Pacific Ocean Pollution Prevention Programme

Improving Ships' Waste Management in Pacific Islands Ports

"For Cleaner Seas in the Pacific Islands Region"

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FOREWORD

As island states located within the world's largest ocean, the member countries and territories of SPREP are overwhelmingly dependent on shipping. Despite the benefits and necessity of shipping, this human use of the ocean can also cause a range of sometimes-severe environmental impacts. Such impacts include (but are not restricted to): introduced marine species; marine spills (oil and other hazardous materials); discharge of ships' waste (oil, sewage and garbage); and impacts from the development and operation of ports.

The Pacific is particularly susceptible to shipping impacts and currently there is a lack of regional and national capacity to address these issues. In direct recognition of this situation, SPREP has developed and is implementing the Pacific Ocean Pollution Prevention Programme (PACPOL).

PACPOL's aim is to maintain, protect and enhance the quality of coastal and marine environments in the Pacific islands region by minimising ship-sourced marine pollution. PACPOL seeks to achieve this aim through, amongst other things, assisting Pacific island countries to become members of the International Maritime Organization (IMO) and implement IMO conventions.

At the 10th SPREP Meeting in Samoa, 1998, SPREP members approved PACPOL's 1999-2004 Strategy and Workplan. The strategy is a result of the recognition by SPREP and IMO of the importance of managing shipping-related marine pollution within the region.

PACPOL is undertaking activities in four focal areas:

- Marine spills;
- Ships' waste management;
- Port operations; and
- Invasive marine species.

One of PACPOL's main activities during the first two years of implementation was to review ships' waste reception facilities and the management of these facilities within the Pacific region. This important activity was made possible funding assistance provided by IMO.

A team of Perth-based URS Consultants and SPREP's Marine Pollution Adviser were involved in the review. The review covered all Pacific island countries and territories with the exception of Tokelau because of the logistical difficulties of getting there. However, Tokelau is being addressed through a separate initiative.

The Review has a number of key findings:

- All countries and territories in the region have both international and domestic shipping calling into their ports;
- That there are two types of ports in the region. There are a number of commercial ports, run by Port Authorities, but the majority of ports are social service ports, run or subsidised by government, primarily for the import of goods and supplies for their country;
- The only ports that currently have adequate ships' waste reception facilities under MARPOL are Guam, Tahiti and Noumea, with Suva and Port Moresby meeting most criteria and with the potential to improve facilities to meet MARPOL requirements.
- None of the five Pacific Island Countries (PICs) currently party to "*The International Convention for the Prevention of Pollution from Ships"* (MARPOL) meet its requirement to provide adequate ships' waste reception facilities.33
- The obligation under MARPOL to provide adequate ships' waste reception facilities was a major impediment to adoption of MARPOL and the reason why many PICs have not yet ratified MARPOL.
- Most PICs, in particular the smaller countries, currently struggle to manage their domestic waste. It is unreasonable to expect them to manage ships' waste generated from international

shipping. In these cases, even if ships' waste reception facilities were adequate, the final disposal of the waste is often environmentally inadequate.

- Most international shipping in the region, when taking into account their routes and duration of voyage, would be able to store wastes until making landfall at regional commercial ports or commercial ports outside the region.

The review makes recommendations at the national, regional and international level for improving the management of ships' waste in the region. The recommendations outline specific actions for key stakeholders at all three levels:

- Regulators – national/territorial governments, SPREP and the IMO;
- Asset owners – national/territorial governments and the ports authorities
- Users – shipping companies, vessel owners/operators, fishing vessels, recreational vessels.

The Review also contains examples of how other countries and regions have addressed the issue to assist us in formulating our own strategies within the region. We hope that all stakeholders within the region with responsibility for the management of ships' waste will use this document to assist them to understand what their responsibilities are and as a guide on how they can more effectively manage their ship generated waste.

Tamari'i Tutangata
Director, SPREP

EXECUTIVE SUMMARY

Background

This report is the first stage in the development of a comprehensive strategy for the management of ship-generated waste in the Pacific islands region. The strategy is to be coordinated by the South Pacific Regional Environment Programme (SPREP). This report:

- presents the findings of an assessment of the current situation with regards to reception and management of ship-generated waste in Pacific island ports; and
- makes recommendations for strategies to improve these arrangements.

Waste management is a major issue for Pacific island states. For many reasons, including lack of technical expertise, land availability and cultural factors, waste is often not managed in an environmentally acceptable manner. This report addresses one component of the larger overall problem of waste management in the Pacific islands region, by concentrating on the management of the ship-generated component of the total waste stream. It is recognised, however, that advances in the management of ship-generated waste can only be accomplished in concert with improvements in the overall management of wastes in the region.

SPREP, with support from the International Maritime Organization (IMO), has established the Pacific Ocean Pollution Prevention Programme (PACPOL). The principal purpose of PACPOL is to develop and implement a comprehensive package of measures to address marine pollution, in particular pollution from shipping, throughout the Pacific islands region.

PACPOL Project SW 1, the Review of Ships' Waste Reception Facilities in Pacific Island Ports, is a key component of the programme. The overall aim of this three-stage project is to:

> *Improve the protection of coastal and marine environments in the Pacific islands region, by developing a regionally coordinated, long-term strategy for the provision of adequate ships' waste reception facilities in each Pacific island country and territory, as appropriate.*

The key tasks of PACPOL SW1 are:

- review existing waste reception practices and capacity in Pacific island ports (Output One); and
- develop appropriate and in some cases innovative strategies to optimise waste reception and management capacity wherever practicable and affordable (Output Two); then
- provide suitable technical assistance to develop optimum ships' waste management arrangements (Output Three).

Methodology

This report represents Outputs One and Two of PACPOL SW1. Compilation of this report involved: literature searches; contact with administrators, regulators, operators and clients of ship-waste reception facilities in the Pacific islands region; and a field survey of around 30 ports, boat harbours and marinas in 18 Pacific island nations and territories. The field surveys were undertaken over the period of October to November 2000 and January to March 2002.

The categories of waste assessed were consistent with those controlled by the IMO in MARPOL 73/78. These are oily wastes, sewage and garbage (including quarantine and recyclable materials). MARPOL 73/78 discharge regulations for oil, sewage and garbage are summarised in Table ES1.

Table ES1: Synopsis of MARPOL 73/78 Pollutant Discharge Regulations (Annexes I, IV and V)

Waste Type	Disposal Outside Special Areas	Disposal Within Special Areas
Oily Wastes (Annex I)		
Oil or oily mixture originating from cargo or cargo handling areas in oil tankers of 150 GRT or greater.	Prohibited, except when: the ship is underway; the ship is > 50 nautical miles from nearest land; instantaneous rate of discharge of oil does not exceed 30 L per nautical mile; total quantity of oil discharged does not exceed 1/30,000 of the quantity of cargo being carried; ship has appropriate oil pollution control equipment (e.g. filters, alarm, automatic shut-off, slop tank).	Disposal prohibited.
Oil or oily mixture from ships of 400 GRT and above or oil tankers of 150 GRT or greater (except from cargo and cargo-handling areas).	Disposal prohibited, except when: the ship is underway; oil content of the effluent before dilution does not exceed 15 ppm; ship has appropriate oil pollution control equipment (e.g. filters, alarm, automatic shut-off).	Disposal prohibited, except for processed bilge water when: (in the case of oil tankers) bilge water does not originate from cargo areas or is mixed with oil cargo residues; the ship is underway; oil content of the effluent before dilution does not exceed 15 ppm; ship has appropriate oil pollution control equipment (e.g. filters, alarm, automatic shut-off).
Oil or oily mixture from ships of less than 400 GRT, excluding oil tankers.	Disposal is discouraged and prohibited except when oil content of the effluent before dilution does not exceed 15 ppm.	Disposal prohibited, except when oil content of the effluent before dilution does not exceed 15 ppm.
Oil sludge (from holding tanks).	Disposal prohibited.	Disposal prohibited.
Oily rags, used oil filters and similar.	Disposal prohibited.	Disposal prohibited.
Sewage (Annex IV) [not yet in force]		
Comminuted and disinfected sewage from ships of 200 GRT, or less if certified to carry more than 10 persons.	Disposal prohibited except when ship is: > 4 nautical miles from nearest land; underway at a speed not less than 4 knots.	NB: Special Areas have no application under Annex IV.
Sewage which is not comminuted or disinfected from ships of 200 GRT, or less if certified to carry more than 10 persons.	Disposal prohibited except when ship is: 12 nautical miles from nearest land; underway at a speed not less than 4 knots.	n/a
Treated sewage (in an IMO approved sewage treatment plant).	Nil restrictions.	n/a
Garbage (Annex V)		

Waste Type	Disposal Outside Special Areas	Disposal Within Special Areas
Plastics.	Disposal prohibited	Disposal prohibited
Floating dunnage, lining and packing materials.	> 25 nautical miles from nearest land.	Disposal prohibited.
Paper, rags, glass, metal, bottles, crockery and similar refuse.	> 12 nautical miles from nearest land.	Disposal prohibited.
All other garbage including paper, rags, glass, etc. comminuted or ground.	> 3 nautical miles from nearest land.	Disposal prohibited.
Food waste not comminuted or ground.	> 12 nautical miles from nearest land.	> 12 nautical miles from nearest land.
Food waste comminuted or ground.	> 3 nautical miles from nearest land	> 12 nautical miles from nearest land.
Mixed refuse.	Determined by the most stringent conditions applying to any single component of the mixture.	Disposal prohibited.
Toxic or noxious materials.	Disposal prohibited.	Disposal prohibited.

Categories of ships' waste identified as having primary importance to marine and coastal environmental protection in the Pacific region are oily wastes and garbage. Sewage was considered only where vessel-sourced discharges contributed to a degradation of harbour water quality, or had a significant potential to do so. Noxious bulk cargoes and harmful packaged goods, which are also controlled by MARPOL 73/78, were also assessed in an incidental manner, noting that cargoes of these sorts are not a major feature of trade in the Pacific islands region.

Effective management of ship-generated waste has a number of cardinal features. These are:

- a comprehensive and compatible framework of international and national laws and regulations;
- an effective compliance inspection and enforcement regime;
- the provision of waste reception facilities in ports, harbours and marinas which are capable of accepting all types and quantities of waste likely to be generated by vessels normally calling there, and the capability to accept such wastes in an environmentally sound manner without causing undue delay to vessels;
- a suitable cost-structure and pricing regime for port waste reception services which does not act as a disincentive to proper waste disposal; and
- the ultimate recycling, reuse or disposal of wastes collected from ships in an environmentally acceptable manner.

Field Survey Findings

The field surveys revealed that there is great variability in the ability of the ports within the region to handle vessel-sourced waste. These range from a handful of ports (Apra, Guam; Papeete, French Polynesia; Noumea, New Caledonia) that can properly deal with the entire spectrum of ship-generated waste to those that can accept almost none at all.

A summary of indicative port waste reception demands for the most common types of vessels visiting Pacific island ports is presented in Table ES2. It is stressed that these estimates are modelled upon best available data and predicted ship-waste generation rates, although their reliability is uncertain. Actual ship-to-shore transfers of wastes are influenced by a range of factors, many of which act to reduce the amount that ships may require to transfer to shore.

Table ES2: Estimated Rates of Potential Demand for Waste Reception Arising from Ships Normally Using Pacific Island Ports

Vessel Type	Indicative No. Persons Onboard	Indicative Displacement (t)	Sludge and Waste Oil [1] m^3/day (at sea before arrival)	Oily Bilge Water [2, 3] amount per ship visit (m^3)	Garbage [1] kg/ day (at sea before arrival)	Sewage [4] m^3/day (in port)
Merchantmen [3]	18	3,000 – 20,000	0.18	n/a	27	1.3
Tankers [3]	15	2,000 – 20,000	0.18	n/a	22	1.0
Cruise Liners [3]	600 – 1,500	10,000 - 20,000	0.27	n/a	1,800 - 4,500	42 – 105
Inter-island Traders	15 - 20	100 - 250	0.05	5	22 - 30	0.4 – 0.6
I/island Ferries (large)	600	1,500	0.05	10	900	n/a
Inter-island Ferries	100	250	0.05	2	150	n/a
Tourist Charter Boats	10 - 20	n/a	0.01	n/a	5 - 10	n/a
Warships (very large) [3]	1,000 – 6,000	20,000 – 100,000	0.18	n/a	1,700 – 10,200	50 – 300
Warships (large) [3]	200	2,500	0.18	n/a	340	10
Warships (small)	20	100 - 250	0.01	5	26	1.0
Fishing (oceanic)	18	250 – 1,000	0.02	10	32	0.7
Fishing ('mothership')	18	2,000 - 4,000	0.05	10	50	0.7
Fishing (local)	2 - 5	n/a	0.005	n/a	2 - 4	n/a
Local workboats	2 - 5	n/a	0.01	0.05	2 - 4	n/a
Yachts (itinerant)	3	n/a	n/a	n/a	1.5	0.06
Local craft (day trips)	2	n/a	n/a	n/a	1	n/a

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. incineration, compaction, shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Older ships not fitted with IMO approved pollution control equipment may need to discharge to shore that oily bilge which is produced while alongside/at anchor.
4. Assumes vessels not fitted with sufficiently large holding tanks or approved sewage treatment plants.

