

10/10/90 George Cornwall

FYI

-Bob C.
WMB#

Opportunities for Improved Management of Transportation Wastes

KE144-0-7059

October 5, 1990

Prepared by

Resource Integration Systems Limited
Toronto • Hartford • Portland • St. Paul

RIS

*Ideas that matter.
Ideas that work.*

October 5, 1990

Mr. Bob Christensen, P.Eng.
Program Engineer
Office of Waste Management
Waste Management Branch
Environment Canada
Ottawa, Ontario
K1A 0H3

Dear Mr. Christensen:

**Re: Final Report on Opportunities for Improved Management of
Transportation Wastes**

Enclosed please find one unbound and nine bound copies of the subject final report. I have sent an additional copy, by courier, directly to Brian Jamieson. This final report incorporates your comments on the two previous drafts, which have been most helpful.

I apologize for the sketchy detail of the first draft and for the delay in producing the final report. While I don't wish to make excuses, the quality of the data that came back from the survey questionnaires and the time required to solicit a response from some of the ports and airports did hamper our ability to meet our schedule. I do hope that the final product meets with your approval.

I have enjoyed working on this study and I hope that RIS can be of assistance to you in the future.

Yours truly,

Bruce Wilson, P.Eng.
Project Engineer

cc Brian Jamieson, Agriculture Canada

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1. INTRODUCTION

The purpose of this report is to identify opportunities for improved management of the handling, transportation and disposal of international transportation wastes at Canadian airports and port facilities.

Virtually all international transportation wastes that enters Canada is currently incinerated. In recent years, public pressure and increasingly stringent regulation of incinerators have made new facilities difficult to site and have led to the closure of some incinerators which had been receiving international transportation wastes. As a result, the handling and disposal of international transportation wastes from airports and port facilities has become a prominent environmental issue in a number of Canadian municipalities, including Toronto and Vancouver.

However, since changes to Agriculture Canada regulations in July, 1990, U.S. transborder waste need no longer be incinerated, although it is still considered to be international waste. Waste entering Canada from countries other than the U.S. must still be incinerated. For the purposes of this report, the term International Transportation Waste (ITW) refers to all waste entering Canada from foreign countries, including the U.S. The term U.S. Transborder Waste (USTBW) refers to waste entering Canada which originated in the U.S. and waste entering Canada from countries other than the U.S. will be referred to as Non U.S. Transborder Waste (Non USTBW).

This study will provide background information on the quantity and composition of international transportation waste entering Canada through airports and ports. In addition to outlining some waste reduction and recycling strategies currently being implemented at some of these facilities, the report provides a series of recommendations to aid in the development of a national strategy for handling ITW.

2. METHODOLOGY

For this study, RIS surveyed 15 airports and 15 port facilities across Canada to determine:

- the quantity of waste handled at each facility;
- the general composition of that waste;
- the number of landings or dockings at each facility;
- what existing waste handling systems are in place; and
- what opportunities for improved handling of ITW exist.

The following airport facilities were contacted:

- St. John's Airport
- Gander International
- Sydney Airport
- Halifax International
- Quebec City Airport
- Sept Isle Airport
- Dorval International (Montreal)
- Mirabel International (Montreal)
- Ottawa International
- Lester B. Pearson International (Toronto)
- Hamilton Airport
- Winnipeg International
- Calgary International
- Edmonton International
- Vancouver International

In addition, the following port facilities were contacted:

- St. John's
- Lewisporte
- Charlottetown
- Saint John
- Sydney
- Halifax
- Matane
- Quebec City
- Montreal

- Hamilton
- Powell River
- Campbell River
- Victoria
- Vancouver
- Cornwallis Island

RIS initially contacted each of the facilities through Agriculture Canada site and regional personnel. As other key personnel at a given facility were identified, surveys were also sent to those willing to participate in the study.

The results of the surveys were tabulated and gaps in the information were identified. Several attempts were made to fill gaps in the information by conducting follow-up telephone interviews. Unfortunately, in some cases, even these supplementary interviews failed to provide information of sufficient detail or quality. In these cases, RIS has used all available information to estimate quantities.

Summaries of the survey results for each of the airports facilities contacted are provided in Appendix A. Survey summaries for each of the ports contacted are located in Appendix B.

3. WASTE QUANTITIES AND CHARACTERISTICS

3.1. AIRPORTS

3.1.1. Quantities of International Transportation Wastes

The quality of information received from the airports contacted varied considerably. For some of the airports, detailed information on the number of international flights, the quantity of waste disposed and a comprehensive description of the handling system were received. For other airports, the information received was incomplete or of questionable quality. As a result, estimates of the amount of international transportation waste received in 1989 and projections of quantities for 1990 and beyond should be considered to be rough estimates at best.

In 1989, the fifteen airports covered by the survey reportedly handled a total of approximately 11,207 tonnes of waste from flights originating outside of Canada. Of this total, RIS estimates that about 2,257 tonnes (20%) was unloaded from international flights, while the remainder (8,950 tonnes or 80%) was from U.S. transborder flights. Under 1989 regulations, all of this waste (11,207 tonnes) was subject to regulations which required that it be incinerated. Table 1 lists the tonnages of both U.S. and non U.S. transborder waste reported or estimated to be received by each of the airports in the survey between 1989 and 1991.

It is interesting to note that 56% of the total waste (6,307 tonnes) was unloaded at Pearson International Airport in 1989. In fact, Figure 1 shows that four airports (Pearson, Vancouver, Mirabel, and Dorval) accounted for almost 95% (10,600 tonnes) of the 1989 international waste handled by the fifteen airports surveyed. Since Canadian airports not included in the survey do not handle any significant volume of international flights, it is safe to say that these four airports handle about 90% of the international and transborder waste entering the country by airplane.¹

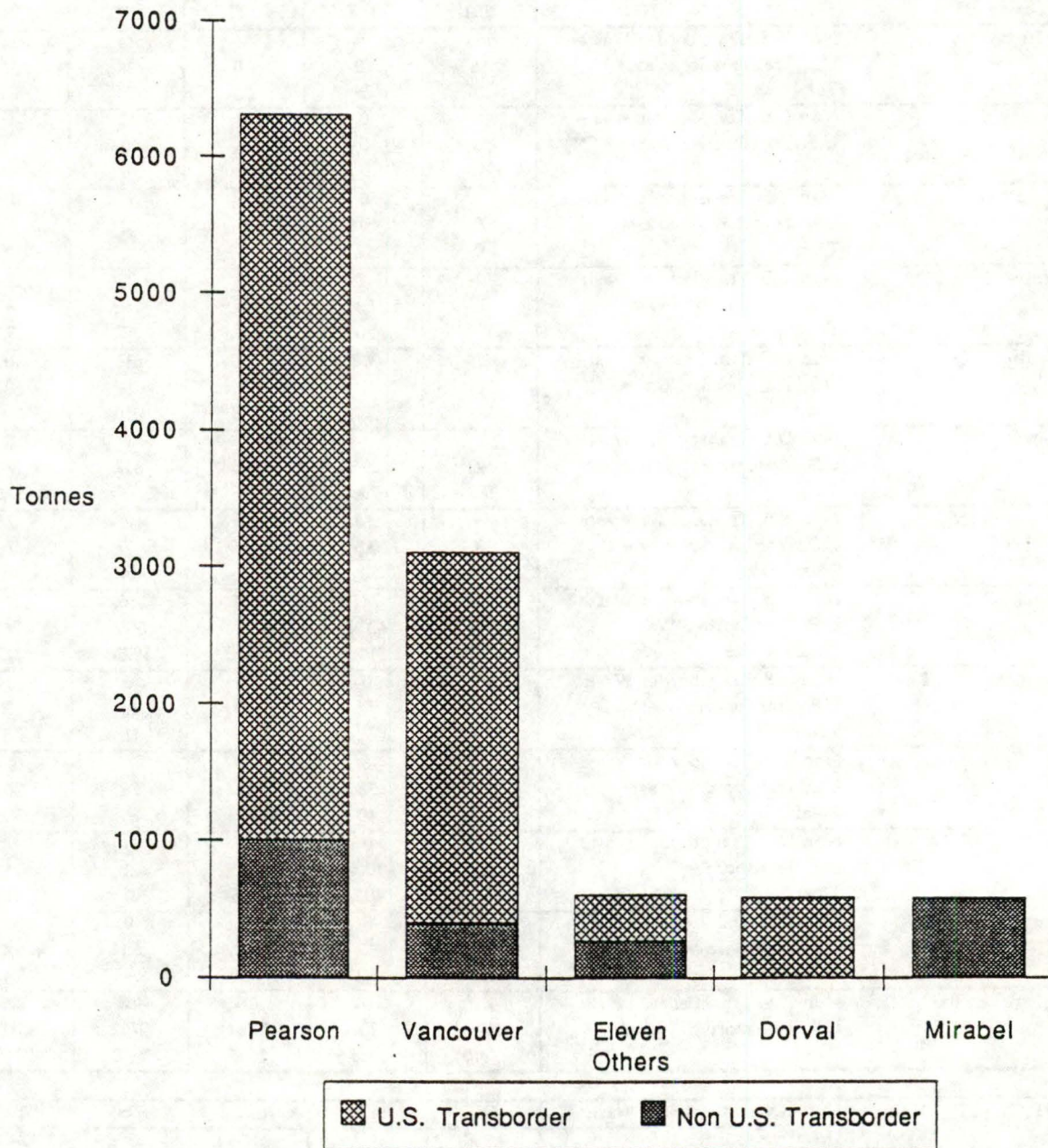
Table 1 also shows that the fifteen facilities covered by the survey reported that, during the first six months of 1990, they handled approximately 7,624 tonnes of waste from flights originating outside of Canada. Of this total, about 1,425 tonnes (17%) was unloaded from non U.S. transborder flights, while the remainder (6,298 tonnes or 83%) was from U.S. transborder flights. During this period, all U.S. transborder waste was incinerated.

¹ The fifteen airports surveyed handled over 80% of all U.S. flights entering Canada and over 98% of all international (other than U.S.) flights entering Canada in 1989. Pearson handled about 34% of all U.S. flights and about 35% of all International flights into Canada in 1989. Further, many international flights touch down at more than one airport, but will tend to unload waste only at Pearson, Vancouver, Mirabel or Dorval. Source: Number of Itinerant Movements - Domestic and International, Transport Canada, 1989.

