathering. The Task Force also said that after such information gathering, it may be necessary to promulgate regulations to clarify that cruise ships operating in California are subject to the state hazardous waste management requirements in the same manner as other hazardous waste generators.

6.2 What federal laws apply to hazardous waste on cruise ships?

6.2.1 Clean Water Act

As noted earlier, the Clean Water Act (CWA) prohibits any person from discharging any pollutant from any point source into waters of the United States, except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit or otherwise authorized under the Act. The term "point source" is defined to include a "vessel or other floating craft." Under CWA section 502(12)(b), the requirement for an NPDES permit applies to the addition of any pollutant from any point source "other than a vessel or other floating craft" in the contiguous zone or the ocean, i.e., outside the territorial seas. Whether a discharge is authorized under an NPDES permit affects applicability of RCRA; dissolved and solid materials in industrial

discharges which are point sources subject to NPDES permits are not "solid waste" under the RCRA statute and thus not "hazardous waste." This only applies to materials once they have been discharged. Prior to being discharged pursuant to an NPDES permit, wastes remain subject to RCRA if they are hazardous wastes.

Section 311 of the CWA also prohibits the discharge of oil or hazardous substances into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the contiguous zone, or in connection with activities under the Outer Continental Shelf Lands Act or the Deepwater Port Act, or which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States in such quantities as may be harmful, as determined by the President. In Executive Order Number 11735, the President delegated to EPA the authority to determine these quantities. EPA has identified the quantities that may be harmful for hazardous substances in regulations at 40 CFR 117 and for oil in regulations at 40 CFR 110. Section 311(b)(5) of the CWA also requires the person in charge of a vessel or an onshore facility or an offshore facility to, as soon as he has knowledge of any discharge of oil or a hazardous substance in violation of section 311, immediately notify the National Response Center of the discharge.

6.2.2 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) imposes management requirements on generators, transporters, and persons who treat or dispose of hazardous waste. Cruise ships regularly use chemicals for operations ranging from routine maintenance such as cleaning and painting, to passenger services such as dry cleaning, beauty parlors, and photography labs. Thus, cruise ships or passenger service facilities within cruise ships may be subject to RCRA requirements. Issues the cruise ship industry may face relating to RCRA include ensuring the hazardous waste identification is made at the point at which a hazardous waste is considered generated; ensuring that parties are properly identified as generators, storers, treaters, or disposers; and determining the applicability of RCRA requirements to these parties.

RCRA (42 U.S.C. §§ 6901 et seq.) is the federal law that, among other things, defines and regulates solid waste and hazardous waste. RCRA is designed to minimize the hazards of waste disposal; conserve resources through waste recycling, recovery, and reduction; and ensure waste management practices that are protective of human health and the environment. In order to achieve these goals, RCRA established a Solid Waste Program (RCRA Subtitle D) and a Hazardous Waste Program (RCRA Subtitle C).[1] Subtitle C of RCRA establishes a hazardous waste management system that controls hazardous waste from the point of generation until ultimate disposal, also referred to as a "cradle-to-grave" program. As part of this program, RCRA Subtitle C regulates hazardous waste generators. The owner or operator of a cruise ship may be a "generator" of hazardous waste. EPA regulation (40 CFR 260.10) defines a generator to mean any person, by site, whose act or process produces hazardous waste, or whose act first causes a hazardous waste to become subject to regulation.

[1] In states with hazardous waste programs authorized by EPA, the authorized state hazardous waste program operates in lieu of the federal hazardous waste program. Some states have authorized hazardous waste programs that are more stringent than the federal hazardous waste program.

As stated previously, the RCRA regulations contain criteria for identifying whether a solid waste is a hazardous waste (40 CFR 261, Subparts C and D). There are two basic ways a waste is defined as hazardous under RCRA -- it is either a waste that appears on one of the four hazardous waste lists (i.e., F-List, K-List, P-List, or U-List), or the waste exhibits at least one of four hazardous characteristics (ignitability, corrosivity, reactivity, or toxicity). EPA's RCRA regulations at 40 CFR 262.11 require that any person who produces or generates a waste must determine if that waste is hazardous. Once a waste is identified as a hazardous waste, any person who generates or manages the hazardous waste must comply with all applicable federal regulations regarding its handling and management.