The ships that are most likely to have an adverse impact on the environment are inter-island coastal traders and international fishing vessels. These vessels remain in the region for significant periods of time and, generally speaking, have nil or only limited onboard facilities to handle waste. Furthermore, many of these vessels are restricted to near-shore waters where regulations regarding waste disposal are more stringent than those applying on the high seas. Larger vessels that service the region from outside have far greater capabilities and opportunities to retain or treat waste onboard, or discharge lawfully at sea. These ships can be expected to require waste reception services at none but the largest ports in the region. Itinerant yachts may have some waste reception needs but, overall, are not deemed a major environmental risk.

A summary of the potential annual waste reception demands for Pacific island ports is presented in Table ES3. It is stressed that the information presented in Table ES3 is theoretical only and based upon best available data for port activities and ship-waste generation models.

Table ES3: Estimated Potential Annual Demand for Waste Reception in Pacific Island Ports

Nation/Territory	Port	Waste Component					Comments
		Sludge/ Waste Oil [1] (m^3)	Oily Water [2] (m^3)	Garbage [1] (t)	Garbage [1] (m^3)	Sewage [3] (m^3)	
American Samoa	Pago Pago	469	4,890	813	4,065	6,628	May expect maintenance and catch wastes from fishing fleet.
Cook Islands	Avarua	57	295	15	74	510	
Federated States of Micronesia	Chuuk, Weno	332	5,115	728	3,638	3,543	
	Kosrae, Okat	99	357	126	632	370	
	Pohnpei, Kolonia	306	4,510	757	3,787	5,745	
	Yap, Colonia	91	1,547	203	1,017	1,805	
Fiji	Denarau Marina	78	3,000	230	1,151	101	
	Labasa/Malau	103	201	31	155	91	
	Lautoka	361	2,025	213	1,065	1,638	
	Suva	691	6,838	895	4,473	8,995	
	Vuda Point	65	*	15	74	307	* Also significant oil tank washings.
French Polynesia	Papeete	4,186	25,705*	2,936	14,680	9,281	* Also oil tank washings.
Guam	Apra	866	3,140*	1,009	5,046	6,602	* Also significant oil tank washings.
Kiribati	Betio	347	4,350	458	2291	1,442	
Marshall Islands	Majuro	370	5,603	999	4,993	6,882	
Nauru	Aiwo	131	20	20	100	191	
New Caledonia	Noumea	915	2,780*	1,381	6,907	10,410	* Also oil tank washings.
Niue	Alofi	116	20	59	296	288	
Northern Mariana Islands	Saipan	292	1,880	547	2,737	1,689	
Palau	Koror	180	3,610	233	1,164	1,515	
Papua New Guinea	Lae	375	2,410	102	512	928	
	Port Moresby	572	2,780	216	1082	2,981	
Samoa	Apia	325	840	175	876	1,172	
Solomon Islands	Gizo	101	2,930	140	698	676	
	Honiara	1,287	17,263	2,072	10,360	4,908	
Tonga	Nuku'alofa	201	845	267	1,335	2,910	
Tuvalu	Funafuti	51	340	107	534	929	
Vanuatu	Luganville	249	9,138	221	1,105	3,042	
	Port Vila	274	4,120	581	2,906	7,026	
Wallis and Futuna	***Nil data***						

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. incineration, compaction, shredding).
2. Does not include tank washings or non-segregated ballast water. Total may be inflated by other ships, not fitted with IMO approved pollution control equipment, which may need to discharge to shore oily bilge which is produced while alongside/at anchor.
3. Cell shaded if port water quality is considered degraded or vulnerable to sewage inputs from vessels.

In general terms, only limited capacity exists within the region to collect oily wastes from ships. There are some excellent oil recovery and recycling schemes in place, as well as informal procedures for the reuse of oily waste for purposes such as fuel, lubrication

and as a corrosion inhibitor. For the most part, however, the greater proportion of vessel-sourced oily wastes in the region are unaccounted for and are presumed to be dumped either at sea or on land.

Facilities and procedures for the reception of garbage also vary greatly across the region. These ranged from a total absence in some areas to fully comprehensive services, consistent with the standards designated by the IMO, in a limited number of ports. A summary of the status of port waste reception facilities and procedures at the time of the field survey is presented in Table ES4.

Table ES4: Summary of Existing Waste Reception Facilities in Pacific Island Ports

Island State	Port	Waste Reception Services								Comments
		Oily Wastes			Sewage	Quarantine	Garbage	Recyclables	Hazardous and Noxious Waste	
		Slops (tank washings, ballast)	Oily bilge water	Sludge and Waste Oil						
American Samoa	Pago Pago	No	Yes (ST)	Yes (ST)	No	Yes	Yes		No	
Cook Islands	Avarua	No	No	Yes	No	Yes	Yes (D)	No	No	Shore ablutions provided for yachts
Federated States of Micronesia	Chuuk, Weno	No	No	Yes (D)	Yes (D)	Yes	Yes (D)	No	No	
	Kosrae, Okat	No	No	Yes (D)	Yes (D)	Yes	Yes (D)	No	No	
	Pohnpei, Kolonia	No	No	Yes (D)	Yes (D) (ST)	Yes	Yes (D)	No	No	
	Yap, Colonia	No	No	Yes (D)	Yes (D) (ST)	Yes	Yes (D)	No	No	
Fiji	Denarau Marina	No	No	No	No	Yes (A)	Yes (D)	No	No	Shore ablutions provided for yachts
	Labasa/Malau	No	No	No	No	No	Yes (D)	No	No	
	Lautoka	No	No	Yes (D)	Yes (D)	Yes	Yes (D)	No	No	
	Suva	Yes	Yes	Yes	No	Yes	Yes (D)	No	No	
	Suva – Yacht Club	n/a	n/a	Yes	No	Yes (A)	Yes	Al, plastic	No	Shore ablutions provided for yachts
	Vuda Point – Oil Terminal	Yes (P)	Yes (P)	Yes (P)	No	No	Yes	bottles, plastic, oil	No	
	Vuda Point – Marina	No	No	Yes	Yes (ST)	No	Yes	Al, bottles, plastic	No	
French Polynesia	Papeete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Guam	Apra, Commercial	Yes (D)	No	Yes	Yes (ST)	Yes	Yes (D)	No	Yes	
	Apra, Military	Yes	Yes	Yes	Yes (P)	Yes	Yes	Yes, all	Yes	
Kiribati	Betio	No	No	No	No	Yes	Yes (D)	No	No	
Marshall Islands	Majuro, Commercial	No	No	Yes (D)	Yes (ST)	Yes	Yes	No	No	
	Majuro, Fishing	No	No	Yes	No	No	Yes	No	No	
Nauru	Aiwo	No	No	No	No	Yes	Yes (D)	No	No	

Island State	Port	Waste Reception Services								Comments
		Oily Wastes			Sewage	Quarantine	Garbage	Recyclables	Hazardous and Noxious Waste	
		Slops (tank washings, ballast)	Oily bilge water	Sludge and Waste Oil						
New Caledonia	Noumea	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Excellent facilities provided for yachts. Quarantine waste measures possibly ineffective.
Niue	Alofi	No	No	No	No	Yes	Yes (D)	No	No	
Northern Mariana Islands	Saipan	No	Yes (ST)	Yes (ST)	Yes (ST)	Yes	Yes	No	Yes	
Palau	Koror, Commercial	No	No	Yes (ST)	Yes (ST)	Yes	Yes (D)	No	No	
	Koror, Fishing	No	No	Yes (ST)	Yes (ST)	Yes	Yes (D)	No	No	
Papua New Guinea	Lae	Yes	Yes	No	No	Yes	No	No	No	
	Port Moresby		Yes	No	No	Yes	Yes (D)	No	No	
Samoa	Apia	No	No	Limited	No	Yes	Yes (D)	No	No	
Solomon Islands	Gizo	No	No	No	No	Yes	Limited (D)	No	No	
	Honiara	No	No	No	No	Yes	Yes (D)	No	No	
Tonga	Nuku'alofa	No	Yes	Yes	No	Yes	Yes (D)	No	No	
Tuvalu	Funafuti	No	No	Limited	No	Limited	Yes (D)	No	No	
Vanuatu	Luganville	No	Yes (ST*)	Limited	No	Yes	Yes	No	No	
	Port Vila	No	Yes (ST*)	Limited	No	Yes	Yes	No	No	
Wallis and Futuna	***Nil data***									

Notes:
A = Quarantine waste accepted by prior arrangement (e.g. on arrival of a major international yacht race)
D = domestic shipping only
P = discharged through pipe connection to shore
ST = sullage/septic collection truck
ST* = potential exists for collection by sullage/septic collection truck, but this is not current practice

Of particular note was the almost total absence within the region of separate procedures for the collection, handling and disposal of special or hazardous wastes. For the most part, these were either unaccounted for or are understood to be handled within the general garbage stream.

Quarantine waste from ships causes major difficulties in some states where there are inadequate facilities for its collection, handling and disposal or destruction. This is often compounded by a lack of discernment when sorting garbage leading to quantities of 'quarantine' material that could be separated and treated as general garbage but which remain with quarantine material; these practices unnecessarily inflate the magnitude of the quarantine waste stream.

The disposal of sewage from vessels was only considered to threaten port water quality to a significant extent in:

- Pago Pago, American Samoa
- Weno, Chuuk State, Federated States of Micronesia
- Kolonia, Pohnpei State, Federated States of Micronesia
- Suva, Fiji
- Papeete, French Polynesia
- Majuro, Marshall Islands
- Noumea, New Caledonia
- Funafuti, Tuvalu
- Port Vila, Vanuatu

Of these ports, Pago Pago, Papeete and Noumea were considered to have effective sewage management regimes in place. Improved control measures are required in the other ports.

Each of the island states considered has a unique set of circumstances, as do each of the ports within each state. However, some generic findings can be reported that will assist in waste management.

It was found that suitable standards of pollution control and waste management by foreign fishing vessels operating in the Exclusive Economic Zones (EEZs) of Pacific island states could be formalised. The issue of licences to fish within EEZs could be made conditional upon fishing vessels demonstrating compliance with these standards.

The fact that MARPOL 73/78 requires island states, if they become signatories, to be able to accept all ship-generated wastes is a disincentive and barrier to wider acceptance of the Convention within the Pacific islands region. This is an unintended outcome and greater flexibility within the requirements of the Convention could improve overall management of ship waste in the region.

In a regional, cooperative effort to assist in implementation of MARPOL 73/78, SPREP has developed generic marine pollution legislation. However, many states have only a limited capacity for the required inspection, monitoring, surveillance and enforcement regime, so it is critical that any legal improvements are supported by education campaigns that enhance compliance through raising awareness of individual responsibilities among mariners in the region.

There needs to be greater cooperation between island states if mutually beneficial outcomes are to be realised. This will allow states that have capabilities to treat, dispose, or perhaps store for future disposal, difficult or intractable wastes, to assist those that cannot deal with even minimal amounts of these wastes. International merchant shipping services in the region are adopting a predominantly trunk and feeder route configuration centred on major regional ports (Suva and Vuda Point, Fiji; Apra, Guam; Papeete, French Polynesia; Noumea, New Caledonia) with these ports subsequently trans-shipping goods to the smaller ports in the region. Most cargo traffic is inwards with the result that there is significant unused cargo space when vessels return to source ports. Potential exists for some wastes, which could be better managed in larger centres, to be transferred to the larger ports within the region or, if necessary, out of the region using this surplus capacity. Additionally, international

shipping can often retain wastes onboard until arrival in these larger ports.

It should be noted that there are barriers to the transfer of wastes around the region. These include international treaties such as the Basel and Waigani Conventions regarding the transport of hazardous wastes, plus national environmental, customs and taxation regimes. These should be reviewed to determine if the net benefits from these restrictions outweigh the regional costs of pollution and ineffective waste management.