TABLE 1
International Transportation Waste Handled by Canadian Airports

AIRPORT	Type of International Waste	1989 (reported) Total (tonnes)	1990 (reported) Jan. - June (tonnes)	1990 (estimate) July - Dec. (tonnes)	1990 (estimate) Total (tonnes)	1991 (projected) (tonnes)
St. John's, NFLD	Non U.S. Transborder Waste	50	24	24	59	48
	U.S. Transborder Waste	20	11	11	11	22
	Total	70	35	35	70	70
Gander, NFLD	Non U.S. Transborder Waste	170	83	83	166	166
	U.S. Transborder Waste	80	42	42	84	84
	Total	250	125	125	250	250
Halifax, NS	Non U.S. Transborder Waste	6	7	7	14	14
	U.S. Transborder Waste	16	18	18	36	36
	Total	22	25	25	50	50
Sydney, NS	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	0	0	0	0	0
	Total	0	0	0	0	0
Sept Isles, PQ	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	0	0	0	0	0
	Total	0	0	0	0	0
Quebec City, PQ	Non U.S. Transborder Waste	16	13	13	26	26
	U.S. Transborder Waste	98	83	83	166	166
	Total	114	96	96	192	192
Mirabel, PQ	Non U.S. Transborder Waste	589	308	308	616	616
	U.S. Transborder Waste	0	0	0	0	0
	Total	589	308	308	616	616
Dorval, PQ	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	592	296	296	592	592
	Total	592	296	296	592	592
Ottawa, ONT	Non U.S. Transborder Waste	6	3.5	3.5	7	7
	U.S. Transborder Waste	3	3.5	3.5	7	7
	Total	9	7	7	14	14
Pearson, ONT	Non U.S. Transborder Waste	1000	781	781	1562	1562
	U.S. Transborder Waste	5307	4334	4334	8668	8668
	Total	6307	5115	5115	10230	10230
Hamilton, ONT	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	15	7.5	7.5	15	15
	Total	15	7.5	7.5	15	15
Winnipeg, MAN	Non U.S. Transborder Waste	5	2	2	4	4
	U.S. Transborder Waste	97	38	38	76	76
	Total	102	40	40	80	80
Calgary, ALTA	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	21	10.5	10.5	21	21
	Total	21	10.5	10.5	21	21
Edmonton, ALTA	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	6.4	3.2	3.2	6.4	6.4
	Total	6.4	3.2	3.2	6.4	6.4
Vancouver, BC	Non U.S. Transborder Waste	400	204	204	408	408
	U.S. Transborder Waste	2710	1351	1351	2702	2702
	Total	3110	1555	1555	3110	3110
TOTAL	Non U.S. Transborder Waste	2257	1425	1425	2850	2850
	U.S. Transborder Waste	8950	6198	6198	12396	12400
	Total	11207	7624	7624	15246	15250

Figure 1
Generation of International Transportation Waste
by Airports, 1989



It is expected that the generation of waste at airports during the second half of 1990 will be approximately equal to generation during the first half. However, the total amount of waste that will require incineration will drop dramatically, since U.S. waste need no longer be incinerated under Agriculture Canada regulations.

Based on reported quantities to date, it appears that about 15,246 tonnes of waste will enter Canada by air from other countries during 1990. Of this total, roughly 12,400 tonnes will be USTBW while the remaining 2,850 tonnes will be non U.S. transborder waste. The 1990 estimate represents an increase of roughly 33% over 1989 totals, primarily due to increases in U.S. transborder flights. Of this total, about 9,050 tonnes will require incineration under Agriculture Canada regulations, while the remaining 6,200 tonnes from U.S. flights during the last six months of 1990 need not be burned.

It is difficult to project quantities of ITW that will be received at Canadian airports in the future, primarily because of the cyclical nature of the airline business. Growth in air traffic has been dramatic in recent years, but air travel is also very sensitive to changes in economic conditions. The possibility of a recession or of large increases in fuel prices could mean dramatic decreases in air traffic in the near future.

In order to estimate the generation of ITW at Canadian airports in 1991, RIS assumed that the amount of waste is not likely to drop below 1990 levels. As a result, RIS estimates that the fifteen facilities covered by this study will generate a minimum of 15,250 tonnes of ITW in 1991. It is also estimated that about 12,400 tonnes of that waste (81%) will enter Canada on U.S. transborder flights while the remaining 2,850 tonnes (19%) will come from non U.S. transborder flights.

3.1.2. Waste Generation Rates for International Aircraft

Reliable information on the amount of waste generated by a typical international flight or by a typical passenger on a international flight is not generally available. The Transport Canada manual cited above reports waste generation rates which range from 0.032 kilograms (kg) per passenger to 0.87 kg per passenger. Once again, confidence in such a large range is low and, once again, numbers specifically for international flights are not available.

Generally, the amount of waste generated on international flights would be higher than domestic or even transborder flights. This is mainly because on more meals and drinks are served to the passengers on longer international flights than on the shorter flights. Data supplied by the Winnipeg airport suggest that international flights generate roughly 50% more waste than transborder flights.

Of the airports surveyed for this study, the results from Pearson and Winnipeg airports appear to be the most accurate. Based on tonnages reported from these two airports, it would appear that a typical international flight generates approximately 0.4 tonnes (400 kilograms) of waste. However, data from other airports in the survey do not support this number. Part of the problem in determining waste generation figures comes from the fact that international flights will often land at several Canadian airports, but will only unload waste at one airport.

3.1.3. Composition of International Waste from Airports

There is little recent or accurate information on the characteristics of waste from aircraft. The general composition of the aircraft waste stream is generally known. Materials typically brought onto aircraft include prepared and packed food products, soft drinks, juice, beer, wine and liquor, newspapers, magazines and a number of miscellaneous items carried aboard by passengers.

Unfortunately, the reported estimates of the breakdown of this waste stream as a percentage by weight range quite dramatically. For example, one Transport Canada report provides the following range of results from three separate studies to estimate the composition of the aircraft waste stream.²

Paper Products	21-62%
Metals	13-17%
Plastics	12-26%
Glass	4-10%
Food Products	1-46%
Other	1-4%

These composition numbers vary so significantly that determining realistic percentages for detailed planning purposes is difficult. The sampling methodology for the three studies is not provided, therefore comparisons between the studies is also difficult. A further difficulty is the fact that the studies were conducted on a mix of domestic, transborder and international flights despite the fact that the type and quantity of waste generated on each type of flight is expected to be quite different. For example, international flights will generate more food waste than short domestic commuter flights.

Several major airlines have discussed the possibility of conducting detailed waste composition studies of the waste generated at their operations. However, to date, no such studies are available. RIS is not aware of any waste composition study that focuses exclusively on waste from international aircraft.

In order to provide rough estimates of the total amount of recyclable and other materials entering Canada from international aircraft, RIS has used the following waste composition breakdown:

² Transport Canada. Solid Waste Collection and Disposal Manual. (AK-65-04-000), February 1983, page B-1.

Paper Products	40%
Metals	14%
Plastics	24%
Glass	6%
Food Products	14%
Other	<u>2%</u>
	100%

It must be noted that this breakdown is based on the range of numbers provided in the Transport Canada report cited above and on RIS judgement only. In general, the percentages estimated for food waste and for container materials are higher than the average from the Transport Canada studies, while the number for paper products is lower than the average. This is due to RIS' understanding that international flights will tend to generate more waste from food and beverage service because more meals are served on international flights. These numbers should be considered to be rough estimates only and should not be relied upon for detailed planning or design.

Paper products on aircraft include newspaper, magazines and a small amount of mixed paper. Based on the projected tonnages for 1991 and on the composition assumptions listed above, RIS estimates that about 1,100 tonnes of paper products will be generated on international flights entering Canada and an additional 4,900 tonnes of paper will be generated on U.S. transborder flights. Of these paper products, newspaper, which should form the majority of the paper from these flights, is the most likely candidate for recycling. Although relatively large quantities of magazines can also be expected in the waste from aircraft, poor markets for magazine stock and competition from other paper products, like newspaper and fine paper, are likely to limit efforts to recycle used magazines in Canada.

Metal cans used on airplanes include aluminum and steel soft drink, beer, juice and cocktail mixes. The majority of cans used by airlines are aluminum due to their light weight, especially on international flights. Flights from some countries may use more steel cans, depending on local bottling practises. Based on 1991 projected tonnages, RIS estimates that 400 tonnes of metal cans will enter Canada on international flights and an additional 1,700

tonnes will be generated on U.S. transborder flights. Markets for metal beverage cans, especially for aluminum cans, are strong, making metal cans an ideal candidate for recycling.

A number of different plastics are used by airlines in a number of different applications. The different plastic resins used by airlines include:

- polyethylene terephthalate (PET) liquor bottles;
- polystyrene (PS) cups, dishes and plates;
- polyvinyl chloride (PVC) drinking water bottles; and
- high and low density polyethylene (LDPE and HDPE) wrapping.

While all these plastics are technically recyclable, they generally must be separated, by hand, into distinct resin types prior to sale. Of all these plastics, only PET and (to a lesser extent) HDPE have established markets and, even then, only in some regions of the country where municipal recycling programs are prevalent. Recycling of plastics from aircraft is further complicated by the differences between air carriers. Different airlines will use different amounts and types of plastic in different applications, and will occasionally change the type of resin used in a given application.

Based on the 1991 projected tonnages, RIS estimates that 680 tonnes of plastic products will be generated on international flights and an additional 3,000 tonnes will enter Canada on U.S. transborder flights. Due to separation and market problems, only a small percentage of the plastic generated will be available for recycling. Meaningful estimates of the amount of this plastic that can be recycled are impossible to make without a detailed waste composition analysis.

Glass bottles on aircraft are used primarily to serve liquor, wine and some juice. Glass liquor bottles are rapidly being replaced with PET bottles. It is likely, however, that glass wine bottles will continue to be used for some time. Based on the 1991 projected tonnages, RIS estimates that 170 tonnes of glass will be generated on international flights and an additional 740 tonnes will enter Canada on U.S. transborder flights.

Food waste on aircraft is generated mainly from food that is not served, from food that is not eaten, and from food scraps left on service trays. According to current regulations made under the Animal Disease and Protection Act, food waste from international flights cannot be recycled or used for compost. Based on the 1991 projected tonnages, RIS estimates that 400 tonnes of food waste will be generated on international flights. An additional 1,700 tonnes of food waste from U.S. transborder flights, which will not be subject to regulation, will be received at Canadian airports in 1991.

The majority of the waste in each of the categories listed above will be received at Pearson, Vancouver, Mirabel, and Dorval airports. It is interesting to note that Toronto, Vancouver, and Montreal all have municipal recycling programs in operation, which would suggest that the marketing of recyclable materials collected at each of these three airports will be relatively easy. Only limited quantities of material will be received at other Canadian airports. Any attempts to recycle any of the waste now entering Canadian airports will require the cooperation of a number of carrier airlines.