Hazardous waste generators are regulated based on the amount of hazardous waste produced each month. Table 6-4 shows that generators are divided into three categories: large quantity generators (LQGs); small quantity generators (SQGs); and conditionally exempt small quantity generators (CESQGs). LQGs are facilities that generate greater than or equal to 1,000 kg of hazardous waste per month, greater than 1 kg of acutely hazardous waste per month (i.e., any waste denoted with the hazard code "H" and all P-listed wastes), or greater than 100 kg of acute spill residue or soil per month (i.e., soil, waste, or debris resulting from the cleanup of an acute hazardous waste spill). SQGs are facilities that generate between 100 kg and 1,000 kg of hazardous waste per month. CESQGs are subject to significantly reduced requirements for managing hazardous waste. Generators are classified as CESQGs if they generate ≤100 kg of hazardous waste per month. If the hazardous waste being generated is *acutely* hazardous waste (a more stringently-regulated category of hazardous waste), then a generator is a CESQG provided they generate ≤1 kg of acutely hazardous waste per month. In situations where the waste being generated is residue, waste, or contaminated soil or debris from cleaning up a spill of acutely hazardous waste, a generator is a CESQG provided they generate ≤100 kg of this spill residue.

Generator status is determined on a monthly basis, so it is possible for a generator's (e.g., a cruise ship) status to change from one month to the next, depending upon waste generation during that period. If a generator's status does change, the generator is required to comply with the applicable regulatory requirements for that class of generators for the hazardous waste generated in that particular month. For example, if a generator has reached LQG status in a particular month, then biennial reporting is required, and all other regulatory requirements applicable to large quantity generators will apply to the waste generated in that month. Accurate counting of the waste is critical, because the regulations are specific to each generator type. EPA regulations (40 CFR 261.5(c) and (d)) specify the types of hazardous wastes that must be included in a generator's monthly count. EPA regulation (40 CFR 262.34) specifies the threshold quantities for LQGs and SQGs and includes limits on the amount of time hazardous waste may be accumulated on site before being sent offsite for further management (e.g., treatment, recycling, disposal, etc.). EPA regulation (40 CFR 261.5) also specifies threshold quantities for CESQGs, as shown in Table 6-4. There is no accumulation time limit for CESQGs. According to the Congressional Research Service (2007), the generator classification assigned to individual cruise ships is often unclear. However, once a cruise ship has determined its appropriate generator classification, the cruise ship must follow the appropriate accumulation requirements.

Table 6-4. Classification System and Accumulation Limits for Hazardous Waste Generators

Classification of Generator	Amount of Hazardous Waste Generated Per Month	Amount of Acutely Hazardous Waste Generated Per Month	Amount of Acute Spill Residue Generated Per Month	On-site Accumulation Time	On-site Quantity Limit
Large Quantity Generators	≥ 1000 kg	> 1 kg	> 100 kg	≤ 90 days on site	No Limit
Small Quantity Generators	100 kg < 1000 kg	N/A	N/A	≤ 180 days on site or ≤ 270 days if shipped 200 miles or more	6,000 kg
Conditionally Exempt Small Quantity Generators	≤ 100 kg	≤ 1 kg	≤ 100 kg	N/A	1,000 kg 1kg acute 100 kg residue

Source: U.S. Environmental Protection Agency, 2005

Any individual cruise ship that is identified as a large or small generator (i.e., LQG or SQG) is required to have a "Cruise Ship Identification Number" to identify both the type and quantity of hazardous waste onboard (40 CFR 262.12); comply with the manifest system (40 CFR 262, Subpart B); handle wastes properly before shipment (40 CFR 262, Subpart C); and comply with record-keeping and reporting requirements (40 CFR 262, Subpart D). The identification number is used to identify a generator and to track waste activities, as well as to provide increased coordination between the Coast Guard, EPA, and states. The number remains with a vessel, and is used on all hazardous waste manifests, regardless of where the waste is off-loaded in the United States. Upon off-loading hazardous waste, the cruise ship must comply with that particular off-loading state's RCRA requirements, whether or not that state assigned the ID number.

The Hazardous Waste Manifest System is a set of forms, reports, and procedures designed to track hazardous waste from the time it leaves the generator where it was produced, until it reaches the off-site waste facility that will store, treat, or dispose of the hazardous waste (for more information on the Hazardous Waste Manifest System, see http://www.epa.gov/epaoswer/hazwaste/gener/manifest/). The system enables waste generators to verify that their waste has been properly delivered, and that no waste has been lost or unaccounted for in the process (40 CFR 262, Subpart B).