This report also notes that rafts of marine debris tend to form in the equatorial doldrums in the region and recommends that consideration, in consultation with IMO, be given to declaring this to be a 'Special Area' where disposal of floating garbage is prohibited.

Recommended Improvement Strategies

Although the focus of the reception and subsequent management of ship-generated waste rests upon the ship/port interface, proper management of this waste stream is a continuum of measures, of which the ship/port interface is but one component. The total package of measures therefore needs to address:

- the legal framework (international, regional, national [and municipal, in some cases]);
- delineation of responsibilities for planning and operations;
- waste reduction at source (i.e. in ships);
- facilities and procedures for waste collection (including coordination between ports and ships, and regional cooperation);
- final disposal options (including reuse and recycling, and the linkage with terrestrial waste management issues);
- fee structure and cost recovery mechanisms;
- compliance checking and enforcement;
- education, information and training;
- monitoring, audit and review; and
- the securing of implementation funds.

In formulating recommended improvement measures, international port waste reception arrangements and their adequacy or otherwise, have been reviewed, as well as development programmes. Current port waste reception arrangements were found to be of varying quality, including those in ports of developed nations. PACPOL was found to be analogous to the Wider Caribbean Initiative on Ship-Generated Waste (WCISW), which seeks to address ship-generated waste in an area with many parallels (technical, economic and environmental) to the Pacific islands region.

To improve ship waste management in the Pacific islands, it is essential that SPREP member states uniformly accede to and properly implement MARPOL 73/78. This will bring about a range of advantages including:

- an effective legal framework (international, regional and national);
- harmonised and consistent ship waste disposal regulations;
- opportunities for IMO technical assistance;
- cooperative ship inspection and Port State Control procedures; and
- regionally coordinated port waste reception measures.
- Accession to MARPOL 73/78 also carries obligations and responsibilities for signatories, the most important of which is arguably the requirement to provide adequate port waste reception arrangements. Adequacy is broadly defined by the IMO as:
- sufficient capacity to meet demand (in terms of the amount and types of waste) for ships normally visiting that port, and their associated cargoes;
- ability to accept wastes without imposing other environmental impacts (such as spills or leaks, and the environmentally acceptable final disposal or treatment of accepted wastes);
- ease of use of waste reception facilities by vessel operators;
- ability to transfer wastes to shore without causing undue delay to the normal operations of a particular vessel in that port;
- reliability of equipment and procedures; and
- affordability.

The limited institutional, technical and economic means of most Pacific island states, compounded by the severe physical constraints imposed in many by the lack of land available for waste disposal purposes, conspire to create a situation where individual states are almost uniformly unlikely to be able to accept and adequately deal with all waste generated by shipping visiting their ports. Therefore, planning for ship waste reception in Pacific island ports must recognise and accord with two cardinal precepts. These are:

- Some Pacific island states have no option but to refuse to accept some categories of ship-generated waste.
- A cooperative regional approach is essential if durable and sustainable improvements are to be realised. This is equally true in terms of legal instruments, port waste reception and waste treatment and disposal.

Given these constraints, some of the responsibilities incumbent upon Parties to MARPOL 73/78 may be acting as a deterrent to wider acceptance of the convention within the pacific islands region. The IMO is encouraged to relax some of these responsibilities where warranted, particularly waste reception requirements.

Any broad advances in the management of ship-generated wastes will be constrained by the capacity of Pacific island states to deal with wastes from all sources (i.e. terrestrial). This finding is consistent with the WCISW. It is therefore essential for SPREP, other regional bodies and member states to continue to promote improvements in national waste management capacities, and to establish appropriate links with port waste reception arrangements.

An important element in the management of ship-generated wastes is the imposition of a suitable structure of waste reception fees. The mandatory imposition of waste management fees for all ships entering a port, whether they intend to discharge waste or not, is seen as critical in order to deter unscrupulous ship operators from avoiding costs by unlawful disposal. The collection of compulsory fees is a policy position agreed to by SPREP member states. The application of fees, however, must be judicious in order to ensure that they are realistic for ship operators and really do provide for the proper reception and management of ship waste.

A comprehensive suite of recommendations for improving ship waste management in the region is presented in this report. Recommended measures have been framed within the paradigm of 'appropriate practice', which seeks to match waste reception and treatment/disposal requirements with the economic, social, cultural and technical conditions in Pacific island states. Recommendations have been categorised according to the level at which they require to be acted upon. These categories are:

- the IMO;
- SPREP;
- other international and regional fora (e.g. Forum Fisheries Agency, Association of Pacific Ports, United Nations Development Programme);
- common national measures; and
- specific measures for individual nations and ports.

Common measures identified for national government action have been further subdivided into discrete elements of the ship waste management continuum.

Many of the small Pacific states, particularly the coral atoll islands, are severely constrained in their ability to accept ships' waste. While non-acceptance from international vessels is an achievable option, no alternative exists for the reception of waste from vessels operating domestically; either this material is received by ports or it is most likely disposed in an environmentally unacceptable manner (and possibly unlawfully).

Regional cooperation is deemed essential. Suitable cooperative arrangements can be achieved by designating selected ports as regional ship waste reception centres, based upon their ability to properly deal with these wastes coupled with their status as significant foci of regional shipping activity. Ports nominated as regional reception centres are:

- Suva, Vuda Point and Lautoka, Fiji;
- Papeete, French Polynesia;
- Apra, Guam; and
- Noumea, New Caledonia.

The function of these ports as regional waste reception centres would be assisted by encouraging ships to:

- discharge waste at other ports external to the region (such as in Australia, New Zealand, Japan or the United States) before sailing for the Pacific islands; or
- retain wastes onboard until returning to an external port from the Pacific islands region.

Regional cooperation is also essential for the reuse/recycling or ultimate disposal of the more difficult to manage components of the ship-generated waste stream (i.e. oils and hazardous materials), principally where national capacity to deal with such wastes is limited or absent. In most cases, some export of these wastes to designated regional centres or nations external to the Pacific islands region is necessary. Ideally, the management of ship-sourced wastes of these varieties will be integrated into larger, fully comprehensive national and regional programmes.

Although the challenges are significant, there is great potential for appreciable improvements in the management of ship-generated waste in the Pacific islands region, with subsequent reduction in the inputs of pollutants to the marine environment. Many gains can be made with the implementation of relatively cheap and simple solutions. More elaborate measures will also be required, but these too should be more achievable if implemented in a cooperative manner within the Pacific islands region

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THE PROJECT TEAM AND ACKNOWLEDGEMENTS

This report was compiled by a team of specialist consultants lead by the Marine and Coastal Environment Section of URS Australia, under the project management of SPREP. The project team comprised:

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GLOSSARY

ANZECC Australia and New Zealand Environment and Conservation Council

APCIS	Asia-Pacific Computerized Information System
AQIS	Australian Quarantine and Inspection Service
ASEPA	American Samoa Environmental Protection Authority
ASPA	American Samoa Power Authority
AusAID	Australian Agency for International Development
CBT	clean ballast tanks
CCA	copper chromium arsenate
CFR	Code of Federal Regulations (US)
CNMI	Commonwealth of the Northern Mariana Islands
COA	Certificate of Adequacy
DNV	Det Norske Verita
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency/Authority
EU	European Union
FFA	Forum Fisheries Agency
FFV	Foreign Fishing Vessel
FSM	Federated States of Micronesia
GRT	gross registered tonnage
iaw	in accordance with
IMO	International Maritime Organization
ITCZ	inter-tropical convergence zone
LOA	length overall
LPG	Liquefied Petroleum Gas
MARPOL 73/78	The *International Convention for the Prevention of Pollution from Ships 1973*, as modified by its Protocol of 1978
MOU	Memorandum of Understanding
OPRC 90	The *International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990*
PACPOL	Pacific Ocean Pollution Prevention Programme
PACPOL SW 1	PACPOL (Ships' Waste Management in pacific Islands Ports)
PCBs	polychlorinated biphenyls
PNG	Papua New Guinea
POL	petroleum/oils/lubricants
POP	persistent organic pollutant
ppm	parts per million
PSSA	Particularly Sensitive Sea Area
RAN	Royal Australian Navy
RMI	Republic of the Marshall Islands
ro-ro	roll on – roll off ship
SBT	segregated ballast tanks

SIDA	Swedish International Development Agency
SPC	South of the Pacific Community
SPREP	South Pacific Regional Environment Programme
SWOT	strengths, weaknesses, opportunities and threats
TEU	twenty foot equivalent unit (ie. equal capacity to a 20' ISO container)
UK	United Kingdom
UNCLOS III	The *United Nations Convention on the Law of the Sea 1982*
UNDP	United Nations Development Programme
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USN	United States Navy
WCISW	Wider Caribbean Initiative for Ship - generated Waste
WHO	World Health Organization
WMP	Waste Management Plan

N.B: United States in this publication denotes the United States of America unless otherwise stated.

PACPOL Project SW 1
Improving Ships' Waste Management in Pacific Islands Ports

1. INTRODUCTION

This report presents the findings of an assessment of the current situation with regards to reception and management of ship-generated waste in Pacific island ports along with a suite of recommended improvement strategies.

1.1 Project Background

Provision of convenient and adequate waste reception facilities in ports and harbours has become a focus of international efforts to reduce ship-related marine pollution, since the absence of such facilities encourages ships to inappropriately discharge wastes at sea. The need to establish suitable facilities in many Pacific ports and harbours is urgent, so as to minimise dumping of oily wastes, garbage and other materials by the various trading vessels, ferries, cruise liners, fishing boats and yachts which ply the region.

In addition to suitable waste reception facilities, effective management of ship-generated waste exhibits a number of other key features. These are:

- a comprehensive and compatible framework of international conventions and national laws and regulations;
- an effective compliance inspection and enforcement regime;
- a suitable pricing and cost-recovery regime for port waste reception services which does not act as a disincentive to appropriate waste disposal; and
- the ultimate recycling, reuse or disposal of the collected wastes in an environmentally acceptable manner.

Provision of suitable reception facilities in ports and harbours is a requirement of the *International Convention for the Prevention of Pollution from Ships 1973*, as modified by its Protocol of 1978 (MARPOL 73/78), administered by the International Maritime Organization (IMO). The adequacy of such facilities encompasses aspects such as the:

- sufficient capacity to meet demand (in terms of the amount and types of waste) for ships normally visiting that port, and their associated cargoes;
- ability to accept wastes without imposing other environmental impacts (such as spills or leaks, and the appropriate final disposal or treatment of accepted wastes);
- ease of use of waste reception facilities by vessel operators;
- ability to transfer wastes to shore without causing undue delay to the normal operations of a particular vessel in that port;
- reliability of equipment and procedures; and
- affordability.

The IMO's *Comprehensive Manual on Port Reception Facilities*, together with the Australian and New Zealand Environment and Conservation Council's (ANZECC) *Best Practice Guidelines for Waste Reception Facilities at Ports, Marinas and Boat Harbours* (herein referred to as 'the Guidelines') provide strategies and guidelines on ship waste management, specifically at the ship/port interface. The ANZECC Guidelines pay particular attention to waste management requirements for small commercial and recreational vessels.

ANZECC Guidelines for Ship Waste Reception Facilities

The Australian and New Zealand Environment and Conservation Council (ANZECC) *Best Practice Guidelines for Waste Reception Facilities at Ports, Marinas and Boat Harbours* provide advice to 'assist managers of commercial ports, marinas, boat harbours and administering authorities, to ensure the provision of facilities and services for the reception of waste from vessels' (ANZECC, 1997). The Guidelines were developed as a component of a broader programme to protect the marine environment from shipping accidents and vessel-sourced pollution. Although the Guidelines have no legal standing within the project area, they nevertheless provide a useful benchmark by which to assess the adequacy of waste reception measures.

The scope of the Guidelines encompasses recommendations for ongoing management of port reception facilities, as well as redeveloping existing facilities or planning for, and establishing, new ones. The focus of the Guidelines is upon best practice techniques, with nominated performance criteria to assess effectiveness.

The Guidelines set criteria for the planning and operation of waste reception services that aim to provide for desirable environmental outcomes without causing undue impediment to vessel operators. The Guidelines address the needs of all shipping in Australian and New Zealand waters, and are considered to better address the requirements for small commercial and recreational vessels than does the IMO's *Comprehensive Manual on Port Reception Facilities*.

The Guidelines also suggest that marina and small boat harbour operators and users should incorporate marine pollution prevention commitments into codes of practice and berthing contracts. This would engender awareness among boat operators of waste management facilities and procedures, and compel compliance because default may jeopardise retention of a berth.