3.2. PORTS

3.2.1. Quantities of International Transportation Wastes

The information received from the port facilities contacted varied even more than that received from the airports. For some of the ports, detailed information on the number of dockings or requests to unload, the quantity of waste handled and a description of the handling system was received. At other ports, the amount of international waste handled is minimal or the port does not handle ITW at all. As a result, our estimates of the amount of international waste received in 1989 and what could be expected for 1990 and beyond are again quite rough.

In 1989, the fifteen port facilities surveyed received approximately 2,575 tonnes from outside of Canada. Under 1989 regulations, all of this waste

would have been incinerated. Roughly 15% of this waste originated in the U.S., while the other 85% came from countries other than the U.S.

The amount of international transportation waste received for the first six months of 1990 at the fifteen port facilities contacted was approximately 1,443 tonnes. Of this total, approximately 555 tonnes (38%) originated in the U.S., while the remaining 888 tonnes (62%) came from non U.S. countries. All of this waste required incineration under Agriculture Canada regulations.

RIS estimates that these facilities will receive approximately 1,440 tonnes of ITW in the second half of 1990. Of this total, 890 tonnes (62%) will originate in countries other than the U.S. and will require incineration. An additional 560 tonnes of waste will enter Canada from the U.S., but this waste will no longer require incineration.

RIS projects that the facilities covered by this study will handle approximately 2,890 tonnes of ITW in 1991. Non U.S. transborder waste will account for 1,776 tonnes (61%) while 1111 tonnes (39%) will come from U.S. sources. Table 2 provides a summary of the information collected by the survey and RIS' projected tonnages for 1990 and 1991 for each of the port facilities.

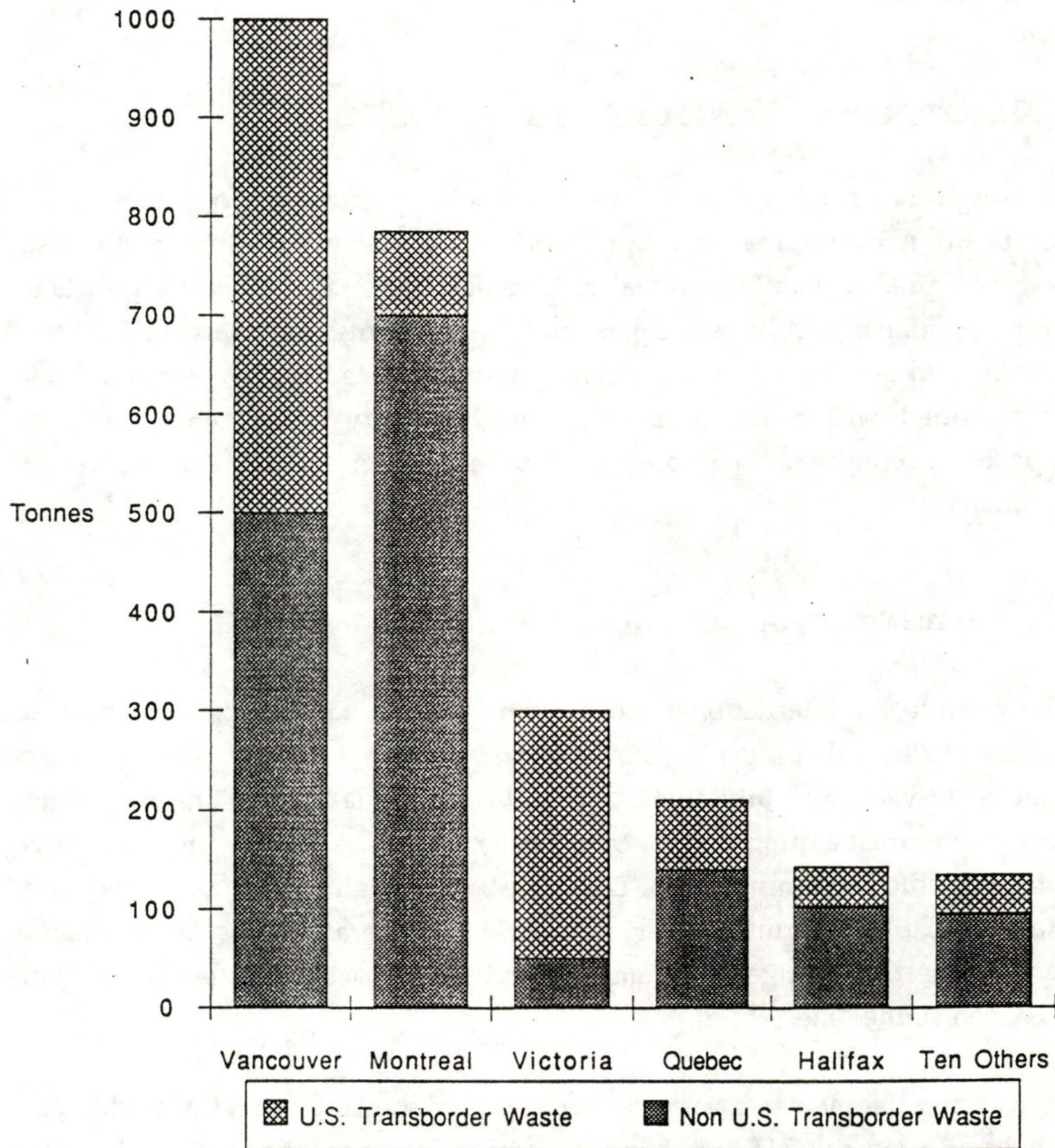
The number of cruise ships that unload ITW in Vancouver has decreased significantly since the declassification of transborder waste. To date in 1990, only one cruise ship has requested ITW unloading. No estimate of the number of cargo ships that unload international waste in Vancouver is currently available. On the East Coast of Canada, there are a number of busy ports receiving international waste from both commercial and cruise vessels. They include Sydney, Halifax, Quebec City, Montreal and St. John's.

It is again interesting to note that five facilities handled almost 95% of the ITW that entered Canada through ports in 1989. Figure 2 shows that Vancouver and Montreal handled the greatest amounts of ITW in 1989, while Victoria, Quebec City and Halifax all handled more ITW than the remaining ten facilities in the survey combined.

TABLE 2
International Transportation Waste Handled by Canadian Seaports

PORT	Type of International Waste	1989 (reported) Total (tonnes)	1990 (reported) Jan. - June (tonnes)	1990 (estimate) July - Dec. (tonnes)	1990 (estimate) Total (tonnes)	1991 (projected) (tonnes)
St. John's, NFLD	Non U.S. Transborder Waste	48	24	24	48	48
	U.S. Transborder Waste	2	1	1	2	2
	Total	50	25	25	50	50
Saint John, NB	Non U.S. Transborder Waste	46	23	23	46	46
	U.S. Transborder Waste	14	7	7	14	14
	Total	60	30	30	60	60
Lewisporte, NFLD	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	0	0	0	0	0
	Total	0	0	0	0	0
Halifax, NS	Non U.S. Transborder Waste	103	110	110	220	220
	U.S. Transborder Waste	40	45	45	90	90
	Total	143	155	155	310	310
Sydney, NS	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	8	19	19	38	38
	Total	8	19	19	38	38
Charlottetown, PEI	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	14	7	7	14	14
	Total	14	7	7	14	14
Quebec City, PQ	Non U.S. Transborder Waste	140	105	105	210	210
	U.S. Transborder Waste	71	58	58	116	116
	Total	211	163	163	326	326
Matane, PQ	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	0	0	0	0	0
	Total	0	0	0	0	0
Montreal, PQ	Non U.S. Transborder Waste	700	350	350	700	700
	U.S. Transborder Waste	85	43	43	85	85
	Total	785	393	393	785	785
Hamilton, ONT	Non U.S. Transborder Waste	2	2	2	2	2
	U.S. Transborder Waste	2	2	2	2	2
	Total	4	4	4	4	4
Victoria, BC	Non U.S. Transborder Waste	50	25	25	50	50
	U.S. Transborder Waste	250	125	125	250	250
	Total	300	300	300	300	300
Powell River B.C.	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	0	0	0	0	0
	Total	0	0	0	0	0
Campbell River, BC	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	0	0	0	0	0
	Total	0	0	0	0	0
Vancouver, BC	Non U.S. Transborder Waste	500	250	250	500	500
	U.S. Transborder Waste	500	250	250	500	500
	Total	1000	500	500	1000	1000
Cornwallis Is., NWT	Non U.S. Transborder Waste	0	0	0	0	0
	U.S. Transborder Waste	0	0	0	0	0
	Total	0	0	0	0	0
TOTAL	Non U.S. Transborder Waste	1589	888	888	1776	1776
	U.S. Transborder Waste	986	555	555	1111	1111
	Total	2575	1443	1443	2887	2887

Figure 2
Generation of International Transportation Waste
by Ports, 1989



3.2.2. Waste Generation Rates for International Shipping

Reported waste generation rates from passengers on cruise vessels vary between about 1.5 kgs per person per day to 2.8 kgs per person per day. This is roughly the same amount of waste that is generated by the average Canadian on shore.

3.2.3. Composition of International Wastes from Ports

Although no sorting operations have been performed to identify the composition of international waste off ships, the waste from non-cruise vessels is predominantly food waste. The waste generated by cruise vessels is probably similar to solid waste generated by large hotels or resorts throughout Canada and the U.S. A detailed composition analysis of ship waste could not be obtained within the time frame of this study. The U.S. Navy has reportedly conducted composition studies, however, this has not been confirmed.

3.3. ESTIMATE OF FUTURE TRENDS

The quantity of international transportation waste handled by airports and marine facilities that must be ultimately be incinerated is expected to decrease significantly. Since July, 1990, Agriculture Canada regulations no longer require the incineration of U.S. transborder waste. At a number of airports which handle large numbers of U.S. transborder flights, such as Ottawa and Hamilton, the amount of waste requiring incineration has been greatly reduced by this change in regulations and the impact on waste incineration has been immediate.

However, at some other airports such as Pearson, the operational changes required to separate U.S. and non-U.S. foreign flights will be completed over a number of months. Therefore, the reduction in the amount of waste that must be incinerated will not be seen for a number of months. It is important to note that some of the U.S. transborder wastes reported in Tables 1 and 2

will continue to be incinerated because they are not being handled separately from non U.S. transborder wastes. However, the high cost of incinerating U.S. transborder wastes when it is not required is likely incentive enough to ensure that, gradually, less and less U.S. transborder waste will be incinerated.

This also applies to port facilities. Collection and segregation is much simpler at port facilities and therefore decreases in international wastes at ports due to changes in these regulations should be seen sooner.