EPA's RCRA regulations (40 CFR 273) also specify that a number of the hazardous wastes generated aboard cruise ships may be treated as Universal Wastes under the Universal Waste Program. The Universal Waste Program was developed under RCRA to streamline collection requirements for certain widely-generated hazardous wastes to promote waste recycling, and to ease the regulatory burden associated with handling, transportation, and collection. Waste considered to be "widely-generated" includes batteries, pesticides, mercury-containing

equipment, and lamps with hazardous components (e.g., fluorescent, metal halide, and high pressure sodium). The Universal Waste Rule allows a facility (e.g., a cruise ship) additional time for these wastes to accumulate for recycling or disposal and thereby streamlines requirements related to hazardous waste notification, labeling, marking, employee training, responses to releases, offsite shipments, tracking, exports, and transportation.

6.2.3 The Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; U.S.C. § 9601 et seq.) regulates the release of "hazardous substances" of which RCRA hazardous wastes are a sub-set. CERCLA provides that any person in charge of a vessel or an offshore or an onshore facility shall, as soon as he has knowledge of any release (other than a "federally permitted release") of a hazardous substance from such vessel or facility in quantities equal to or greater than those determined pursuant to CERCLA section 9602, immediately notify the National Response Center of such release. The National Response Center conveys the notification expeditiously to all appropriate government agencies. While the universe of CERCLA hazardous substances is larger than RCRA hazardous wastes (see 40 CFR 302.4 for the complete list of CERCLA hazardous substances), all RCRA hazardous wastes are by definition CERCLA hazardous substances. Therefore, in addition to the RCRA "cradle-to-grave" requirements summarized elsewhere in this section, releases of RCRA hazardous waste in amounts above the regulatory threshold are subject to reporting as a CERCLA hazardous substance unless exempted as a federally permitted release.

6.2.4 National Marine Sanctuaries Act

The National Marine Sanctuaries Act (NMSA; 16 U.S.C. § 1431 et seq.), as amended, established a national program to designate certain areas of marine environments as areas of special national significance that warrant heightened care. The primary purpose of the law is to protect marine resources and ecosystems, such as coral reefs, sunken historical vessels, or unique habitats, from degradation while facilitating public or private uses compatible with resource protection.

NMSA authorizes the National Oceanic and Atmospheric Administration (NOAA) to designate as National Marine Sanctuaries areas of the marine environment that have special aesthetic, ecological, historical, or recreational qualities, and to provide comprehensive and coordinated conservation management for such areas. The National Marine Sanctuary Program manages 13 sanctuaries and the Papahānaumokuākea Marine National Monument (together referred to as "sites"). Designated sites are managed according to site-specific management plans developed by NOAA that typically prohibit by regulation the discharge or deposit of most material. Under NOAA's implementing regulations for NMSA, discharging hazardous waste is prohibited at all sites except for the Thunder Bay and the Hawaiian Islands Humpback Whale National Marine Sanctuaries, where such discharges are prohibited under other legislation or regulation.

6.3 What practices are available to manage hazardous wastes generated on cruise ships?

Among the previously noted Cruise Lines International Association (CLIA) environmental standards, those applicable to hazardous wastes consist of programs for waste minimization, waste reuse and recycling, and waste stream management for incorporation into the Safety Management Systems (see Section 1.5). Specifically, a 2006 update to the CLIA environmental standards describes revised practices and procedures for the management of the following: photo processing wastes, including x-ray development fluid wastes; dry-cleaning waste fluids and contaminated materials; print shop waste fluids; photo copying and laser printer cartridges; unused and outdated pharmaceuticals; spent fluorescent and mercury vapor lamp bulbs; spent batteries; and minimizing the generation and avoiding the hazardous contamination of incinerator ash (CLIA, 2006).

According to California's Cruise Ship Environmental Task Force (2003), the information that CLIA and individual cruise ships reported regarding hazardous waste treatment onboard consists of the following:

- Incineration/burning of used oil, oily sludge, medical and bio-hazardous waste, and outdated pharmaceuticals;
- Aerosol can crushing and the collection of liquids from the aerosol cans;
- Silver recovery from photo and x-ray processing;
- Crushing and sieving of spent fluorescent and mercury vapor bulbs; and
- Separation of oil and water mixtures.