The Guidelines anticipate that they will be implemented by relevant government authorities through the licensing and approvals processes as they apply to ports, boat harbours and marinas, as well as by 'other measures for ensuring effective management of these facilities'. This latter statement draws a nexus with, among other things, environmental impact assessment of port and harbour development proposals, and policy and planning mechanisms related to the management of marine pollution from vessels.

Most Pacific island nations and territories have few, if any ship's waste reception facilities at their ports. Many of those in place are inadequate.

For many Pacific island nations/territories (particularly those comprising small atolls) the provision of such facilities may, in fact, be inappropriate due to a shortage of land for disposal sites and/or infrastructure problems that can hamper effective management of land-sourced wastes. It is unreasonable to expect a country that is struggling to come to terms with the management of domestically generated wastes to provide facilities for the reception and management of wastes generated by international shipping. The developing status of most of the Pacific island states often compounds these difficulties in both technical and economic terms, whilst social and cultural perspectives can also influence waste management issues, priorities and practices.

The layout of many Pacific island ports compounds waste reception problems, especially those comprising a simple sheltered anchorage in which containers or dry break-bulk cargo are transferred to or from lighters and barges, and/or where tankers deliver petroleum products from an isolated mooring via floating or underwater

pipelines. Key regional ports which act as ferry bases and/or are frequented by cruise liners also deserve special attention as these vessels can generate considerable quantities of garbage, particularly packaging waste.

1.1.1 Project Concept

The South Pacific Regional Environment Programme (SPREP), with support from the IMO, the Government of Canada and the Commonwealth Secretariat has established the Pacific Ocean Pollution Prevention Programme (PACPOL). The principal purpose of PACPOL is to develop and implement a comprehensive package of measures to address ship related marine pollution throughout the Pacific islands region.

Project SW 1 (*Review of Ships' Waste Reception Facilities in Pacific Island Ports*) is a key component of PACPOL. The overall aim of this three stage project is to:

> *Improve the protection of coastal and marine environments in the Pacific islands region, by developing a regionally coordinated, long-term strategy for the provision of adequate ships' waste reception facilities in each Pacific island country and territory, as appropriate.*

The key tasks of the project are:

- review existing waste reception practices and capacity in Pacific island ports (Output 1); and
- develop appropriate and in some cases innovative strategies to optimise waste reception and management capacity wherever practicable and affordable (Output 2); then
- provide suitable technical assistance to develop optimum ships' waste management arrangements (Output 3).

This project is focused upon reviewing current measures and developing waste management arrangements that will suit the circumstances of the particular Pacific island countries and territories to which they will be applied (i.e. Outputs 1 and 2). The PACPOL initiative has anticipated that the strategies proposed in Output 2 will include cooperative management measures tailored to the sub-regional and regional levels. Output 3 is outside the scope of this report.

1.1.2 Project Objectives

The specific objectives of the Output 1 and Output 2 phases were:

- Output 1: To review the current status of ships' waste reception facilities in each Pacific island country and territory, including whether such facilities exist, and if they do whether they are adequate in relation to demand and the requirements of MARPOL 73/78, and if the ultimate fate of these wastes is environmentally acceptable.
- Output 2: To recommend the optimum ships' waste management arrangements for each country and territory, that suit each nation/territory's circumstances and are coordinated with other states in the region. The project recognises that in some states, the optimum arrangement may be non-acceptance of wastes.

1.1.3 Project Scope

The geographical scope of the project is the 14 independent or semi-independent Pacific island countries and six of the eight Pacific island regions which are members of SPREP (see Figure 1). These are:

Pacific island countries:

Cook Islands
Federated States of Micronesia
Fiji
Kiribati
Marshall Islands
Nauru
Niue
Palau
Papua New Guinea
Samoa
Solomon Islands
Tonga
Tuvalu
Vanuatu

Pacific island territories:

- American Samoa (United States of America)
- Commonwealth of the Northern Mariana Islands (United States of America)
- French Polynesia (France)
- Guam (United States of America)
- New Caledonia (France)
- Wallis and Futuna (France)

Most PACPOL projects do not cover the Pacific island territories and apply to independent island countries only. However, for this project six of the territories have been included, as it is recognised that implementation of the most appropriate waste management arrangements must be regionally coordinated.

The territory of Tokelau (administered by New Zealand) are not covered by this project due to time and financial constraints. Both islands are not accessible through commercial air services. SPREP will undertake a similar exercise in-house to cover the two islands.

Figure 1: Map of the Pacific Islands Region

1.1.4 Terminology

In the interests of brevity, Pacific island countries and territories will be collectively referred to as 'states' in the report.

'Ship' refers to any vessel of any type used by humans for transport, commerce, recreation or any other purposes. The term 'ship' includes, but is not restricted to, cargo and passenger vessels, fishing vessels, research vessels, naval and police vessels, yachts, barges, boats, motor launches, dinghies and canoes. Hydrofoils, air-cushion vehicles, submersibles and fixed and floating platforms also fall within the umbrella definition of ship. This definition is consistent with those employed by the IMO and SPREP.

1.2 Project Methodology

1.2.1 Output One: Review of Current Status of Reception Facilities in Each Pacific Island State

A literature review and field survey of the current status of ships' waste reception facilities was undertaken in each state within the Pacific islands region with the exception of Tokelau and Wallis and Futuna (deleted from the field survey programme due to a paucity of scheduled travel services). Desk top assessments only was made of these Wallis and Futuna from discussions with New Caledonia and French Authorities. Tokelau will be addressed separately through a separate initiative. Information gathered and assessments made during the site visits covered:

- identification and assessment of the demand for ships' waste reception facilities in each state (including types and quantities of waste and frequency of waste reception requirements);
- whether such facilities exist; and
- if they do, whether they were adequate in relation to:
  - demand and the requirements of MARPOL 73/78 (i.e. the determination was based on the principles contained within the IMOs' *Comprehensive Manual on Port Reception Facilities* and ANZECCs' *Best Practice Guidelines for Waste Reception Facilities at Ports, Marinas and Boat Harbours in Australia and New Zealand*);
  - their environmental acceptability, including the acceptability of:
    (a) the end-use of the waste in terms of disposal impacts and reuse/recycling potential, and
    (b) the degree of integration with, and impacts upon, local terrestrial waste management arrangements
- a review was also conducted of current and forecast ship waste reception and management measures in other areas of the world.

To ensure consistency and comprehensiveness of data collection, a standard Port Survey Protocol was developed. This was applied at all ports visited in the Pacific islands region. A copy of the protocol is provided in the appendices to this report. The protocol took account of:

- the nature and intensity of present port operations (i.e. types and numbers of ships visiting or based at the port, and the quantity and types of waste these vessels are likely to generate), plus expected future trends;
- whether the port has:
  - enclosed, poorly flushed harbour waters; with
  - a significant concentration of vessels, where people live aboard, and which are resident for extended periods; and
  - if so, whether any infrastructure and procedures for the adequate management of sewage exist or are required (assessment of sewage requirements is in anticipation of eventual future enforcement of Annex IV of MARPOL 73/78);
- existing practices and end-use for the disposal of any ship-generated waste that is collected, including the degree of integration with, and impacts upon, terrestrial waste management practices. This included a preliminary assessment of the environmental suitability and sustainability of existing or possible

waste management measures. In addition, any current in-country recycling programmes, and their capability to accept ship-generated waste, were also assessed; and
- opportunities for waste minimisation through application of techniques to reduce, reuse or recycle ship-generated waste.

Individuals and organisations consulted during the field studies covered a broad cross-section of stakeholders. These included:
- port management and operating authorities;
- terminal operators and stevedores;
- yacht club and marina operators;
- ship owners and operators;
- shipping agents;
- ships' masters and crews;
- maritime management and regulatory authorities;
- government environment, quarantine and waste regulatory agencies;
- municipal authorities;
- oil company agents;
- representatives of public utilities and major industrial enterprises; and
- waste disposal contractors.

Given the financial constraints of visiting every port, boat harbour and marina in the Pacific islands region within the required time, a representative array of ports and harbours within each country and territory was surveyed. Although concentrating on major centres, smaller ports and marinas within the Pacific region were also visited by the field survey team on an opportunistic basis.

The field survey took account of relevant local legislative requirements, policy intentions, and the status of relevant international marine pollution agreements, principally MARPOL 73/78. Ports visited during the field survey are listed in Table 1.

Table 1: Field Surveys: PACPOL Project SW1

Nation/Territory	Ports	Dates Visited
MICRONESIA		
Federated States of Micronesia	Chuuk, Weno,	9 – 10 October 2000
	Kosrae, Okat	16 – 18 October 2000
	Pohnpei, Kolonia	19 December 2000
	Yap, Colonia	16 – 17 November 2000
Guam	Apra	21 November 2000 22-24 February 2002
Kiribati	Betio	10 – 12 October 2000
Marshall Islands	Majuro	18 – 20 October 2000
Nauru	Nauru	17 – 20 October 2000
Northern Marianas	Saipan	10 October 2000
Palau	Koror	13 – 14 November 2000
MELANESIA		
Fiji	Denarau Marina	8 October 2000
	Labasa/Malau	13 – 14 October 2000
	Lautoka	10 October 2000
	Suva	6 – 8 & 16 October 2000
	Vuda Point	11 - 12 October 2000
New Caledonia	Noumea	16 – 18 October 2000
Papua New Guinea	Lae	25 – 27 October 2000
	Port Moresby	23 – 25 October 2000
Solomon Islands	Gizo	28 February – 4th March 20002
	Honiara	26-28th February 2002 4-5 March 2002

Nation/Territory	Ports	Dates Visited
Tonga	Nuku'alofa	4 – 6 October 2000
Tuvalu	Funafuti	9 – 11 October 2000
Vanuatu	Luganville	12 – 17 October 2000
	Port Vila	18 – 21 October 2000
POLYNESIA		
American Samoa	Pago Pago	4 – 6 October 2000
Cook Islands	Avatiu (Rarotonga)	6 – 9 October 2000
French Polynesia	Papeete	11 – 13 October 2000
Niue	Alofi	30 October 2000
Samoa	Apia	3 – 5 October 2000

1.2.1.1 Estimating Demand for Port Waste Reception

In estimating the demands which may be placed upon shore reception facilities it is necessary to consider the:

- quantities and types of wastes historically received in a given port;
- quantities and types of wastes that should be expected, given the nature and intensity of shipping activity in that port;
- the quantities and types of wastes that ships may retain for discharge either to sea or at another port; and
- any anticipated changes in the types and/or intensity of shipping activities at the port.

Standard estimates of ship waste generation rates, as developed by organisations such as the IMO, the Royal Australian Navy (RAN), commercial organisations and other agencies, were used to assist in assessing demand for shore reception facilities in relation to intensity of shipping and boating. In this context, the principal determinants of the types and quantities of ships' waste, and hence demand for reception facilities are:

- vessel types and numbers;
- duration of voyage and the period between ports;
- ship size, age, condition and types of propulsion and auxiliary systems;
- crew size and number of passengers (as applicable);
- onboard waste treatment equipment (e.g. food macerators, incinerators, garbage compactors, shredders, oil/water separators, sewage treatment plants, sewage holding tanks, waste oil tanks, sludge tanks, etc.);
- cargo types and associated wastes;
- area/s of operation in relation to waste discharge restrictions (e.g. open ocean transits compared to coastal waters);
- waste types and quantities presently retained or discharged at sea;
- waste types and quantities landed at the last port/s of call; and
- waste types and quantities that can safely and hygienically be retained onboard until the next port/s of call.

Estimates of waste generation rates are very imprecise and subject to great variability, and they should only be relied upon to provide very approximate, order of magnitude predictions. More precise data would be available from rigorous audit of ships and ports, however such studies were beyond the scope of this project. Further details on predicted ship-waste generation rates are given in Section 3.3.

1.2.2 Output 2: Recommended Improvement Strategies

Output 2 built directly on the results of Output 1. Technical, environmental, economic, social and cultural factors operating in the Pacific islands region were taken into consideration when formulating recommended strategies. The intention of Output 2 was to identify and evaluate options, and then develop and recommend 'appropriate', as opposed to 'best practice', management measures, noting that the latter may be incompatible in the context of the Pacific islands region.

1.3 The Pacific Islands Region

PACPOL Project SW1 encompasses all Pacific island states (with the exception of Pitcairn Islands and Tokelau) which are members of SPREP. The Pacific islands region covers a significant proportion of the Pacific Ocean, extending over a 50º arc of latitude (21ºN to 28ºS), and a 100º arc of longitude (130ºE to 132ºW). A synopsis of pertinent physical, human and economic indicators are presented in Table 2.