Other factors that influence the number of international landings or dockings are very site specific. For example, the port facility at St. John's expects an increase in the number of international dockings with the development of Hibernia oil. Another example is that St. John's airport receives waste from a number of international military flights.

3.4. DATA LIMITATIONS

The accessibility to data for this study was limited mainly by the short time frame and by the reluctance of some private companies to disclose operational information. Some companies were reluctant to provide detailed information about tonnages handled or costs involved. A number of the locations reported that they handle small amounts of international waste but that accurate weights, volumes and frequency of pickup were unavailable.

At the airports, some of the contacts were very helpful and understood the collection and disposal system in great detail. Other site contacts provided little information or assistance. Contacts with airlines, haulers, servicing agents or airline consultative committees proved to be helpful in some cases and frustrating in others.

At the ports, Harbour Masters, district veterinarians, shipping agents and waste haulers were the prime contacts and provided different levels of detail. As a result, accurate weights and volumes of ITW were usually difficult to determine.

For many of the airports and seaports which had waste quantity data available, that data was only available in terms of volume, not in terms of weight. This added greater uncertainty to final estimates of tonnage estimates because of the wide range of waste densities possible. For example, one 40 cubic yard bin of waste might weigh 2.7 tonnes if the waste were primarily uncompacted container materials with a density of 150 lbs per cubic yard while the same bin might weigh 9 tonnes if it contained primarily food waste or waste paper with a density of 500 lbs per cubic yard or more.

4. CURRENT HANDLING PRACTICES

4.1. AIRPORTS

Waste is generated on aircraft during a number of in-flight services provided to the travelling passenger. The main airline activities that generate waste are food and beverage services and the provision of newspapers and magazines.

Aircraft waste is split into cabin waste and galley waste. Cabin wastes include all the waste that is stored in compactors or bins on the plane and is collected at the airport in airside bins or by a collection service. This waste includes food preparation materials, bar service materials (cups, cans and bottles) and waste left behind by the passengers such as newspapers, magazines and other types of packaging waste.

Galley waste is collected at the airline commissary or flight kitchen. This waste usually includes all the materials that are found on the food service trolleys and beverage trolleys. Food waste, food service items (plates, cups, utensils etc.) and beverage containers (cans, glass and plastic bottles) are the main types of galley waste. Whether the waste is collected as galley or cabin waste depends on the actions of the individual flight attendants working on the aircraft.

ITW generated at each of the airports contacted is currently incinerated. These operations are dependent upon the coordination of the collection

system at the airport. International flights that indicate that they want to unload waste must use orange plastic garbage bags for that waste. All waste collected in orange bags is identified as international waste and is incinerated.

Waste generated by domestic flights or by U.S. based flights since July 1990 is not considered international and therefore does not require incineration. These wastes are commonly taken to municipal landfill sites. In some locations, such as Hamilton, the local incinerator is the closest disposal facility and services both international and domestic waste generated at the airport.

In certain situations, domestic or U.S. related wastes are handled and disposed as international waste. This is due mainly to a poor ground handling system for separating waste from international flights. This is the case at Pearson Airport in Toronto. In order to simplify waste handling activities at Mirabel all galley waste, whether international, transborder or domestic, is collected from the aircraft, classified as international, and incinerated. Therefore, some of the waste that is listed as U.S. transborder waste in Table 1 will continue to be incinerated for some time, regardless of the changes to Agriculture Canada regulations.

Each of the major airports has an airline consultative committee and/or an airline operations committee. These committees are made up of representatives from each of the airlines, servicing companies, flight kitchens and government agencies. These committees discuss and negotiate issues and procedures related to the operations at the airport. Transport Canada's policy is that the disposal of ITW is the responsibility of the airlines that generate the waste. Therefore, these committees have all had to address the problems and costs associated with the disposal of this waste.

The handling and disposing of international waste is usually arranged by the airline consultative committees. The mechanism for dividing costs among the airlines varies by airport. At Pearson, it is based on a percentage of the number of international passengers. At Mirabel, a flat fee is charged to each aircraft that lands, whether domestic or international. This fee does not change with the size of the aircraft or the number of passengers.

4.2. PORTS

There is usually only one main container on board a ship for storing solid waste. The majority of the wastes from all but cruise ships are generated in the galley operations. Wastes generated in cabins or offices on board also usually feed into the one waste collection container.

Waste generation in cruise ships is similar to that of waste generated from a large hotel or resort. A majority of the waste is generated in the food preparation and service areas (restaurants and bars), with waste also being generated in the passenger cabins, retail and recreational areas on board.

With the majority of ship waste being stored in one bin, segregation of wastes rarely takes place, if at all. The practice of dumping waste into the oceans is very common. As a result, ITW is not commonly brought into port from long voyages, but is dumped at sea prior to docking. The lack of a coordinated effort to handle, store, segregate, dispose of or recycle ship waste is encouraging this practice.

Existing regulations which relate to disposal of garbage from ships include the Garbage Pollution Prevention Regulations under the Canadian Shipping Act. These regulation prohibit the disposal of waste within Canada's 200 mile limit. Under these regulations, any federal agency (including the Coast Guard, the Department of Fisheries and Oceans, Environment Canada, Agriculture Canada, and the Department of National Defence) may enforce the regulations. However, there is lack of a proper system and coordination between concerned federal agencies which enables collection of adequate evidence with which to pursue prosecutions³

Internationally, regulations concerning the disposal of waste at sea are governed by the International Convention for the Prevention of Pollution from Ships, 1973, commonly referred to as Annex V of the MARPOL

³ Fisheries and Oceans. Plastic Debris in the Aquatic Environment - Halifax Workshop Report. May 1989, page 42.

agreement.⁴ Not all countries, including Canada have implemented the MARPOL regulations. The MARPOL regulations ban the disposal of plastics at sea, restrict the dumping of other garbage (although existing Canadian regulations are more strict) and requires the provision of garbage handling facilities at ports.

ITW which is unloaded at Canadian ports is predominantly from international vessels which remain docked for longer than a few days. For example, some vessels remain in port several weeks or longer for dry dock repairs or for crew leave from military vessels. These ships remain in port too long to store their waste until they return to international waters for ocean-dumping.

At all but the largest ports, the handling of international waste is avoided for one of the following two reasons:

1. Ships have unloaded their waste into the ocean before entering Canadian waters.
2. Proper handling of ITW is not possible locally. For example, in Campbell River (B.C.) and in Matane (Quebec) there are no local incinerators and transporting wastes to a distant location for burning is economically prohibitive.

When unloading of international waste is requested at ports where this is possible, it is most commonly taken to an incinerator that is designed to burn municipal solid waste. The shipping firms usually pay either the port operating vendor or a shipping agent, who arranges for a waste bin to be spotted at the dock by a local waste hauling firm. The port vendor or shipping agent then pays the waste hauler, and the hauler builds into his or her price the fee for incineration on top of the simple hauling costs. The port facility in Saint John, New Brunswick receives ITW and an Agriculture Canada inspector oversees the open-burning of this waste at a local provincial dump site.

⁴ A brief summary of Annex V of the MARPOL regulations is provided in Appendix C.

5. EXISTING WASTE REDUCTION EFFORTS

5.1. AIRPORT AND AIRLINES

A number of waste reduction and recycling efforts have been initiated by the major airlines such as Canadian Airlines and Air Canada at their commissaries and flight kitchens. Most of these programs are usually based at large airports such as Pearson and Vancouver, and are not yet universal across all air bases. This includes the following:

- glass bottle recycling;
- aluminum and steel can recycling;
- newspaper recycling.

However, the proportion of recyclables collected from international and domestic flights has not yet been determined.

A number of the waste reduction and reuse programs are system wide for the airlines and are usually implemented for improving the level of passenger service. The waste diversion impact of these reduction programs is difficult to determine. This includes:

- serving food on reuseable/washable plastic or china plates;
- serving drinks in washable glasses;
- providing reusable headphones;

Canada's two major airlines have begun to examine their waste handling practices and are both in the process of developing waste reduction and recycling programs as part of a broader environmental strategy.

Canadian Airlines has just recently started an aluminum can recycling program at seven major federal airports; Halifax, Dorval, Pearson, Winnipeg, Calgary, Edmonton and Vancouver. Results for this program are not yet known.

Glass bottles are being recycled at Vancouver and Pearson, and newspaper has just recently been added in Vancouver. Expansion of the glass and newspaper recycling programs is planned for all the above airports within the year. Expansion of the program to collect other materials (such as PET), and to other locations across Canada is also expected to begin over the next year. Canadian Airlines has appointed an Environmental Affairs Manager to oversee all areas of environmental issues associated with the airline.

Air Canada has also begun to implement recycling programs for these materials. At Pearson Airport, glass has been collected for a number of years. An aluminum can recycling program was started in March of 1990 and as of mid-September has collected and recycled 8.24 tonnes of aluminum and 4.67 tonnes of steel cans. Air Canada estimates that about 8% (or about 1 tonne) of the metal cans recovered originated from international flights.

Air Canada is currently developing a waste reduction and recycling strategy for the company which will involve all aspects of airlines operations, including in-flight services. Air Canada is reviewing the possibility of developing an environmental department for the airline.

Two major catering and food service companies, Cara and Caterair, serve the majority of airlines in Canada and many international airlines that fly into the country. Both companies have begun to participate in a number of recycling programs initiated by the airlines. These operations are now being asked to separate and store recyclables by Canadian and Air Canada. They are limited in what they can physically collect by how the airlines are handling the materials in-flight. These service companies cannot easily recycle material if their airline customers are not recycling.

Foreign airlines that land in Canada have generally not been involved in waste recycling efforts. Due to limited Canadian staff and the extensive use of contracted food and commissary services, it is difficult for foreign carriers to implement such programs outside their regions of influence.

To date most recycling efforts have been initiated by individual airlines. The Canadian airports have small recycling programs limited to office paper or

soft drink cans. Gander Airport has just initiated an aluminum can recycling program for the passengers in the international waiting lounge.

5.2. PORTS AND SHIPS

Current waste reduction and recycling efforts on international ships and at ports are virtually non-existent. The practice of dumping waste into the ocean is the cheapest, and often the only, waste management option available to many ships. If waste is stored on-board, limited space on the ship can make the segregation of recyclables and other wastes difficult to achieve.

Published guidelines for implementing MARPOL⁵ make several recommendations concerning on-board sorting and processing of garbage (including the separation of recyclables) and suggest several methods of minimizing the amount of waste that ships must handle.

Even if recyclable materials were segregated on-board ships, it would be difficult for them to be collected for recycling. Most port facilities in Canada do not have a recycling infrastructure, such as segmented bins and collection services, in place to receive those recyclables. If such bins were in place, it would be important to ensure that no materials which must be incinerated under Agriculture Canada regulations inadvertently entered the bins.