In some cases, the cruise ship industry is installing new technologies and design features to minimize hazardous waste generation (ADEC, 2000):

- Effective and efficient digital photo technology to reduce hazardous waste stream generation during photo processing;
- Use of non-toxic printing ink and non-chlorinated solvents and other non-hazardous products to eliminate hazardous wastes in print shops; and
- Alternative dry cleaning processes such as CO_2 and wet (i.e., a water-based alternative to dry cleaning) processes.

According to the CLIA environmental standards, member lines have agreed to reduce the production of incinerator ash by minimizing the generation of waste and maximizing recycling opportunities. CLIA further notes that incorporating waste stream segregation practices should prevent the introduction of hazardous materials to the incinerator, thereby directing the use of onboard incinerators primarily for food waste, contaminated cardboard, some plastics, trash, and wood. According to the CLIA environmental standards, non-hazardous ash is disposed of at sea in accordance with MARPOL Annex V. If any ash is identified as being hazardous, it is disposed ashore in accordance with RCRA. The CLIA environmental standards provide for testing of incinerator ash at least once quarterly for the first year of operation (in order to establish a baseline), and subsequent annual testing. (CLIA, 2006).

Cruise ships are also directing efforts to hazardous waste collection and storage prior to off-loading for disposal ashore. For hazardous materials that cannot be re-used and/or recycled, the

CLIA environmental standards provide that hazardous waste is to be collected and stored onboard, then landed ashore for disposal in accordance with RCRA requirements or other applicable laws and regulations (CLIA, 2006). The GAO Report (2000) states that officials of some of the larger cruise ship companies reported that hazardous waste from photo labs, dry cleaning operations, and other sources are collected, stored in separate locked rooms, and off-loaded in port. Based on several ship board visits accompanied by Coast Guard inspectors and/or cruise ship company officials, GAO observed locked storage areas for hazardous chemicals, reviewed procedures for handling hazardous waste, and in some instances observed the equipment for collecting hazardous wastes from photo processing and dry cleaning operations (U.S. General Accounting Office, 2000). Ultimately, when considering the means by which to dispose of the hazardous wastes, the local port infrastructure, availability of services providers, and the quality of disposal facilities are critical.

Additional wastes stored until offloaded ashore for proper disposal are used fuel/oil filters. The Task Force reported that cruise lines have indicated that "fuel oil from cruise ships' bunker tanks is run through filters and mechanical separators to remove sludge and water. The used filters are supposed to be disposed of in a hazardous waste dump." Cruise lines further indicated that the engine lubrication system uses oil filters to screen out particulate matter, with the treatment of the used oil filters to be the same as that for the fuel filters just mentioned (Cruise Ship Environmental Task Force, 2003).

6.4 What are the potential environmental impacts associated with hazardous waste from cruise ships?

Although the quantities of hazardous waste generated on cruise ships are small, their toxicity to sensitive marine organisms can be significant (CRS, 2007). The environmental effects of a hazardous waste release would depend on the chemical and toxicological characteristics of the particular waste released. Although the Cruise Ship Environmental Task Force stated in its 2003 report that they were unaware of any studies conducted on the environmental effects from the illegal discharge of hazardous waste, it could be assumed that the environmental impacts of such a release in port areas would have a far greater impact to the environment than a release far from shore where dilution effects are more efficient (Cruise Ship Environmental Task Force, 2003). There are a number of possible hazardous waste streams produced on cruise ships, including perchloroethylene, silver, mercury, hydrocarbons, heavy metals, and corrosives, that could enter the environment and cause harm if not appropriately managed as required under RCRA.

When hazardous waste generated aboard cruise ships is properly identified, stored, and treated and/or disposed onshore, the risk posed to the marine environment is normally minimized. Hazardous wastes should be properly stored and segregated from other wastes where required by law (e.g., incompatible hazardous wastes cannot be stored together) and where necessary to ensure proper management. When considering the incineration of waste, the generation and/or discharge of incinerator ash meeting the hazardous waste characteristics can be reduced, if not prevented, through a rigorous program of waste segregation, including education, and periodic ash testing. To ensure hazardous waste is handled and disposed of properly, adequate operational procedures and employee training and, in some instances, passenger training (e.g.,

clear demarcation of the proper locations for the onboard discard of materials that may be hazardous) is necessary.