1.3.1 Geography of the Pacific Islands Region

1.3.1.1 Physical Geography

The Pacific Islands Region covers a total area of 30 million square kilometres of the Pacific Ocean, and encompasses 14 independent (and semi-independent) nations and eight major territories (as well as several other minor island territories, mainly under United States of America administration, although these are not addressed by PACPOL). The total population of the region is 6.9 million people, of which 4.3 million live in Papua New Guinea (PNG) and 770,000 in Fiji. The remaining 1.8 million reside in a further 20 island states, with Niue having the smallest population (excluding Tokelau and the Pitcairn Islands) with slightly more than 2,000 persons.

The region is predominantly oceanic, with an aggregate land area of 551,682 km^2, or less than 2 percent of the total. Excluding PNG, the total land area of the remaining islands is only 89,439 km^2. All of the island states have claimed rights over an Exclusive Economic Zone (EEZ) out to 200 nm from defined baselines, in accordance with the United Nations *Convention on the Law of the Sea III* (UNCLOS III). This has provided these states with immense sea areas. For example, Tuvalu's total land area is 26 km^2 compared to an EEZ of 900,000 km^2. The combined EEZs of all the Pacific island states (including Tokelau) is 29,623,000 km^2.

Pacific islands vary from substantial, high rocky islands of (mainly) volcanic origin, to very small, low-lying coral atolls. Islands occurring within the atolls are typically elongated, with the result that few, if any, places within a particular state are far from the sea, compounding effective waste management.

Statistics on population densities of Pacific island states may be misleading. Although a state can have many islands within its territory most may be uninhabited or only sparsely populated. Populations tend to congregate around regional centres, where population densities will be correspondingly higher. In common with many developing nations, the Pacific island states also display a tendency for internal migration toward urban centres. Population growth rates in excess of 2 percent per annum (population doubling time of 35 years) exist in seven of the states, with extremes of 3.9 percent and 3.8 percent (population doubling time of 18 years) in the Marshall Islands and Northern Marianas, respectively. Growing populations, coupled with their characteristic spatial concentration, exacerbate planning and environmental problems, particularly in the realm of waste management.

The entire Pacific islands region lies within the tropical climatic zone. Temperatures within the region vary from mild to hot, with minimal diurnal variation, except in highland areas where temperatures can be relatively cool. Most areas experience annual average rainfall in excess of 3,000 mm (and up to 8,000 mm), sometimes delivered in intense showers following protracted dry spells, although the low-lying coral atolls may have annual rainfall of less than 1,000 mm (and as low as 200 mm in drought years).

Islands within the region, except those within about 5º latitude either side of the Equator, are periodically subject to tropical storms, typhoons and cyclones. The typhoon season north of the equator extends from August to November; south of the equator, cyclones occur from November to March. Storm surges associated with the heavy seas and intense low pressures of tropical

cyclones and typhoons can inundate coastal zones and are particularly critical in low-lying areas. Cyclones and typhoons have, on occasion, caused massive damage to Pacific island states, with loss of life and devastation to housing, industry and public infrastructure. The economic and social development of island states can be set back many years by a major storm event.

1.3.1.2 Government and Administration

All of the sovereign nations and territories have a system of elected, representational government, with varying degrees of autonomy for those states administered as territories. Elements of historical and traditional rule still feature in the leadership and administration of the region, with Tonga retaining its monarchy. Traditionally, many Pacific island societies were founded upon a patriarchal system, with village leadership vested in selected elders. This system has been incorporated within, or superimposed upon, the modern democratic systems adopted by some of the Pacific island states. Examples include advisory councils of chiefs, and parliamentary upper houses to which eligibility for appointment is based upon traditional family or village standings.

All of the 14 Pacific island nations covered by this project are relatively recently independent, with Samoa the first to gain self-determination in 1962. The youngest sovereign nation is Palau which gained independence in 1994. The political status of the Cook Islands and Niue is that they are 'self-governing in free association with New Zealand' whereby the latter nation retains responsibility for foreign affairs.

Institutional arrangements in the region are characteristically immature compared to western nations. In terms of legislative frameworks, most jurisdictions lack the full suite of laws required for effective and comprehensive environmental management of both the terrestrial and marine domains. This situation is further compounded by a limited and varying capacity for regulatory compliance advice, surveillance, monitoring and enforcement.

1.3.1.3 Economic and Technical Development

In general terms, Pacific island economies feature little diversification and are almost universally based upon tourism and natural resource extraction, particularly marine resources, although Fiji and Papua New Guinea have broader bases. Dependence upon overseas financial aid and technical assistance is endemic.

Regional exports are principally primary products. Typical export commodities are fish (mainly tuna), timber, minerals (mainly nickel and phosphate), copra and other coconut products, and tropical agricultural produce.

Service and tertiary industries within the region are small and generally in the early stages of development. Great reliance is placed on technical input and assistance from larger regional neighbours, principally Australia, New Zealand and Japan, as well as the United States of America and France within their respective territories or former possessions.

Virtually all manufactured goods are imported into the region. All oil and gas is sourced from outside of the region (with the exception of an indigenous crude oil supply in Papua New Guinea) and there is also a heavy reliance upon food imports. Imports of building aggregates, including sand and rock, are also required by land depauperate states, such as the coral atolls.

The total value of any of the island economies is small in absolute terms, by virtue of the small national populations, and with great variation across states within the region. In 1998 terms, total economies ranged from US$11.6 *billion* (Papua New Guinea) to US$4 *million* (Niue). Per capita incomes also feature great disparities, ranging from US$19,000 in Guam to US$800 in Tuvalu. Mean per capita income across the region is US$5,440, with 18 of the 20 economies having per capita GDPs below US$11,000, and 12 of those below US$3,000. With the possible exceptions of French Polynesia, New Caledonia and

Guam, all of the Pacific island states are considered to be developing nations.

Australia, New Zealand, France and the United States of America, and to a lesser extent Canada, the United Kingdom and Japan, are the principal developed nations maintaining an interest in the Pacific islands region. This is variously expressed in the form of economic aid, administrative and technical assistance and membership of regional fora, including the Forum Secretariat, South Pacific Applied Geo-science Commission (SOPAC), the Pacific Community, the Forum Fisheries Agency (FFA) and SPREP.

Table 2: Summary of Physical, Human and Economic Indicators of the Pacific Island States

Island State	Physical Geography	Area (km^2)	EEZ (km^2)	Population	Population Density (pers/km^2)	Population Growth Rate (% per annum)	GDP ($US million)	GDP/capita ($US)
American Samoa	high-island volcanic	200	390,000	61,000	305	2.5	150	2,600
Cook Islands	volcanic/low coral atoll	237	1,830,000	10,000	42	1.6	112	5,600
Fed. States Micronesia	low-lying coral atoll	701	2,978,000	105,500	150	3.3	240	2,000
Fiji	high-island volcanic	18,333	1,290,000	773,000	42	1.4	5,900	7,300
French Polynesia	high-island volcanic	3,521	5,030,000	219,500	62	1.8	2,600	10,800
Guam	volcanic	541	218,000	145,400	269	1.7	3,000	19,000
Kiribati	low-lying coral atoll	811	3,550,000	77,700	96	2.3	74	860
Marshall Islands	low-lying coral atoll	181	2,131,000	60,000	331	3.9	105	1,670
Nauru	uplifted coral	21	320,000	11,400	543	2.0	100	10,000
New Caledonia	high-island volcanic	19,103	1,740,000	197,000	10	1.5	3,000	15,000
Niue	uplifted coral, high	259	390,000	2,100	8	0.5	4	2,250
Northern Marianas	volcanic/uplifted coral	471	777,000	58,800	125	3.8	524	9,300
Palau	volcanic/low coral atoll	488	629,000	17,300	35	1.8	160	8,800
Papua New Guinea	continental island	462,243	3,120,000	4,311,500	9	2.5	11,600	2,500
Samoa	high-island volcanic	2,935	120,000	170,700	58	- 0.2	485	2,100
Solomon Islands	high volcanic/low coral atoll	28,370	1,340,000	401,000	14	3.0	1,210	2,650
Tonga	volcanic/uplifted coral	747	700,000	97,500	130	1.9	238	2,200
Tuvalu	low-lying coral atoll	26	900,000	10,900	419	1.4	8	800
Vanuatu	high-island volcanic	12,190	680,000	177,200	14	1.7	245	1,300
Wallis & Futuna	volcanic	255	300,000	14,200	56	-	29	2,000
Pitcairn Islands [1]	volcanic	38	800,000	50	1	- 2.1	-	-
Tokelau [1]	low-lying coral atoll	10	290,000	1,500	150	- 0.9	1.5	1,000
Total	--------	551,682 (89,439 excl. PNG)	29,623,000	6,923,200 (2,611,700 excl. PNG)	--------	--------	--------	--------

(after: AusAID & Pacific Island Commission, 1997; CIA, 2000)

Note:

1. Pitcairn Island and Tokelau are included for indicative purposes only.

1.3.2 Terrestrial Waste Management Within the Pacific Islands Region

1.3.2.1 Introduction

This section provides an overview of prevalent practices and difficulties within the Pacific islands region with regard to waste management. While it is neither the purpose nor the intention of this report to address terrestrial waste management within the Pacific islands region, an appreciation of the current situation and prospects for improvement is essential in the consideration of the management of waste sourced from vessels operating in the region. The ultimate success of ships' waste management strategies depend on the availability of effective land based facilities and processes to appropriately process and dispose of these wastes.

Unlike large, developed nations, the management of ship related waste in Pacific island states presents limited options and cannot be divorced from the management of internally sourced waste. Awareness of the general waste management situation within the region is necessary to place within context the prospects for improving ship-related waste. Current waste management issues are reviewed according to categories of waste; these categories are consistent with those used to review characteristics and management options for ship-generated wastes.

Waste management poses particularly acute environmental, technical, economic, public health and cultural challenges for most Pacific island states, and has been recognised as one of the most pressing environmental and social problems within the region. Morrison & Munro (1999) identified a number of impediments to effective waste management in the region, including:

- insufficient government priority and political determination;
- incomplete regulatory framework;
- inadequate finance;
- a general absence of long-term planning;
- poor past planning and ineffective implementation to date;
- a dearth of skilled personnel and national technical capacity;
- physical limitations to the establishment of landfill sites (e.g. lack of land, proximity to ground water tables and the sea);
- lack of public and institutional awareness of the health and environmental problems caused by inadequate waste management;
- inadequate attention to the problems of hazardous and noxious wastes; and
- inadequate reuse and recycling of wastes, particularly organic wastes and septic/sewage sludges.

In a historical sense, waste management only became a real issue for most Pacific island peoples in the latter half of the 20th Century. Prior to that time, all material was of natural origin, sourced from the forest, gardens or the sea. Thus, any waste or residue was organic and quickly re-assimilated into the environment, or used to provide compost for gardens or food for domestic animals. It may be argued that the ability to easily extract required commodities from nature also inculcated a culture of 'repair by replacement' where items were simply used until exhausted, and then discarded and replaced. This history has resulted in a prevalent culture within the region that compounds waste management in two critical ways:

- waste material is still discarded into the environment at large (terrestrial and marine) with little awareness of the cumulative and long-term consequences of such actions. The root cause of this is that many islanders have not made the mental adjustment that much of the packaging is no longer bio-degradable, as was the case when only natural materials were used, so still follow the traditional practice of throwing this material away to be assimilated by nature; and
- maintenance and repair of items is rudimentary, leading to their premature failure. Apart from financial considerations, this may also generate a greater quantity of waste, due to the

faster rate of turnover of commodities and materials.

Compared to accepted practice in developed nations, current waste management services and processes in some Pacific island states are scant or non-existent. Problems with waste management have been recognised as national and regional priorities. Various national environmental improvement strategies have been developed for Pacific island states as national initiatives, under the auspices of regional agencies such as SPREP, international agencies such as the United Nations Development Programme (UNDP) and the World Health Organization (WHO), plus individual national overseas development agencies. Past and ongoing projects have attempted to rectify these shortcomings by:

- improving government and public awareness;
- strengthening institutional capacity and regulatory frameworks;
- commissioning demonstration projects and/or providing waste management equipment and facilities (e.g. bins, garbage collection trucks, oil/water separators, incinerators); and
- furnishing targeted funds.