The cruise ship industry has been under an growing amount of public pressure throughout North America regarding the waste management practices on-board luxury cruise ships. It is expected that these types of vessels will be undertaking a review of waste management practices and will likely develop waste reduction and recycling policies.

⁵ Guidelines for the Implementation of Annex V of MARPOL 73/78, International Maritime Organization, 1988.

6.0 OPPORTUNITIES FOR IMPROVED HANDLING OF TRANSPORTATION WASTE

6.1 AIRPORTS

From our research, we have identified a number of opportunities for improved handling of international transportation waste. RIS' recommendations regarding international transportation waste that is generated on aircraft and handled at airports are listed below, together with our rationale for each recommendation.

1) Develop Guidelines for Recycling International Transportation Waste

There need to be definitive guidelines for airlines and flight kitchens to follow with regards to the potential for recycling materials from international flights. The current guidelines as stated in the Animal Disease and Protection Act have been interpreted by a number of people to mean that any and all waste generated from an international flight is international waste which must be incinerated. That interpretation effectively rules out recycling programs for paper, glass and metals.

It appears as though waste reduction and recycling could be an effective waste management option for selected materials found on international flights. The source separation, storage and recycling of newspaper, magazines, aluminum and steel beverage cans, plastic and glass bottles and other plastics such as cups is technically feasible.

A number of the airlines such as Canadian Airlines and Air Canada have implemented limited recycling programs for aluminum cans. The impetus for the airlines to implement these in-flight recycling programs has been mainly through the employees efforts, the revenue potential of the aluminum can, and the positive corporate image of such programs.

2) Encourage Detailed Waste Composition Analysis of Aircraft Waste

The current numbers available on waste characterization and generation for aircraft waste are outdated and vary considerably from each other. Therefore, a detailed analysis will provide up to date and accurate information which can be used for determining future disposal needs and reduction and recycling potential.

All airlines and a number of the airport committees would be interested in this type of data. The airlines will likely be conducting such waste audits to provide baseline data for recycling programs, however, the results may become proprietary. Therefore, a combined effort on the part of the airlines and the federal agencies would be recommended.

3) Encourage Airlines in the Research and Development of New Disposal Technologies

The individual airlines have been given the responsibility of handling and disposing of ITW. These airlines are paying the high cost of disposal and have been actively looking for new alternative disposal systems. For example, the airlines have just announced plans to test a plasma-arc system at Pearson International³.

The results of this and other research into disposal technologies is very important to all the federal agencies involved. The Departments of Agriculture, Transport and Environment should actively encourage the development and testing of new technologies for handling international transportation wastes. As such new technologies become cost-effective, they should be used to replace older technologies, such as incinerators.

³ Curley, George. September 1990. Personal Conversations with International Waste Management advisor Canadian Airlines.

4) Transport Canada Should Encourage Airline Consultative Committees to Develop User Pay Arrangements

The costs for international waste disposal are usually divided among the airlines based either on a percentage of passengers carried or on a flat fee. Therefore, the diversion of waste from disposal through a recycling program is not necessarily rewarded with a disposal cost saving. This user pay concept is based on the premise that it is the weight of the waste requiring disposal that is the key cost factor.

At Pearson Airport, ITW disposal costs are approximately three times the cost of domestic disposal. The current system for dividing the costs of ITW disposal among the airlines is based on a formula where the total costs are divided by the percentage of international passengers handled by the particular airline. In the case of Pearson Airport, Air Canada pays the greatest amount.

Under this system, even if an airline could reduce the amount of ITW that it generated by one half through reduction and recycling efforts, it would not realize any direct reduction in disposal costs. If individual airlines saw those disposal cost savings, waste diversion activities would most certainly be increased.

6.2 PORT FACILITIES

Canadian regulations regarding the handling of ITW are designed to avoid the introduction of disease or unwanted life-forms into the Canadian environment. This primarily concerns on-shore handling practices and may suggest the continuance of ocean disposal when that practice is legally carried out.

On the other hand, regulations concerning the disposal of waste at sea, including existing Canadian regulations and MARPOL regulations, are primarily designed to minimize damage to the marine environment. The

objective of these regulations is primarily to restrict disposal at sea and may suggest increasing the amount of waste handled on-shore.

In order to resolve the conflicting objectives of these two sets of regulations, it is helpful to consider two extreme cases. The first case would involve handling all ITW on shore while the second would involve handling all ITW at sea.

Handling All International Transportation Waste On Shore

This scenario is in keeping with MARPOL best management practices to avoid dumping at sea by transporting all solid waste to ports for on-shore disposal. The main advantage of this scenario is the elimination of insults to the marine environment as related to the ocean dumping of solid waste. The difficulties with this approach include:

1. Inability to handle all this waste on-shore—If all solid waste from foreign vessels is handled on shore, a waste handling problem would likely occur at most Canadian ports, especially where significant quantities of ITW would be received and consequently incinerated. Current quantities of ITW handled represent only the tip of the ITW iceberg since most ITW from ships is now dumped into international waters. To this end, Canadian ports would need to vastly increase on-shore handling opportunities for international solid waste, at a price that will not result in continued ocean dumping as the predominant waste management method (i.e., subsidize ITW handling). However, incinerating solid waste on-shore may not hold environmental advantages over dumping it at sea, depending on the type of waste being considered and details of the ocean dumping and combustion processes being compared.
2. Inability of vessels to store solid waste during transatlantic or transpacific voyages—This would require vessel operators to invest in on-board waste compacting equipment, and would also require increased storage space on-board whether or not waste is compacted. It is not realistic to expect vessel operators to save their waste on-

board from voyages of several weeks when the vessels and their operating procedures are set up to handle waste from only a few days.

Disposing All International Transportation Waste At Sea

The other extreme example is a scenario in which all ITW is disposed of at sea. This scenario is very close to current practices. If shippers are to address MARPOL goals, however, they cannot continue to dump all solid wastes at sea, but will have to store plastic wastes (and plastic-contaminated mixed waste) separately for transport to ports for on-shore disposal.

Combined Approach Including Both On-shore and At-sea Disposal

The best system to move towards for ITW waste handling is the middle road between the two extreme scenarios identified above. The near-term solution is to increase the capability to handle ITW through incineration, and to begin receiving source-separated plastic waste, along with shipper education programs regarding responsible ocean-dumping practices. The MARPOL procedures suggest several "next-best" practices for ocean dumping if wastes are not brought into shore, including cutting or grinding food into small pieces before dumping it at sea, dumping the size-reduced food and other non-plastic wastes far from shore, and always bringing plastic wastes to port for on-shore disposal. In the long-term, more of the ITW received at ports could be recovered for recycling. The most appropriate material to recover first is aluminum because of its high scrap value and its light weight, and therefore its potential to offer success in fledgling ship-waste recycling programs.

The issue of storing waste plastic and plastic-containing mixed waste on-board ships for transport to ports is the greatest implication of ratifying and implementing the MARPOL Annex V suggested regulations. In terms of vessels sailing under the Canadian flag, all vessels would require operator and crew training and mostly likely on-board compactors as well. In terms of non-Canadian vessels, the opportunity to unload plastic waste must be available to all visiting ships. Plastic probably does not comprise a large percentage of the waste off ships, but even a small percentage of all the waste

currently dumped at sea could amount to significant tonnages if brought to shore. Even though handling all plastic waste off ships appears to be a daunting task, changing the handling practices of plastic wastes will take time, and this time lag will allow the provision of appropriate on-shore handling facilities, starting at the larger ports.

Regardless of what changes come about in handling ITW, shipping firms will be affected in two ways: (1) behavior changes would be required; and (2) increased costs would have to be paid. Once again, any system chosen for implementation will need to be phased in over time, in terms of regulatory deadlines as well as education and training programs, to allow for infrastructural and behavioral changes both on ships and on-shore.

To achieve these objectives, RIS recommends the following actions:

1) Develop Recycling Guidelines for Use by a Responsible Agency in the Managing of Transportation Wastes

Definitive guidelines are needed for port authorities to follow regarding the potential for recycling materials from international shipping. As is the case with airline waste, no alternative waste management options can be implemented until there are guidelines which clearly allow for some international waste to be diverted from incineration.

A coordinating agency should be designated to explore new recycling programs at ports. This agency could start by establishing programs in ports where the number of vessels carrying recyclables is high (i.e., ports with cruise ships carrying aluminum beverage containers, and cruise or cargo ships carrying waste cardboard); and where there are local marketing opportunities for the recyclable materials once they have been collected. Since recycling opportunities in ports should apply to all vessels docking and not just international vessels, it is most appropriate for the agency currently responsible for domestic solid waste management regulation to establish new recycling programs at ports.

2) Encourage Detailed Waste Composition Analysis of Ship Waste

There is a dearth of available data on waste characterization and generation rates for foreign commercial ships, although some information is available on cruise ships and the industry appears to be slowly addressing this issue. A detailed analysis will provide up-to-date and accurate information which can be used for determining future disposal needs and the potential to reduce waste at its source and/or develop waste recycling programs.

Given the number of ports and vessels, the number of foreign companies involved, and the great variability of waste composition off ships, a ship-waste composition study would be considerably more complicated than a composition analysis for airline waste.

3) Improved Enforcement of Regulations Concerning Disposal at Sea

The dumping of waste into international waters is the most common waste management practice in the shipping industry; most waste from international shipping does not reach the port. Although the practice of ocean dumping reduces the amount of international waste that must be handled at Canadian ports, it can cause disturbances to the marine environment. The MARPOL procedures for handling waste at sea appear to offer sound guidance, and the Canadian government should ratify these regulations for local implementation and enforcement. While it is difficult to detect, gather evidence against, and prosecute offenders, the problem of inappropriate ocean dumping can be addressed by a range of federal agencies. According to the IMO, increasing shipper compliance with MARPOL regulations can be attempted through the following measures:

- Documenting existing waste handling facilities at Canadian ports.
- Designating appropriate enforcement agencies with legal authority, funding, trained staff, and equipment.

- Implementing a garbage discharge reporting system (Agriculture Canada supervision of ITW unloading has already offered good control over ITW handling, but the Agriculture Canada role could be expanded to include additional education and information gathering tasks).
- Incentives such as research and financial support for on-shore and on-board waste handling technologies, possibly to include tax incentives, loan guarantees, and/or bounty programs for discarded fishing gear.