After three years of sampling and analysis, ADEC (2002) determined that sewage and graywater waste streams are not used for hazardous waste disposal and that cruise ships screen for hazardous waste prior to incineration. If passenger and crew education efforts regarding waste management and waste segregation are not effective, waste materials that are hazardous (or otherwise contain hazardous constituents) may be comingled and then incinerated with solid wastes, and in some cases, cause the resulting incinerator ash to be hazardous. The IMO guidelines for Annex V implementation recognize the potential for air pollution associated with incinerator use, and therefore discourage the use of incinerators in ports in or near urban areas (Annex V, Appendix B, Section 5.4). The guidelines further recognize that some disadvantages of incinerators may include the hazardous nature of the ash or vapor, and that when in use, incinerators may not meet air pollution regulations imposed in certain harbors (Annex V, Appendix B, Section 5.4.5).

The incineration of plastics requires special precautions due to the potential environmental and health effects from the combustion of by-products. In these cases, the guidelines suggest that the incineration of plastic wastes complying with Annex V are to take place in a safe manner with an incinerator suitable for the incineration of plastics, otherwise the following problems can result:

- Depending on the type of plastic and conditions of combustion, some toxic gases can be generated in the exhaust stream, including vaporized hydrochloric and hydrocyanic acids. These and other intermediary products of plastic combustion can be extremely dangerous (Annex V, Appendix B, Section 5.4.6.1).
- The ash from the combustion of some plastic products may contain heavy metal or other residues which can be toxic and should therefore not be discharged into the sea (Annex V, Appendix B, Section 5.4.6.2).

Further, the Parliamentary Commission for the Environment (2003) states that a cruise ship solid waste incinerator may produce small amounts of polychlorinated biphenyls and polycyclic aromatic hydrocarbons.

6.5 What action is the federal government taking to address hazardous waste from cruise ships?

EPA has brought multiple enforcement actions against cruise ship operators for illegal discharges of hazardous substances and other pollutants to ensure that cruise ships comply with these requirements through environmental management systems developed as conditions of probation in criminal plea agreements.

EPA and states have worked together to develop a system whereby an EPA hazardous waste identification (ID) number is assigned to every cruise ship (U.S. Environmental Protection Agency, 2001). Previously, cruise ships were receiving different numbers from a variety of states upon off-loading hazardous waste. As a result, cruise ships were receiving multiple identification numbers and creating multiple copies of hazardous waste management records. Implementation of this 2001 policy has enabled individual cruise ships to be assigned a single

EPA hazardous waste identification number for the purposes of identification as a generator of hazardous waste under the Resource Conservation and Recovery Act. Under the 2001 policy, the following procedures apply:

a) A cruise ship determines its American-based home port state (the state in which it has corporate offices or its main port of call).
b) After determining the home port state, the cruise line notifies the selected state or corresponding EPA regional office of its hazardous waste activities.
c) The cruise ship identifies its hazardous waste generator size in accordance with 40 CFR 261.5(c).
d) The home port state or EPA regional office issues a hazardous waste identification number for the cruise ship. The number reflects the home port state initials and ten alphanumeric characters.

After the identification number is assigned, that number remains with the ship, and is used for all hazardous waste manifests, regardless of where the waste is off-loaded in the United States. The assignment of the EPA ID number does not affect the applicability of state-specific RCRA requirements; cruise ships must still comply with each state's RCRA requirements when off-loading hazardous waste, regardless of which state assigned the ID number. The ship must provide records to the relevant individual off-loading state, as required by that state's laws.

The National Park Service (NPS) manages cruise ship waste streams indirectly in Glacier Bay National Park through competitively awarded concession contracts. The NPS has jurisdiction over the submerged lands and marine waters of Glacier Bay National Park up to 3 miles from the mean high tide line and including all of Glacier Bay proper. Glacier Bay is a well known, very popular attraction for the cruise ship industry in Alaska. Recent environmental reviews and decisions allow up to two cruise ship entries per day into Glacier Bay proper during the primary visitor season. Cruise ship operations in the park are authorized under concession contracts, which are awarded under a competitive solicitation and prospectus process. Impact on park resources is a general standard selection criterion for park concessions. The NPS uses waste stream management as one of a number of selection criteria in this regard. In the past, cruise ship operators have usually proposed to minimize the impact of waste streams by committing to a no-discharge policy while in the park (even when discharge is legal under applicable law) for sewage, graywater, ballast water, bilge water, cooling water, hazardous waste, and solid waste. If awarded a contract, companies must comply with their proposal. Typically cruise ships operate in the park for 8-10 hours and then depart. Cruise ships do not dock or transfer any wastes to shore while in the park.