Many foreign aid projects have floundered due to inadequate attention to the technical, economic, logistic and cultural realities of the Pacific island states. For example, sophisticated equipment such as compactor trucks and dozers have been provided, but the utility of these items quickly diminishes due to the difficulties of paying for, and acquiring, the skills and materials necessary for maintenance and repair. The endemic lack of maintenance is exacerbated by the corrosion and other problems induced by the coastal environments in which many of these plant and vehicles operate.

Government waste management responsibilities are shared between national and municipal administrations. The general framework is that national governments will set the national agenda by drafting appropriate legislation, articulating national development plans and coordinating international assistance. Municipal authorities will organise disposal sites and collection and disposal services.

Waste management services are variously provided by government agencies (normally at the municipal level) and private contractors. The latter may provide services either by contract with and on behalf of a government agency, or by direct agreement with the waste generator (as in the case of industrial enterprises generating large quantities of waste).

1.3.2.2 Garbage

Garbage within the region originates from domestic, commercial and industrial sources, with great variations in composition and volume of the latter two streams. Domestic solid waste is estimated as conforming with the following parameters:

Generation rate:	0.2 to 0.6 kg/pers.day
Density:	100 – 350 kg/m^3
Composition (by volume)**:**	High percentages of: food waste (2 to 45 %); packaging materials (16 to 63 %); and garden waste (14 to 44 %)

(WHO, 1996)

The acute shortage of land in many of the Pacific island states places a premium on the availability of suitable areas for competing uses, such as human settlements, agriculture,

forestry, conservation and waste disposal landfills (Plate 1). In the case of coral atolls, even if enough land is available for a waste landfill, it will typically be very close to the sea (often in the order of 10 metres or less). This close proximity poses a risk of inundation of a landfill during storm surges, and also provides minimal opportunity for containment or attenuation of leachate in the highly porous soils before it reaches the sea. In both cases pollution of the marine environment is the result. This may be compounded by the lack of flushing and mixing typical of the low-energy environments of lagoon waters. Furthermore, sand is also a scarce commodity on coral atolls, so other materials need to be sourced and used to provide for periodic covering of a landfill.

Plate 1: The Very Small Land Area of Some of the Pacific Island States Places Severe Constraints Upon National Ability to Dispose of Waste by Landfill

Many municipalities do not have garbage collection services, and those that do are often unreliable with regards to frequency of service and adherence to schedules, and may not cover the entire municipal area. Waste collection is carried out via municipal or contractor collection vehicles, or directly by the waste generator (for example, by larger industrial enterprises) or in private vehicles.

Except for Tahiti, there are no currently sanitary landfills within the Pacific islands region. Garbage is typically disposed of at a landfill or tip. Most landfills or tips are inadequately supervised, encouraging the disposal of some waste types in an inappropriate manner. There is no separation of hazardous or noxious wastes. Dumping into uncontrolled landfills or tips causes contaminated leachate problems and the subsequent pollution of ground, surface and marine waters. There are also problems with vermin, odour, visual aesthetics and the dispersal of garbage by wind. Scavenging is also a problem in some states, with attendant human health problems.

Incineration is widely practiced within the region, mainly for hazardous or special materials that are combustible, such as clinical wastes, quarantine items and unused pesticides. Most incinerators are not custom designed for the purpose but rather nothing more then a fireplace with a chimney or an

open pit. As a rule, incinerators within the region are not well operated or maintained.

Some attempts have been made to reduce waste at source, particularly packaging materials. Options include placing refundable levies on refillable bottles and aluminium cans, with a collection fee paid to any person who returns the container for reuse or recycling. An isolated example is a voluntary ban by the population of one island on the import of disposable nappies.

Limited opportunities exist for the recycling of solid waste materials such as scrap iron, aluminium, glass, paper and cardboard. The biggest impediment is access to recycling services, with the nearest aluminium recycling centres in Australia, New Zealand or Singapore. The need to ship recyclable materials overseas adds to cost barriers and makes recycling a marginal, or simply uneconomic prospect. Waste aluminium collection, export and recycling schemes have been established in Cook Islands, Kiribati, Tonga, Tuvalu and Vanuatu. Not all of these are still operating, mainly due to economic pressures and in some cases, antagonistic tax and customs environments. Green waste can be recycled by mulching or composting and used to improve soil condition in gardens, and other putrescible wastes may be suitable for pig or chicken feed.

The most comprehensive recycling programmes within the region exist in Fiji and Tahiti, French Polynesia. Steel, stainless steel, non-ferrous metals (copper, brass, aluminium), paper, cardboard, glass bottles, coloured glass, PET bottles and batteries are collected and generally exported for recycling. Some pre-processing is undertaken before export, such as grinding and compaction. Export destinations are typically Australia, New Zealand, Singapore and Indonesia.

Opportunities also exist for the reclamation and reuse of solid waste. Some of this is informal, such as the stripping of old vehicles for used parts, or the refilling of bottles for locally brewed beverages. Formal schemes include bottling plants distributing their products in refillable glass bottles.

Sea dumping of large, inert and environmentally clean wastes, such as old motor vehicle bodies, is considered a viable waste disposal alternative. The deep waters surrounding many of the states within the region augur to make this an attractive, and environmentally benign, disposal option. This however needs to meet strict IMO guidelines on ocean dumping.

1.3.2.3 Oil

A 1996 United Nations report estimated that in excess of 10 million litres of waste oil per annum is generated by 12 Pacific island nations (this report did not consider Niue or Palau, nor any of the French or US Pacific possessions). Principal sources are electricity generating utilities (almost universally diesel-fired), large mining and industrial complexes, motor transport and shipping.

In some instances, effective programmes for the collection, filtering and reuse of waste oil have been established. These typically involve combustion of the waste oil as supplemental fuel for electricity generation or furnace fuel at industrial premises. Schemes have also been established involving the export of waste oil from smaller island states to Fiji, Nauru and Samoa for processing and reuse. The scheme in Samoa collapsed due to the imposition of an import tax which undermined the economic viability of the project.

Some waste oil is recovered on a small scale and informal basis and reused for:

- protective coatings as a corrosion inhibitor;
- wood preservative and termite barrier;
- marking of sports fields;
- fire accelerant (e.g. for rubbish disposal);
- fuel for firefighting training;
- roadside dust suppressant;
- flea treatment for pigs; and
- weed suppressant.

The environmental acceptability and sustainability of these uses is often doubtful. There also exists the possibility of adverse

effects upon human health, especially considering the impurities likely to be present in the oil.

A significant proportion of waste oil in the region is unaccounted for and is suspected of being disposed of in an environmentally unsound manner. This can be by burial, burning, inclusion within the general garbage stream, or by dumping on land or at sea.

1.3.2.4 Sewage, Wastewater and Stormwater

Septic tanks are the predominant sewage treatment system employed within the region, although wastewater collection and treatment systems have been established in the larger regional centres. At the lower end of the scale, some areas rely upon pit latrines or direct discharge of sewage into marine waters.

Although the focus of many national and foreign aid projects, sewage treatment remains less than optimal, with problems of outdated and overloaded systems which are often incorrectly operated and/or inadequately maintained. Where urban wastewater treatment schemes have been established, their effectiveness may be compromised by lack of effective controls over inputs into the system. Poor urban planning has resulted in the installation of septic systems on the edges of lagoons, with the attendant risk of overflow into marine waters. Additionally, new septic tanks are often commissioned when tanks fill, in lieu of removing the sludge from the original. In many instances sludge removal is not always possible, owing to non-availability of collection trucks or prohibitive costs. When sludge is removed there may be little certainty that it is disposed of in an appropriate manner. Although it can be dried and used as a soil amendment, in many instances it is simply dumped or pumped into ponds not designed for that purpose.

Urban stormwater within the region is usually directed straight into marine waters, in common with typical practices worldwide. This can be expected to carry heavy nutrient and pollutant loads of hydrocarbons, heavy metals, sediments and organic matter, as well as litter and debris. The transport of pollutants in stormwater is accentuated during 'first flush' events, particularly after extended dry periods. Some gross pollutant traps have been fitted to stormwater outlets in places such as Noumea and Papeete, but over most of the Pacific islands region it is the exception rather than the rule. In any event, intense rainfall events can overwhelm pollution containment barriers such as bunds and interceptor pits, thereby permitting additional pollutants to enter the environment.

1.3.2.5 Special and Hazardous Wastes

Wastes typically generated within the region that require special treatment include:

- quarantine items;
- lubricants and engine additives;
- chemicals (acids, pesticides, herbicides, solvents, cleaners, photographic processing chemicals, wood preservatives);
- paints;
- batteries; and
- medical wastes (drugs, infectious materials, sharps and low-level radioactive material).

Limited technical capacity exists within the region for the effective disposal of the more intractable elements of the waste stream. Many wastes requiring special handling are disposed of by inappropriate means, such as to landfill. Some materials, typically quarantine and medical wastes, may be destroyed by incineration, although often in an ineffective manner (Plate 2). The prevailing management preference is to stockpile the more intractable wastes, particularly persistent organic pollutants (POPs), until practicable treatment options become available. This is expected to encompass either the supply and use of suitable incinerators in-country, or export of the wastes to a location where proper disposal can be effected.

Plate 2: Open Pit Used for Incinerating Hospital Wastes in a Pacific Island Nation

The export of hazardous wastes is currently controlled by the Basel Convention. Application of the tenets of the Basel Convention within the Pacific islands region will be reinforced by the provisions of the Waigani Convention, when that treaty enters into force. The imposition of this treaty should ensure that any export within the region of hazardous wastes is undertaken in a manner that presents minimal risk to the environment or the receiving state.

1.3.2.6 Options for Improvement

Numerous international development assistance programmes have aimed to redress the present situation. Although improvements have been made, shortcomings include schemes that are inappropriate in technical and cultural terms, and lack of proper attention to the importance of improving public and institutional awareness.

Regional cooperative arrangements offer some prospects for improving waste management. Schemes either already in operation or mooted for future implementation address recyclable materials, waste oil and hazardous wastes, particularly POPs. Their small-scale, compounded by unavoidable transport costs, suggest that, at best, all of these schemes are likely to have only a marginal economic prospect. Further potential impediments exist in the form of unfavourable tax or customs treatment, and import restrictions, particularly those arising from the Basel and Waigani Conventions.

2. FRAMEWORK FOR MANAGEMENT OF SHIP-GENERATED WASTE

2.1 Ship Waste Management Continuum

Management of ship-generated waste operates within a web of regulatory

requirements, ship operating profiles and technical waste management capabilities. These in turn are linked to the types and amounts of waste that ships generate and the ports through which they operate. Thus, the ultimate management of ship waste is influenced by a complex amalgam of many factors. These include international, regional, national and local pollution prevention and waste management regulations, disposal options available in the waters where vessels operate, waste types and quantities generated, onboard treatment or disposal capabilities, and available port reception facilities.

Holistic management of ship-generated waste has many facets, with the effective management of each component being fundamental to the achievement of successful and sustainable outcomes. These individual components can be summarised as:

- legal framework (international, regional, national [and municipal, in some cases]);
- delineation of responsibilities for planning and operations;
- waste reduction at source (i.e. in ships);
- facilities and procedures for waste collection (including coordination between ports and ships, and regional cooperation);
- final disposal options (including reuse and recycling);
- fee structure and cost recovery mechanisms;
- compliance checking and enforcement;
- education, information and training;
- monitoring, audit and review; and
- obtaining implementation funds.

The initiation of many vessel-waste reception schemes will also, in many instances, involve sourcing adequate funds, especially for capital costs. A short synopsis of the key attributes that are required for each of these components is presented in the following sub-sections. Further guidance is provided in IMO publications, namely the *Comprehensive Manual on Port Reception Facilities* and the *Guidelines for Ensuring the Adequacy of Port Waste Reception Facilities*. Examples of philosophies and practices for the management of ship-generated wastes in other regions and nations are presented in Appendix A.

The Australian Framework for Managing Ship Waste

A comprehensive framework for the management of ship-generated waste is being constructed in Australia. Elements of this framework are:

- accession to relevant IMO marine pollution prevention conventions;
- expression of these IMO conventions through effective and comprehensive national enabling legislation;
- an effective and rigorous regime of Flag State and Port State Controls, including effective sanctions and deterrents for non-compliance;
- a programme of surveillance and reporting of alleged breaches of ship discharge regulations;
- a comprehensive education and information campaign;
- an assessment of the demand for and the best means of providing adequate port reception facilities, including for small vessels operating from boat harbours and marinas (i.e. the ANZECC *Best Practice Guidelines for Waste Reception Facilities at Ports, Marinas and Boat Harbours in Australia and New Zealand*);
- a programme of cooperative implementation at the regional level (i.e. with New Zealand), and with other relevant national, state and port authorities, as well as ship owners and operators;
- an assessment of the adequacy of existing port waste reception arrangements and the implementation of a range of demonstration projects to improve such facilities; and
- publication, with regular updating, of a widely available guide to port waste reception facilities in the Australia/New Zealand region, as well as advice of these facilities to the IMO for subsequent promulgation.