4) Improved Education Regarding Disposal at Sea and International Waste Disposal

Fact sheets should be prepared and distributed summarizing key issues. Appropriate issues include: (1) Canadian regulations for the management of solid waste off ocean-going vessels; (2) a clear definition of international waste and regulations specific to the handling of international waste; (3) suggested waste handling procedures as outlined in MARPOL.

In order to make progress in mitigating environmental harms associated with international waste, it is important to identify and understand what current and potential harms are to be mitigated. The two categories include: (1) risks related to on-shore waste handling, such as the spreading of hoof-and-mouth disease among cattle; (2) risks related to ocean dumping, such as fish kills or beach pollution (note that category number 2 is not specific to international waste, but applies to all solid waste dumped from vessels).

The federal agencies should sponsor research and assign new responsibilities to an existing agency (or form a new organization) to track environmental problems associated with disposing of solid waste off of vessels, and specifically international solid waste where such a differentiation is possible. The information obtained through this process could be used in the above education program.

The objective of increased documentation of marine environmental impacts related to solid waste should be communicated with marine research groups, Armed Forces and the Coast Guard.

Suggestions for educational programs for the implementation of MARPOL regulations, as recommended by the International Maritime Organization (IMO) include:

- Communicate with the International Maritime Organization regarding current waste handling practices; copies of relevant domestic laws and regulations; educational materials; available information on the evidence and impacts of solid waste in the ocean.
- Expand domestic maritime certification exams so that national and international laws regarding ocean pollution by garbage are addressed.
- Require all ships to post Annex V garbage discharge regulations in appropriate places on board.
- Develop or augment curricula at maritime colleges and technical institutes to address the handling of ship-generated garbage.
- Organizations training seamen are encouraged to address waste handling in their training programs.
- Establish general public awareness programs regarding ship-generated waste handling.

The guidelines document also suggests minimizing the amount of potential garbage through changes in provisioning, cargo management, and fishing gear technologies and management. Recycling is also suggested as a way to avoid waste disposal needs at sea and on shore.

5) Designate Ports Where Proper Reception Facilities Would be Assured

MARPOL guidelines suggest offering ITW unloading opportunities at all ports where international vessels dock. At a number of the ports surveyed, adequate facilities for proper handling of international waste are not locally available. In most of these ports, the cost to off-load international waste is determined by the distance to the nearest solid waste incinerator, resulting in prohibitive costs for proper handling. For many of these ports, the number of requests to off-load international waste does not justify the construction of a small-scale solid waste incinerator. For ports where requests to off-load international waste are frequently denied, it may be appropriate to invest in a small-scale burning unit to handle these wastes or subsidize the transportation of ITW to waste incinerators in other locations.

6) Improved Record Keeping Procedures at Ports

Through our survey of ports, we found that information such as the number of dockings, the number of requests to off-load ITW and the weight of the waste disposed is not known at many sites. The exchange of information between the harbour master, Agriculture Canada inspector, shipping agents, waste haulers and incinerator operators is not always very complete.

Some sort of reporting mechanism where all vital data regarding the collection, transportation and disposal of ITW are recorded and stored in a regional or central data base would be very helpful in addressing this issue in the future.

7) Develop Economic Incentives to Encourage Ships to Off-Load Wastes at Port Facilities

If it is cheaper to dump waste at sea, some ships will always chose that option of waste management. One possible method of encouraging ships to bring their waste into a port is to charge them a flat fee for waste disposal at the dock side, whether they use the service or not. For example, a ship could be

charged a fee for waste disposal based on the size of the crew or on the size of the ship, regardless of whether or not they off-load waste. Where federally-funded incinerators (or even municipally- or provincially-funded incinerators) exist near ports, cooperative arrangements should be worked out so that ITW can be burned at these facilities. This approach will not greatly increase ITW handling opportunities, however, because most ports receiving significant quantities of ITW are already using nearby solid waste incinerators where available.

If a ship had already dumped its waste, it would be paying anyway for a waste management service it wasn't using. Any excess funds collected through flat fees and not spent on ITW handling could be used to develop recycling and waste reduction programs and/or a rebate or lower fee could be offered to ships separating out recyclable wastes for recovery at ports.

8) Improve the Waste Handling Procedures of All Canadian Vessels

Part of a national strategy for improved handling of international waste at sea and in ports is to ensure, to the best of your ability, that Canadian vessels whether private, Coast Guard or Navy are complying with existing and pending (MARPOL) procedures. Implementing MARPOL procedures will require the following changes on board ships (as identified by the IMO):

On-board waste handling methods should allow for separate bins for three different types of solid waste:

1. Plastics and plastics mixed with non-plastic garbage.
2. Food waste and other wastes contaminated by food wastes.
3. Other non-food waste which can be disposed of at sea.

Suggested procedures may also allow the combining of food waste with other non-floating waste, and keep floatable waste in its own bin to be stored until it can be unloaded in port.

Ships complying with the MARPOL regulations will also need some type(s) of on-board waste processing, including size-reduction for waste materials to be dumped at sea, compaction for materials to be delivered to shore, and possibly an incinerator for burning waste while at sea.

The opportunities for increased research into improved waste handling, such as designing or retrofitting storage spaces on ships for plastics or recyclables, will be enhanced by establishing a working relationship with other federal agencies and private parties regarding waste disposal.

APPENDIX A

Airport Survey Summary

St. John's Airport, Newfoundland

Contact:

Dr. P. Robichaud, Agriculture Canada, (902) 772-5100

Collection and Handling of ITW

- ITW is collected in orange plastic bags by cabin groomers and placed in 10 cubic yard containers which are collected approximately twice per week by Harvey's Industrial Disposal. Harvey's Disposal takes the waste to a fenced compound where it is stored until they have three full bins.

Disposal

- The waste is transported approximately 75 km to the municipal incinerator at Carbonear. There is no tipping fee charged at the incinerator.

Waste Generation

- In 1989 it is estimated that 70 tonnes of ITW were collected and incinerated. The 1990 tonnages to date is estimated at 35 tonnes.

Volume of International Air Traffic

- St. John's handles an average of about 20 international flights per week. This includes a number of military, private and Air Canada flights.

Gander International Airport, Newfoundland

Contact

Dr. P. Robichaud, Agriculture Canada, (902) 772-5100

Collection and Handling of ITW

- ITW is collected from the aircraft by three ground service companies. Waste is put into 10 cubic yard containers and is collected about once a day.
- Agriculture Canada has just approved an aluminum can recycling program for the international waiting lounge in the terminal building. It is too early in the program to obtain recovery results.

Disposal

- ITW is incinerated on site at an Agriculture Canada facility. Approval has just been given to test a sterilization unit.

Waste Generation

- In 1989 it is estimated that 250 tonnes of ITW was incinerated. The 1990 tonnages to date are approximately 125 tonnes.

Volume of International Air Traffic

- Gander averages about 20 flights a day, mainly Cubana Airlines, Aeroflot and military aircraft.

Halifax International Airport, Nova Scotia

Contact

Dr. Chew, Agriculture Canada, (902) 426-2125
Roy Lyon, Canadian Airlines, (902) 427-5153

Collection and Handling of ITW

- ITW from the aircraft cabins is collected by Hudson General and from flight kitchens by D.P. Waste, a division of Pacific Incinerator.
- Canadian Airlines started a metal can recycling program on August 1st. However, the number of cans from international flights has not yet been determined.

Disposal

- D.P. operates an incinerator on-site.

Waste Generation

- 1989 tonnages about 22 tonnes
- 1990 tonnages to date about 25 tonnes

Volume of International Air Traffic

- The number of international flights is not known, although a few Air Canada, KLM and Canadian flights are handled. Halifax is a transit location for KLM's flights to Ottawa, which do not unload ITW in Halifax.

Sydney Airport, Nova Scotia

Contact

Francis Whelan, Airport Manager, (902) 564-7720
Tom McNeil, Engineer County of Cape Breton, (902) 563-2700

Collection and Handling of ITW

- No requests to unload ITW were recorded for 1989 or 1990.

Disposal

- If ITW is to be unloaded, the ground servicing company would segregate it and arrange for a bin to be placed at the airport. The waste would then be sent to the county incinerator.

Volume of International Air Traffic

- The international flights that arrive are usually from the island of St. Pierre-Miquelon and do not actually unload waste.

Sept Isle Airport, Quebec

Contact

Alain Bastarache, Airport Manager, (418) 962-8211
Jean-Eve LaRouche, Canada Customs, (418) 962-2632

Collection and Handling of ITW

- Customs ensures that all ITW remains on the aircraft. Most international flights are private business jets that land for refueling.

Volume of International Air Traffic

- Airport is limited to flights with 15 people or less.

Quebec City, Quebec

Contact

Dr. Martineau, Agriculture Canada, (418) 648-7373

Collection and Handling of ITW

- ITW is collected by the ground service companies.

Disposal

- The waste is taken to an incinerator in Beauport which is operated by Services Sanitation DuLac. Wastes are taken to incinerator about three times per week in the winter and two times per week in the summer.

Waste Generation

- In 1989, approximately 114 tonnes of ITW were incinerated. In 1990 to date approximately 96 tonnes have been incinerated.

Volume of International Air Traffic

- The number of international flights in 1989 was 338 and the number of international flights in 1990 to date is 208. It is not known how many of these flights unloaded ITW at the airport.

Dorval International, Quebec

Contact

Gilles Massey, Transport Canada, (514) 633-3351

Collection and Handling of ITW

- All waste generated at the airport is taken to a municipal incinerator by Laidlaw Waste Systems. Tenders for a new collection contract are being called for November 1st.

Disposal

- Since U.S. waste need no longer be incinerated, it is expected that waste generated at the airport will be landfilled. It is not known how ITW will be handled at Dorval if it is received.

Volume of International Air Traffic

- The majority of flights into Dorval are either domestic or transborder. There are no scheduled international flights into Dorval, and only a few international charters. International flights fly into Mirabel, located about 60 km to the north.

Mirabel International, Quebec

Contact

Michel Labrosse, Agriculture Canada, (514) 476-3275
Mr. J. Haynes, Haycot Services Inc., (514) 476-0665
Claude Benoit, Concordia Disposal Services, (514) 435-2627
Gilles Minville, Transport Canada, (514) 476-3152

Collection and Handling of ITW

- All wastes unloaded at Mirabel are considered international. Haycot Services cleans all the aircraft of cabin wastes. All non-airside waste is handled by Cara or Caterair. Concordia provides a collection service for all generators.
- A flat fee is charged to all flights that land at Mirabel. This fee is not dependent on the size of the aircraft whether it unloads ITW or not.

Disposal

- ITW is taken to the City of Montreal Incinerator from September to June and to a Quebec City incinerator in July and August when the Montreal facility is closed.