6.6 Possible Options and Alternatives to Address Hazardous Waste from Cruise Ships

Based on the public comments received on the draft of this report as well as other information gathered, listed below are a wide range of options and alternatives that address hazardous waste from cruise ships. Identification of any particular option does not imply any EPA recommendation or preference for future action, or that EPA has determined that any of these options are necessary or feasible, or that EPA believes a change to the status quo is warranted, or that EPA or any other entity has the legal authority to implement that option.

Prevention & Reduction

- Establish standards or best management practices for operation, maintenance, and/or training that will decrease the contaminants in hazardous wastes and/or the volume of hazardous waste on cruise ships.
- Resolve issues that may be impeding safe waste storage and expanded use of incinerators.
- Foster cruise ship industry hazardous waste minimization programs.
- Provide education and outreach to the cruise industry regarding hazardous waste generator requirements, including requirements to:
    - identify treatment activities,
    - report the locations where treatment takes place, and
    - obtain the appropriate hazardous waste permits or authorizations if cruise ships operate treatment units within certain state waters.
- Post waste segregation requirements, as well as the legal and environmental concerns, onboard cruise ships via placards and written information for employees and passengers.
- Conduct research on the effects of air quality as a result of incinerating hazardous wastes and materials aboard cruise ships.
- Conduct research to determine the presence of hazardous wastes (other than oil) entering the bilge that will eventually be discharged, given that present treatment processes target oil.

Control: Discharge Standards

- Review provisions of state laws -- in states with cruise ship port calls -- as they pertain to the CWA and RCRA to ascertain whether more stringent state provisions should be enacted.
- Ensure that the handling and disposal of batteries, special chemicals, etc., are done in accordance with state solid waste regulations.
- Expand training for employees regarding waste segregation requirements by including the legal and environmental reasons for those requirements.
- Establish industry practice of regular standardized ash testing before sea disposal.

Control: Geographic Restrictions on Discharge

- EPA should begin a rulemaking to prohibit the discharge of any hazardous materials or materials with hazardous characteristics into U.S. waters out to the 200-mile Exclusive Economic Zone.
- Expand port reception facilities to accept hazardous waste.
- Prohibit incinerating hazardous waste while in port.

Enforcement & Compliance Assurance: Monitoring

- Establish a requirement for a full accounting of hazardous waste disposal.
- Establish a mandatory incinerator ash testing program to determine whether each batch of incinerator ash is hazardous and proceed with disposal accordingly.
- Develop a means to track the path of all onboard generated hazardous wastes for all states and foreign ports.

Enforcement & Compliance Assurance: Reporting

- Include in the mandatory incinerator ash testing program maintenance of a certified log book documenting test results, dates, volumes, and ultimate disposition of ash (based on hazardous waste determination).

Enforcement & Compliance Assurance: Inspections & Enforcement

- Clarify that the cruise industry is subject to hazardous waste generator requirements and inspections by Certified Unified Program Agencies and the Department of Toxic Substances Control at ports where cruise ships take on or discharge passengers.
- Increase inspections and inspection requirements on cruise ships that received a permit to treat hazardous waste where these permits may exist.
- Increase inspections of authorized hazardous waste facilities that receive cruise ship hazardous wastes.
- Establish a funding mechanism based on the polluter-pays model that will provide revenues to develop and implement a comprehensive regulatory scheme specific to cruise ships.
- Impose uniform requirements on all ships as a condition of port entry and within waters under the jurisdiction of the United States consistent with international law, regardless of flag state.
- Expand Coast Guard inspections for environmental compliance to include pollution prevention equipment and practices for hazardous waste management.
- Establish a coordinated inspection program by the Department of Toxic Substances Control or Certified Unified Program Agencies, along with Coast Guard, to enforce generator reporting to promote cruise ships' accountability for all off-loaded hazardous wastes, to deter illegal disposal, and to identify if additional regulations are required to address offshore management of hazardous wastes.
- Prohibit or otherwise restrict noncompliant vessels (and sister ships, depending on the degree of involvement by parent companies) from operating in sensitive areas of the marine environment under U.S. jurisdiction.

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