Apart from waste minimisation practices adopted at the source, it cannot be over-emphasised that the physical aspects of waste management involve three inter-dependent components, namely:

- collection of waste at point of origin;
- removal of waste from the point of origin to the point of disposal or treatment; and
- treatment or ultimate disposal in an environmentally acceptable manner.

Any system will fail if any element of this waste management trident fails.

2.1.1 Legal Framework

The prevention of pollution of the sea from vessels is regulated by a large number of international conventions and national laws. The IMO is the coordinating forum for the development and implementation of international maritime agreements, variously addressing ship safety, navigation and marine environmental protection. Other regional fora and agreements addressing marine pollution prevention are also in operation, many undertaken in cooperation with the IMO; SPREP's PACPOL initiative is an example. The legal framework is expanded upon in Section 2.2.

Translating MARPOL 73/78 into Effective National Laws and Regulations

All international and regional conventions addressing marine environmental management rely upon signatory nations to enshrine their provisions within complementary national laws. The IMO has identified four key objectives of complementary national legislation. It should:

- Give effect to MARPOL 73/78 and connect it with any applicable regional agreements, national laws and local regulations.
- Provide a focus on implementation of MARPOL 73/78 once it has been ratified (including defining implementation responsibilities, and control mechanisms [such as licences and permits]).
- Provide appropriate power to relevant authorities to enforce the legislation (inspection powers, and penalties for non-compliance).
- Establish a framework for the setting of specific implementation and control regulations.

Not all Pacific Island States have become parties to the various conventions, or all components of them and, of those that have, many are yet to enact national enabling legislation.

It should be noted that MARPOL 73/78 and similar agreements only set standards for discharge of pollutants from ships to sea; they have no control on what happens to the material once it has been discharged to shore. Actual waste collection, transport and disposal operations therefore need to be regulated to ensure that all activities are undertaken in an environmentally and socially responsible manner. This can be achieved via suitable licence and registration schemes.

National implementation of MARPOL 73/78 need not only involve the enactment of laws specifically linked to the agreement. Laws dealing with matters such as waste management, hazardous materials, quarantine, public health, environmental protection, coastal and marine resource management and protection, and land use planning are also likely to have relevance to the planning for, and actual disposal of, ship-sourced waste.

PACPOL has drafted a Model Marine Pollution Prevention Act that fulfils all the objectives stated above. This model legislation has been made available to all member states. The Cook Islands enacted their national legislation using this model as a guide.

2.1.2

2.1.3 Delineation of Responsibilities

Distinct responsibilities exist for the various components of the continuum of measures that are needed to properly manage ship-generated waste. In broad terms, the key responsibilities are as follow:

- national governments - responsible for setting and enforcing the legislative framework and assistance in securing/funding pertinent infrastructure;
- port operators - for providing requisite reception facilities and procedures;
- waste disposal facility operators or recyclers - for accepting and treating wastes; and
- vessel operators and crews - for adhering to waste management requirements.

The actual delivery of these services can involve many different parties, sometimes operating in a number of capacities. For example, although national governments may enter into international agreements and enact complementary national legislation for marine environment protection, a range of government agencies may have varying roles and responsibilities to achieve stated national objectives. Interested national

government agencies may typically cover the portfolios of environment, planning, health, agriculture (quarantine), transport (or shipping) and foreign affairs. Municipal governments may also have input, through, for example, planning and waste management schemes and regulations.

In the case of port operators, these can be government port authorities, municipal government, stevedoring companies, shipping companies, mining companies or other private enterprises. The actual functions of ship waste collection and disposal can in turn be let to private contractors.

Whatever the blend of responsibilities, it is important to ensure that all aspects of ship-waste management are effectively addressed. Ship waste management regulators, planners and operators must be vigilant to ensure that there are no omissions, oversights, gaps, contradictions or inefficient and unproductive overlaps in the discharge of their collective responsibilities. This can be achieved through appropriate planning, dialogue, cooperation and liaison.

2.1.4 Waste Reduction at Source – Improvements in Ship Waste Management Procedures

Waste reduction is a key component of effective waste management. This can be achieved by ships by critically examining onboard materials and procedures in order to limit the amount of waste generated. It can also be achieved by complying with MARPOL 73/78 requirements for the fitting and operation of onboard pollution control equipment.

Any reduction in the rate of generation of waste onboard vessels will simplify port waste reception requirements by limiting the quantities of waste to be accepted by the port.

2.1.5 Facilities and Procedures for Waste Reception in Ports

As defined by the IMO, facilities and procedures in ports for the collection and disposal of ship-generated waste must be adequate in all respects for the varieties and quantities of wastes typically generated by vessels normally using the port. Actual determinants of *adequacy* are discussed further in Section 2.2.2.2.

Coordinating Waste Management Procedures Between Ships and Ports

It is important for ships and ports to coordinate waste management activities. This should be done to ensure that waste is transferred in a timely manner, ideally simultaneously with other gainful activities while in port to reduce risk of undue delay. It is also important to provide a means of recognising and addressing actual or alleged inadequacies of port waste reception facilities. Coordination of ship and port activities can be achieved by:

- ports providing notification to seafarers and shipping agents of port waste reception facilities and requirements for their use (such as through the IMO and via port guides);
- prior notification to ports by ships of their waste discharge requirements – this facilitates planning for the transfer, including scheduling discharges to coincide with other productive activities, arranging necessary contractors and ensuring appropriate equipment is available;
- monitoring/spot checks of waste transfers, to ensure that reception capacity and means of transfer are adequate and avoid spills, and providing a means for ship masters (or agents) to report alleged inadequacies to port authorities (if deemed necessary, in parallel with reports to the IMO using standard pro forma); and
- ensuring that subsequent handling of waste is undertaken in a manner which does not risk human health or safety, nor the environment.

2.1.6 Final Disposal Options

Ultimate use or disposal of the waste material collected from vessels must be environmentally sustainable. Two elements of the waste management hierarchy need to be addressed, namely waste reuse and recycling. Waste reuse and recycling should be applied when there are regular and realistic opportunities to obtain productive use of waste in an economical manner with net environmental benefit. When reuse or recycling are not viable options, then waste disposal should be undertaken in a manner which is sustainable and avoids or minimises potential adverse environmental impacts, chronic or acute. This latter consideration is particularly germane to Pacific island states, especially those with extremely limited land areas.

Quarantine is also a very important waste management issue for the Pacific islands. If waste is to be accepted from ships which travel internationally, then this waste material must be handled and disposed in a manner which minimises the risk of unwanted introductions of biota, fungi, viruses and bacteria.

In short, it is counter-productive to recover waste from ships if the shore disposal option simply translates a potential marine pollution problem into a land pollution problem, and/or causes unacceptable impacts on local communities.

2.1.7 Fee Structure and Cost Recovery Mechanisms

The provision, operation and maintenance of waste reception facilities, plus the actual disposal or treatment of wastes, involve costs. It is important that these costs are recognised, quantified and recovered, to ensure that the waste reception and disposal procedures do not place inordinate financial burdens on parties that do not generate the waste. When distributing costs and developing pricing mechanisms for the provision and operation of ship waste reception facilities, responsible bodies should ensure that:

- the 'polluter pays' principle is followed;
- costs and charges are visible and accountable;
- the system equitably distributes costs among the various ‘heavy', ‘moderate' and ‘light' users; and
- charges and their method of application do not discourage vessel operators from using the facilities to properly and responsibly manage their wastes.

Current prospects for significant income generation from waste management enterprises in the Pacific islands region are marginal. Nevertheless, latitude may exist to defray waste management costs by income generated from the waste if this involves materials recovery by recycling or reuse. Examples include recycling of aluminium cans and glass, and filtering/reuse of waste oil as a fuel.

The PACPOL Strategy and Workplan endorsed by SPREP member states recommends the adoption of a policy that compulsory waste management fees will be paid by vessels visiting Pacific island ports, regardless of whether waste is actually discharged to shore. This policy should ensure that fees for waste disposal do not become a disincentive for responsible waste disposal, as vessel operators will not gain any financial advantage by avoiding a particular port or its reception facilities. This approach has been identified by the International Chamber of Shipping as one of the most critical ingredients to achieving proper use of port waste reception facilities by ship operators.

Nevertheless, it is important that compulsory fees are set equitably across a region and at a realistic level. Furthermore, their application and collection mechanisms should recognise the varying operating profiles and waste generation characteristics of Pacific island shipping and be consistent with a port’s capability to receive and properly manage the waste. In essence, fees must be set for the specific purpose of receiving and properly disposing of ship-sourced waste, and not merely as form of taxation upon shipping.

Several broad charging strategies exist, given that the recommended policy of

PACPOL is to charge fees irrespective of whether or not ships will actually request waste reception during a particular port visit. Possible charging strategies include:

- applying a uniform charge on all vessels entering a port, regardless of factors such as ship size, number or persons borne, or type/s of waste produced, etc;
- applying charges based upon a single criterion, such as vessel displacement or number of persons onboard;
- applying charges based upon an amalgam of factors such as vessel displacement, number of persons onboard, types and quantities of waste typically generated, duration of stay, etc;
- applying set charges for individual categories of waste that a vessel may normally be expected to land (for example, yachts would normally discharge minor volumes of garbage and some oily wastes to shore, but would generally have minimal requirement to discharge oily bilge water, so yachts would only be charged set fees for garbage and waste oil, but not oily mixtures); and/or
- taking account of the frequency of visits to a particular port, so that vessels based at a port and which frequently return to that port with minimal quantities of waste onboard do not face the same full charge every time they return, compared to itinerant and irregular visitors which may carry more waste.

In setting port waste management charges it is also important to ensure that vessel operators who fit, properly maintain and effectively use marine pollution prevention equipment do not incur the same financial imposts as those who do not have or do not properly operate such equipment. The fitting and operation of ship pollution control equipment incurs costs for operators, while in most cases simultaneously reducing their demand on port reception services. Application of port waste reception fees should therefore attempt to reward responsible ship operators by reducing port waste reception fees. Otherwise the lack of such cost differential can effectively impose a double financial impediment by providing no financial incentive for ship operators to fit pollution control equipment.

Notwithstanding the complexity of factors which must be considered when formulating a fee system, it is important that any fee structure is relatively straightforward to interpret and implement, and that the fees imposed are fair, realistic and not beyond the reasonable means of those who will be required to pay them.

2.1.8 Compliance Checking and Enforcement

Two approaches are provided under international law for national authorities to ensure compliance with marine pollution prevention practises by both domestic and international vessels. These are ‘Port’ and ‘Flag’ state powers which furnish national regulators with the legal authority to conduct compliance inspections and enforce international convention requirements on:

- any vessel registered in a nation which is a signatory to a ratified convention ('Flag State' controls); and
- any vessel, of any nation of registration, when in the port, offshore installations or anchorages of a signatory to a given convention (Port State controls).

In addition to these international powers, enactment of national legislation can provide maritime authorities with the inspection and enforcement powers necessary to ensure compliance by domestically registered vessels.

Compliance checking and enforcement can be undertaken under a regional framework, whereby states cooperate in the checking of ships, and the application of any enforcement measures in the event of a breach of regulations. Cooperative mechanisms can include elements such as information exchange, training of inspectors, tracking of vessels known or suspected to be in breach, uniform application of sanctions against vessels in breach (e.g. detainment or prohibition of vessels entering ports), identification of vessels presenting greatest risk, or coordinated inspection programmes.

A number of regional agreements relating to Port State Control are currently in effect around the world, including the Pacific region. These are:

- the Memorandum of Understanding on Port State Control in the Asia-Pacific Region (Tokyo MOU);
- the Paris Memorandum of Understanding on Port State Control (Paris MOU), which covers the North Atlantic;
- the Acuerdo de Viña del Mar (Viña del Mar or Latin-America Agreement), which covers South America;
- the Memorandum of Understanding on Port State Control in the Caribbean Region (Caribbean MOU);
- the Memorandum of Understanding on Port State Control in the Mediterranean Region (Mediterranean MOU);
- the Indian Ocean Memorandum of Understanding on Port State Control (Indian Ocean MOU); and
- the Memorandum of Understanding for the West and Central African Region (Abuja MOU).