Waste Generation

- The 1989, 616 tonnes of ITW were unloaded. To date in 1990, 290 tonnes have been handled. Generally, the high volume periods for this airport are summer flights to Europe and winter flights to the Carribean.

Ottawa International, Ontario

Contact

Dr. Georgeson, Agriculture Canada, (613) 998-8784
Patrick Saggee, Decom Wastes, (819) 568-0838
Jim Ducette, Hudson General, (613) 521-4730

Collection and Handling of ITW

- ITW is collected airside by Hudson General. ITW is stored in 0.5 cubic yard boxes with plastic liners.

Disposal

- Collection and incineration is operated by Decom in Gatineau, Quebec.

Waste Generation

- The 1989 estimate for ITW at Ottawa is 9 tonnes. The estimate for 1990 to date is 5 tonnes.

Volume of International Air Traffic

- There are two KLM flights per week to Europe. Canadian flies some charters south during the winter. Air Canada is planning a schedule change for October and this may add some international flights.

Lester B. Pearson International, Ontario

Contact

George Curley Canadian Airlines Toronto
Derek Wilson, Consultant, Tech. Sub Committee (416) 223-5585
Malcolm Metcalfe, Canadian Airlines (604) 270-5001
Joe Santos Cara Airline Services (416) 676-2620

Collection and Handling of ITW

- The airlines either have their own employees clean the aircraft or contract out for this service to companies like Hudson General. Commissary and food services are either handled by the airline or more usually contracted out to Cara or Caterair. All airside waste is hauled by BFI. All galley ITW is hauled by individual companies (WMI) and taken to BFI transfer station by Terminal One. The costs are split among the airlines and are based on the percentage of international passengers arrive; therefore Air Canada and Canadian pay the highest percentage. The costs have decreased from as high as \$1,000/tonne, to \$500/tonne to their current level of approx. \$300/tonne. Aluminum and steel can recycling programs are operating at the Air Canada and Canadian commissaries. To date over 12.4 tonnes of cans have been recycled, however, the split between international and domestic cans has not been determined.

Disposal

- All ITW is moved to Fort Knox, shredded and compacted in trucks for disposal at Occidental in Buffalo, New York. The tipping fee at Occidental is \$150/ton (\$165/tonne) U.S.
- The airlines are given 3 month permits by the U.S. Department of Agriculture to transport and incinerate ITW in Buffalo.
- There is a technical subcommittee of the Airline Consultative Committee that is looking at the handling of international and domestic transportation wastes. The technical committee has commissioned a study to test an new plasma-arc process for the destruction of ITW.

Waste Generation

- Pearson handled 6307 tonnes of ITW in 1989. They handled 5115 tonnes in the first six months of 1990.

Volume of International Air Traffic

- Pearson handled 117,000 transborder and 21,000 international flights in 1989.

Hamilton Airport, Ontario

Contact

Dr. Hurley, Agriculture Canada, (416) 572-2343
Brad Mandryk, Laidlaw Waste Systems, (416) 523-1362

Collection and Handling of ITW

- Leak-proof containers are provided to ground service staff by Laidlaw but the collection is contracted out to Green River Disposal.

Disposal

- Incineration takes place at Laidlaw operated SWARU facility in Hamilton.

Waste Generation

- The 1989 estimate for ITW handled at Hamilton airport is 15 tonnes. There has been no ITW unloaded to date in 1990.

Volume of International Air Traffic

- International flights are now almost non-existent since the Agriculture Canada ruling on U.S. transborder waste.

Winnipeg International, Manitoba

Contact

Dr. Kevin Miller, Agriculture Canada, (204) 983-8628

Collection and Handling of ITW

- ITW is collected airside by Cara and Air Canada.
- Cara is operating an aluminum can recycling program for Canadian Airlines. No recovery figures from these programs, which started in August, are available.

Disposal

- All ITW that is collected is taken to the incinerator operated by Cara on site. Cara charges \$5 per orange bag of ITW.

Waste Generation

- In 1989 it is estimated that 102 tonnes of ITW were incinerated. To date in 1990, 40 tonnes of ITW have been incinerated.

Volume of International Air Traffic

- In 1989, Winnipeg handled 5382 transborder and 213 international flights. The number of flights in 1990 to date is 2013 transborder and 117 international. The number of ITW unloadings is not known.

Calgary International, Alberta

Contact

Dr. R. Jones, Agriculture Canada
Harold Hippe, Caterair Services
Frank Cress, Cara Airlines Services

Collection and Handling of ITW

- Caterair collect their own galley and cabin wastes.
- Cara collects their own galley and cabin wastes. They own and operate their own incinerator.
- Both Cara and Caterair are operating aluminum can recycling programs for Canadian, however tonnages are not known since the program just started in August.

Disposal

- ITW is currently being sent to the incinerator operated by the Calgary Humane Society.

Waste Generation

- On average, the Humane Society handles about 0.8 tonnes each month. Cara incinerates approximately 0.9 tonnes each month.

Volume of International Air Traffic

- The airport averages about 17 international flights per week and about 29 transborder flights per week.

Edmonton International, Alberta

Contact

Dr. Lamoureux, Agriculture Canada, (430) 495-3063
Eldon Cuss, Cara Airline Services, (403) 890-4440

Collection and Handling of ITW

- All ITW is collected and incinerated at a facility operated by Cara.

Disposal

- All ITW is collected and incinerated at a facility operated by Cara.

Waste Generation

- Approximately 400 lbs per week are generated in the summer and 150 lbs. per week are generated in the winter.

Volume of International Air Traffic

- Edmonton handled 3,750 transborder and 1,300 international flights in 1989.

Vancouver International, British Columbia

Contact

Paul Belange, Canadian Airlines, (604) 270-5064
Malcolm Metcalfe, Canadian Airlines, (604) 270-5001
Manager at Cara Airline Services, (604) 278-9144
Alan Price, Pacific Incineration, (604) 254-2446

Collection and Handling of ITW

- All airside and cabin ITW is collected and incinerated by Canadian at their on-site incinerator. Cara handles a limited amount of galley ITW from Air Canada, British Airways, KLM and Singapore airlines. Steels aviation also handles small amounts from their galley services.

Disposal

- Canadian is scheduled to upgrade their on-site incinerator within the next few months. Both Cara and Steels take their ITW to Pacific Incineration at the Vancouver Harbour.

Waste Generation

- The 1989 tonnages for ITW are 3,100 tonnes. The 1990 estimates to date are 1,500 tonnes.

Volume of International Air Traffic

- Vancouver handled 45,000 transborder and 6,700 international flights in 1989.

APPENDIX B

Port Survey Summary

St. John's, Newfoundland

Contact:

Dr. P. Robichaud, Agriculture Canada, (709) 772-5540
David Fox, St. John's Port Corporation, (709) 772-4664

Collection and Handling of ITW

- Ships are requested to store all ITW on-board if the ship is in port for a short period of time. A shipping agent arranges for the collection of waste from ships that have been approved for unloading. The cost for this service is a \$350 flat fee.
- Local recycling in the City includes metal cans and corrugated cardboard.

Disposal

- Waste is taken to the Town of Carbonear's incinerator approximately 75 km from the port.

Waste Generation

- The amount of ITW averages about 25 tonnes annually. Most ITW is unloaded in Montreal.
- The most common requests for unloading ITW come from Soviet vessels in port for a lay-over and from foreign trawlers staying for about three weeks as a recreational stop. Six cruise ships have unloaded to date in 1990.
- The amount of ITW received is expected to increase due to the recent Canadian government announcement to allow oil exploration in Hibernia. Port authorities expect an increase in international vessels servicing exploration operations.

Volume of International Shipping

- There are about 475 total dockings per year, and about 170 of these are foreign.
- Approximately 50-60 ships unload ITW on an annual basis.

Lewisporte, Newfoundland

Contact:

Dr. P. Robichaud, Agriculture Canada, (709) 772-5540

Collection and Handling of ITW

- No ports of entry in Newfoundland, except St. John's, are capable of handling ITW. There is quite a bit of vessel traffic at other ports, like Lewisporte, however, they have no facilities or handling protocols for the unloading ITW.

Sydney, Nova Scotia

Contact:

Larry McIntosh, (waste hauler), (902) 562-5762
Tom McNeil, Cape Breton County Incinerator, (902) 563-2700

Collection and Handling of ITW

- Collection and disposal is arranged through a shipping agent. Haulers typically use 40 cubic yard bins. Haulers collect fees from the agent and the agent collects from the ship.

Disposal

- A flat fee of \$400 is charged by the County for disposal at their incinerator.

Waste Generation

- The estimated tonnage for 1989 was 8 tonnes and for 1990 to date is 19 tonnes.

Volume of International Shipping

- In 1989, 3 loads consisting of three 40 cubic yard bins were handled, all from cruise ships. In 1990 to date, 4 loads of seven 40 cubic yard bins were made, again, all from cruise ships.

Halifax, Nova Scotia

Contact:

Dr. Chew, Agriculture Canada, (902) 426-2125

Collection and Handling of ITW

- There are two agencies involved in the collection of ITW. D.P. Waste and International Disposal Services collect the waste from a number of sites around the port.

Disposal

- The waste is taken to the Halifax International Airport incinerator that is operated by D.P. Waste.

Waste Generation

- The 1989 tonnage of ITW is estimated at 104 tonnes. To date in 1990, 155 tonnes have been handled.

Volume of International Shipping

- In 1989, 817 international dockings were handled. To date in 1990, 412 international ships have docked. Not all of these ships that docked unloaded ITW. The port handles approximately 50-60 cruise ships each year.

Charlottetown, PEI

Contact:

Dr. Craig Bellamy, Agriculture Canada (902) 566-7621
Paul McGonnell, Port Manager (902) 566-7974

Collection and Handling of ITW

- Few vessels request solid waste unloading, ITW or otherwise, because of the time and expense. The docks in the harbour are not long, and so the ships extend out into the harbour and waste cannot be lowered directly onto a dock. A barge with a crane must be hired to remove the waste bins from the vessels onto a barge for transport to the dock. The cost for waste hauling and incineration is about \$40 per dumpster, as provided by a local hauling firm. Requests to unload waste, international or otherwise, are usually limited to ships that remain in port for long periods of time.
- Some recyclable wastes are collected locally in curbside pick-up programs for residents, indicating that local markets for recyclables exist.

Disposal

- Most waste is incinerated regardless of origin. ITW is taken to a local solid waste incinerator that has been operating since about 1982.

Waste Generation

- Estimated ITW quantities were about 50 cubic yards four years ago, about 100 cubic yards in 1989, and an expected 200 cubic yards in 1990.

Volume of International Shipping

- Tankers bringing fossil fuels to PEI comprise the greatest number of dockings. These vessels do not generally request unloading of their domestic solid waste. The majority of cruise ships docking are registered in Nassau, but the passengers, crew, and voyage origin are Canadian and U.S., and solid waste unloading is rarely requested. Vessels docking after overseas voyages are generally involved in exporting potatoes and importing fertilizer, and these vessels rarely request waste unloading.

Saint John, New Brunswick

Contact:

Dr. Joseph Ansong-Danquah, Agriculture Canada, (506) 636-4987
Gill Perry, Dominion Refuse Collectors, (506) 633-8986

Collection and Handling of ITW

- The majority of waste is received in large bins containing about 35 cubic yards. One vessel may sometimes fill two or three of these bins. Remaining waste is collected in small bins that are about 6 cubic yards each.

Disposal

- ITW unloading is overseen by Dr. Ansong-Danquah. Since there are no local incineration opportunities for large quantities of solid waste, the ITW is taken by a local waste hauler to a provincial dump site, and burned under Agriculture Canada supervision. The flat fee cost for this service is approximately \$350. Problem materials such as loads rich in meat are taken to a local hospital for incineration rather than burned openly at the dump site.

Waste Generation

Approximately 60 tonnes of ITW in 1989.

Volume of International Shipping

- About 400 vessels dock annually, and the number of ITW hauling events has ranged from 9 to 29 per year during the period 1986 through 1990.
- ITW unloading requests come from cruise vessels, the U.S. Navy (2-3 times per year), and from Cuban cargo ships (3-5 times per year). In general, no vessel requests unloading of waste unless it is docked for more than two days.

Quebec City, Quebec

Contact:

Dr. Martineau, Agriculture Canada, (418) 648 -7373
Jean-Claude Michaud, Harbour Master, (418) 648-4160

Collection and Handling of ITW

- There are 25 (6 cubic yard) containers used at the port which are supervised by the Port of Quebec. Waste is currently collected by Services Sanitation DuLac. The bins are collected 3 times per week in the summer and 2 times per week in the winter.

Disposal

- Wastes are transported to the Quebec Incinerator at Beauport. A second incinerator located on south shore in St. David has also been used on occasion.

Waste Generation

- In 1989, 399 international dockings disposed of 210.5 tonnes. In 1990 (up until August), 228 international ships disposed of 162.5 tonnes.

Volume of International Shipping

- There are approximately 50 international cruise ships that dock at the harbour each year

Matane, Quebec

Contact:

Dr. Martel Jean Louis, Agriculture Canada, (418) 722-3032

Collection and Handling of ITW

- No ITW is unloaded at Matane. There has not been a foreign ship in the last two years. There has been no long-term docking in the last 25 years. Of the 12 domestic tanker dockings per year, the maximum stay is four or five days, and unloading of solid waste has never been requested. Two daily local ferries cross the St. Lawrence Seaway (one for cars and one for trains) and dock in Matane. Domestic solid waste is collected from these ferries by a local private hauling firm.
- Port authorities suggested that Gaspé handles a greater number of foreign vessel dockings.

Montreal, Quebec

Contact:

Edmond Jones, Agriculture Canada, (514) 283-6346

Collection and Handling of ITW

- Little detail on collection and handling practices was provided.

Disposal

- ITW is taken to the City of Montreal's incinerator. The current tipping fee at the incinerator is \$49.50 per tonne.

Waste Generation

- Over 750 tonnes of ITW is unloaded yearly.

Volume of International Shipping

- Approximately 1500 ships per year.

Hamilton, Ontario

Contact:

Dr. P. Hurley, Agriculture Canada (416) 572-2343
Brad Mandryk, Laidlaw Waste Systems (416) 523-1362

Collection and Handling of ITW

- All ITW is suppose to be checked at Montreal, however, this does not always happen. Waste that does make it as far as Hamilton is stored on board in 45 gallon drums with lids on deck. These are transferred to 6 cubic yard containers that are provided by Laidlaw when needed.

Disposal

- All ITW from harbour is taken to SWARU incinerator operated by Laidlaw (formerly Tricil). The tipping fee at the facility is \$110 per tonne.

Waste Generation

- Less than 5 tonnes of ITW per year.

Volume of International Shipping

- In 1989 there were 150 international dockings and in 1990 to date there have been 76 dockings.

Victoria, British Columbia

Contact:

David Featherby, Harbour Master, (604) 388-3578
Paul Ridout, King Bros. Ltd. (port vendor), (604) 384-1174
John Beute & Dave Lindley, Laidlaw Waste Systems, (604) 656-0951

Collection and Handling of ITW

- Vessels in dry dock are usually there for one to two weeks, and these vessels are most commonly the source of the ITW unloaded.

Disposal

- ITW is taken to a solid waste incinerator about 72 km north in Cowichan, British Columbia. The cost for incineration is about \$175 per tonne; after transportation costs are included, the cost for handling ITW is \$700 to \$1,250 per ton. Shippers pay the port vendor and the port vendor pays the hauler.

Waste Generation

In the past, Victoria has handled about 300 tonnes per year of ITW. With changes to regulations, this will probably drop to about 50 tonnes per year primarily from foreign vessels in dry dock.

- Each cruise ship leaves anywhere from a partial bin to three 40-cubic-yard bins of waste.

Volume of International Shipping

- About 35 to 40 cruise vessels visit the port each year. Cruise ships arrive between May and October, while the wood products vessels operate year round. Most of this waste will now be classified as domestic because it comes from the U.S. Only one or two of the roughly 40 cruise ship visits will require ITW waste handling.

Powell River, British Columbia

Contact:

Ann Tait, Powell River Shipping Service Ltd., (604) 485-6866
Steve Mercer, MacMillan Bloedel, (604) 483-3722

Collection and Handling of ITW

- Permission to discharge ITW was granted only once in the past 10 years. About one ton of waste was unloaded in 1990 because the Vancouver incinerator was not able to handle it. Customs supervised the unloading, and the waste was trucked to an incinerator.

Waste Generation

- Although most U.S. tugs dispose of their waste at sea or in their home ports of Portland, Oregon or Seattle, Washington, it is possible that some of their waste ends up on the bins located on the wharf to receive mill waste.

Volume of International Shipping

- About 135 U.S. registered tugs and 75 freighters visit the port annually.

Vancouver, British Columbia

Contact:

Kent Setterholt, Agriculture Canada, (604) 666-0842
Alan Price, Pacific Incinerator, (604) 254-2446

Disposal

- Since their permit for a floating incinerator has been revoked, Pacific had been shipping waste to a company call Aggassi. This arrangement has just recently been terminated due to dissatisfaction with Aggassi.

Waste Generation

- Pacific Incinerator handles about 500 tonnes per year. They estimate that they service about 20% of the ships in the port.

Volume of International Shipping

- Approximately 800 vessels per year.

Campbell River, British Columbia

Contact:

Captain Clapp, Former Harbour Master, Home (604) 287-9635
Nicki Johnson, local Shipping Agent (604) 287-7434
Rosalynn Curnow, Laidlaw Waste Systems (604) 286-6311

Collection and Handling of ITW

- Ships from overseas do not unload ITW in Campbell River because it has to be trucked to Duncan, B.C. for incineration and the cost is prohibitive. In the past two years, there have been no ITW unloading events.

Waste Generation

- Only one ship requests unloading of large quantities of domestic (U.S.) waste. The Thorseggen, sailing from San Francisco, usually docks after about four days at sea.

Volume of International Shipping

- Most of the small vessel traffic in Campbell is comprised of fishing boats (seiners, gill netters, and trawlers) and pleasure boats, almost none of which come from overseas.
- The large vessel traffic occurs at Discovery Terminals where about 130 ships docking per year are related to exporting wood products from the local Fletcher Challenge company and 12 to 14 additional dockings load materials for the local Westmin Mines Ltd. ore company.

Cornwallis Island, Northwest Territories

Contact:

Martin Bergmann, Dept. Fisheries and Oceans Freshwater Institute, year-round office in Winnipeg (204) 983-3776; temporary office in Resolute Bay on Cornwallis Island (819) 252-3785.

Collection and Handling of ITW

- No solid waste is unloaded, international or otherwise. Cornwallis Island has problems dealing with domestic solid waste because burial is not possible in permafrost that reaches a depth of 250 metres.

Disposal

- No changes are expected in the number of vessel dockings or in the amount of solid waste unloaded. The ice makes nearby ocean passages dangerous even during the two months per year when the waters are unfrozen.

Waste Generation

- Essentially no ITW is handled at the port.

Volume of International Shipping

- There are only about three vessel dockings per year in Resolute Bay, including two for fuel delivery and one for general supplies delivery, although other vessels anchor in the harbour.
- Once every several years, a cruise vessel with Liberian registration visits the harbour.

APPENDIX C

SUMMARY of MARPOL 73/78
Annex V

SUMMARY OF MARPOL 73/78, ANNEX V

Background

The *International Convention for the Prevention of Pollution from Ships* contains a set of regulations titled "Annex V, Regulations for the Prevention of Pollution by Garbage from Ships." These regulations are enforceable on a nation-by-nation basis as individual countries ratify Annex V and begin implementing these regulations.

The regulations offer the following definition for garbage:

"Garbage means all kinds of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the ship and liable to be disposed of continuously or periodically except those substances which are defined or listed in other Annexes to the present Convention."

Summary of Annex V Ocean Disposal Regulations

Annex V Regulation 3 spells out prohibited and allowable ocean disposal practices, including:

"(1) Subject to the provisions... of this Annex:

- (a) the disposal into the sea of all plastics, including but not limited to synthetic ropes, synthetic fishing nets and plastic garbage bags is prohibited;
- (b) the disposal into the sea of the following garbage shall be made as far as practicable from the nearest land but in any case is prohibited if the distance from the nearest land is less than:
 - (i) 25 nautical miles for dunnage, lining and packing materials which will float;
 - (ii) 12 nautical miles for food waste and all other garbage including paper products, rages, glass, metal, bottles, crockery and similar refuse;
- (c) disposal into the sea of garbage specified in sub-paragraph (b) (ii) of this regulation may be permitted when it has passed through a comminuter or grinder and made as far as practicable from the nearest land but in any case is prohibited if the distance from the nearest land is less than 3 nautical miles. Such comminuted or

ground garbage shall be capable of passing through a screen with openings no greater than 25 millimetres.

(2) When the garbage is mixed with other discharges having different disposal or discharge requirements the more stringent requirements shall apply."

Other Issues Addressed in Annex V

Annex V spells out several areas including the Baltic Sea, the Black Sea, the Red Sea, and the Gulfs Area which are referred to as "Special Areas" and where waste disposal regulations are more stringent.