Regional agreements are also under development for the Black Sea and the Persian Gulf.

The Memorandum of Understanding on Port State Control in the Asia-Pacific Region (Tokyo MOU)

The Tokyo MOU is an Asia-Pacific regional agreement for the cooperative implementation of Port State Controls. The MOU provides a framework for the coordination of port state inspections for ships operating in the Asia and Pacific areas, and the exchange of information. IMO conventions covered by the MOU address ship safety and marine environmental protection, and include MARPOL 73/78. The Tokyo MOU is supported by a computerised database, the Asia-Pacific Computerized Information System (APCIS), which is operated from Vladivostok, Russia.

Of the Pacific island nations, only Fiji, Papua New Guinea and Vanuatu are parties to the MOU, with the United States of America (a territorial administrator) and the Solomon Islands both holding the status of Observer. Other member nations, including Australia, New Zealand, China, Japan, the Republic of Korea, the Philippines and Singapore, collectively represent many of the ports of origin and/or destination of merchant shipping in the Pacific islands region.

International maritime agreements provide the powers necessary for Port and Flag State powers of inspection and enforcement. These can be, and should be, implemented through the drafting and subsequent proclamation by the government of national laws and regulations. These laws should provide appropriate powers to maritime inspectors and establish adequate penalties in the event of any breach of the requirements they set.

Effective inspection and enforcement regimes require:

- suitably trained and resourced inspectors;
- effective liaison with Flag state authorities (i.e. where ships are registered) and other regional ship inspection authorities;
- an effective programme of inspections which provides a high degree of confidence that all ships are captured within the inspection scheme, especially those considered to present the greatest risk of non-compliance;
- ship tracking and reporting mechanisms, especially in the case of ships considered to present a risk of non-compliance or positively ascertained to be in non-compliance;
- the establishment of adequate penalties, under national legislation, for contravention of convention requirements; and

- reciprocal enforcement mechanisms, whereby ships ascertained as non-compliant by one jurisdiction can be prosecuted and penalties imposed by another exercising Flag or Port State controls over that vessel.

At the national and local levels, additional effort will be required by the Pacific island states to ensure compliance with regulations concerning waste handling and disposal. Mechanisms for regulating these activities may include a system of licences and permits, safeguarding both public health and environmental interests. License or permits would typically be issued and regulated by national or municipal authorities and would cover requirements such as waste collection, and storage and transport methods, and the location and method of disposal.

2.1.9 Education, Information and Training

Any efforts at collecting and disposing of ship-generated waste will be of limited value if the organisations and individuals involved are unaware of the measures in place and the reasons for them, and their individual roles and responsibilities in minimising marine pollution.

Education and training is fundamental to ensure that involved persons understand their individual and/or collective responsibilities, such as:

- how to properly plan for and use ship waste reception facilities and related procedures;
- how to introduce means of reducing ship-generated waste and minimising discharge of such wastes to the marine environment;
- the correct operation and maintenance of waste reception and treatment facilities and equipment;
- environmentally sound methods for the treatment or disposal of the collected waste;
- inspection, compliance checking and enforcement techniques;
- incident response measures; and
- monitoring, audit and review procedures.

Education programmes should be aimed at creating an initial awareness of marine pollution issues, with this message reinforced and developed through ongoing information programmes. Primary awareness may be best achieved for commercial seafarers during their initial or follow-up training at the various maritime training colleges in the Pacific islands. Ongoing information and education can be achieved by maritime colleges, maritime regulators and environmental agencies working collaboratively. Regional agencies already have marine pollution information programmes in place, and these may form a suitable base for ongoing marine pollution education efforts. It is important to ensure adequate education for those who operate vessels but are unlikely to train at a maritime college; these include groups such as recreational boaters and those engaged in small-scale fishing operations. Port staff and waste contractors will also need some awareness of ship waste management requirements and characteristics.

2.1.10 Monitoring, Audit and Review

Any measures implemented to manage the reception and disposal of ship-generated waste need to be continually monitored and periodically audited to assess their effectiveness, delineate any shortcomings and identify means of improvement. Monitoring may be informal, such as visual checks on the rate of use of bins (e.g. in relation to their holding capacity and frequency of being emptied), or more structured and undertaken in accordance with a pre-determined timetable. Monitoring and audit actions can include:

- recording the frequency, quantity and types of waste transferred to shore;
- inviting and investigating reports of alleged inadequacies made by ship operators;
- reviewing management reports from port operators, including data on the use of ship waste reception facilities and the nature, frequency and responses to incidents;
- determining the use and effectiveness of ship waste reception facilities via

formal audit procedures (such as the ANZECC monitoring/auditing programme for marinas, boat harbours and ports); and/or

- checking water condition in ports where water quality is degraded or marginal, and where this effect is caused or contributed to by vessel-sourced discharges.

Whatever the monitoring and audit regime used, it should be tailored to the particular circumstances and requirements of the particular port. The findings of monitoring and audit programmes should subsequently be reviewed by management to determine the effectiveness or otherwise of procedures employed by the port. Where deficiencies are identified, the review process should initiate corrective actions to rectify the shortcomings.

2.1.11 Funding

Funding for the development, establishment and sustenance of ship-waste reception and management is a critical component of the continuum. While ongoing funding will ideally be provided by port waste management charges, seed funding will be needed in most ports for the initial set-up of waste reception facilities and procedures. Some of this may be available from national governments, or alternatively from corporate sources, if it is decided that to let contracts for waste reception services actioned through contracts.

Realistically, however, it is most likely that some sort of assistance, either in cash or services, will be required to establish requisite waste programmes, especially pilot programmes. Potential sources of funds for Pacific island ports are numerous, and include:

- the Asian Development Bank;
- aid agencies of Australia, New Zealand, France, the European Union, Canada, the United States of America and Japan;
- funding programmes organised through the IMO (once a state has acceded to the relevant convention/s); or
- national waste management initiatives of metropolitan governments in territories under their administration.
- implementing a regional cooperation programme similar to the Wider Caribbean Initiative for Ship-generated Waste (WCISW).

2.2 Regulatory Framework for Management of Ship-Generated Wastes

2.2.1 Introduction

The prevention of pollution of the sea from vessels is regulated by myriad international conventions and national laws. The IMO is the coordinating forum for the development and implementation of international maritime agreements, variously addressing ship safety, navigation and marine environmental protection. Other regional fora and agreements addressing marine pollution prevention are also in operation, many undertaken in cooperation with the IMO; SPREP and the PACPOL initiative are examples.

A range of IMO conventions are concerned with marine pollution prevention. Principal among these, and of greatest relevance to this project, is MARPOL 73/78. Other IMO conventions of less-direct or incidental relevance are:

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (the London Convention), plus the *1996 Protocol*; and

International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990 (OPRC 90).

The SPREP Convention (*Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, 1986*) also specifically addresses vessel-sourced pollution. Additionally, the SPREP Pollution Emergencies Protocol (*Protocol Concerning Cooperation in Combating Pollution Emergencies in the South Pacific Region*) places an obligation upon

participating nations to prevent and reduce the risk of pollution incidents.

All of the international conventions rely upon signatory nations to enshrine their provisions within complementary national laws. Not all Pacific island or metropolitan nations have become parties to the various conventions, or all components of them and, of those that have, many have yet to enact national enabling legislation.

2.2.2 MARPOL 73/78

MARPOL 73/78 is concerned with the management of 'operational wastes' from shipping, as opposed to sea dumping. Operational waste is considered to be that which is generated during the course of the normal activities of a vessel, as opposed to waste material which may be carried by a ship for the express purpose of disposing that material at sea, otherwise referred to as 'sea dumping'. Operational waste can be further subdivided into three components:

- Domestic waste – all food wastes and other material produced by passengers and crew in the vessel's living spaces;
- Maintenance waste – waste generated in the routine operation and maintenance of the vessel's engineering equipment and hull; and
- Cargo-associated wastes – all waste materials produced as a result of cargo stowage and handling.

The treaty has six annexes, addressing oil (I), noxious liquid substances (II), harmful packaged substances (III), sewage (IV), garbage (V) and air emissions (VI). Annexes I and II are 'compulsory', in that accession to the treaty automatically carries with it accession to these annexes; all other annexes are optional. Annexes I, II, III and V have been ratified by the community of nations and are currently in force. Annexes IV and VI have yet to be ratified by the requisite number of nations and are not yet in force, although Annex IV is largely being observed by world shipping. Annexes I and V are of principal interest to this project, plus Annex IV to a lesser extent.

MARPOL 73/78 essentially revolves around prohibiting the discharge of polluting materials to sea, except for selected materials and only when a ship is in an area where such disposal is permitted, and in accordance with other regulations stipulated by the Convention. The Convention also provides a framework for:

- the provision of adequate port reception facilities;
- ship construction and equipment standards, set in order to reduce the risk of marine pollution, particularly of oil or chemicals in the event of accident;
- a ship survey and inspection regime, and cooperation between governments for enforcement and the detection of violations;
- a framework for the reporting of ship accidents involving oil or harmful substances; and
- promotion of the exchange of information and technical cooperation.

The Convention has declared a number of 'Special Areas', denoted for their particular sensitivities to marine pollution. More stringent discharge restrictions apply in Special Areas. Nine Special Areas have been designated to date, none of which occur within the Pacific islands region. MARPOL 73/78 is also able to declare 'Particularly Sensitive Sea Areas' (PSSA), where discharges are banned completely; the Great Barrier Reef region of Australia is the only PSSA declared to date.

Although only covered by the Convention in an incidental sense (and technically covered by the provisions of Annex V), residues of bulk cargoes are considered to require a greater focus. It is envisaged that MARPOL 73/78 will be strengthened in the near future to better address these wastes.

2.2.2.1 Discharge Restrictions Under MARPOL 73/78

A synopsis of MARPOL 73/78 discharge restrictions is presented in Table 3.

Annex I essentially bans the discharge to sea of oily wastes. The provisions of Annex I apply to any tanker of 150 tons GRT or greater, or any other ship of 400 tons GRT

or greater. Discharges are only permitted under clearly defined circumstances. Annex I specifies that the Administration (i.e. the government of the signatory nation) shall ensure that vessels less than 400 tons (or tankers less than 150 tons) are equipped as far as practicable and reasonable with installations to ensure the storage of oil and its discharge to reception facilities or into the sea in compliance with the regulations (i.e. an oil in water concentration of less than 15 ppm, plus other conditions). Vessels under 400 tons are not required to be fitted with oily waste management equipment, but are not expected to discharge any oily wastes to sea.

Ships over 400 tons built since the late 1970s, such as merchant ships and passenger liners, are required to be fitted with large slops tanks and waste oil tanks, plus oily water filtration and discharge monitoring equipment. These tanks store waste oil and fuel sludges, and may be of sufficient capacity to permit many months of operation before emptying. Tankers are similarly required to have slops tanks of sufficient capacity to also accept tank washings and any oil contaminated ballast residue.

Most garbage may be discharged to sea, provided that the ship is in an appropriate position in relation to nearest land or Special Area. Food waste has the least stringent discharge conditions. Plastic and materials containing plastic are totally prohibited from discharge, as are any toxic or noxious substances, or those containing oil (including oily rags).

Sewage disposal is essentially only regulated in coastal waters, with the discharge of treated sewage permitted under specified conditions once a vessel is at least four miles clear of nearest land; untreated sewage can be discharged when a vessel is at least 12 miles clear of land.

Under the strict terms of the Convention, warships and naval auxiliaries are exempt from the requirements of MARPOL 73/78. Nevertheless, it is expected that such ships will comply with the general intent of the treaty and many nations require their navies to at least *voluntarily* observe the treaty. The navies of Australia, New Zealand and the United States of America generally observe MARPOL 73/78 and in some cases apply more rigorous discharge restrictions.

Table 3: Synopsis of MARPOL 73/78 Pollutant Discharge Regulations (Annexes I to V)

Waste Type	Disposal Outside Special Areas	Disposal Within Special Areas
Oily Wastes (Annex I)		
Oil or oily mixture originating from cargo or cargo handling areas in oil tankers of 150 GRT or greater.	Prohibited, except when: a. the ship is underway; b. the ship is > 50 nautical miles from nearest land; c. instantaneous rate of discharge of oil does not exceed 30 L per nautical mile; d. total quantity of oil discharged does not exceed 1/30,000 of the quantity of cargo being carried; e. ship has appropriate oil pollution control equipment (e.g. filters, alarm, automatic shut-off, slop tank).	Disposal prohibited.
Oil or oily mixture from ships of 400 GRT and above or oil tankers of 150 GRT or greater (except from cargo and cargo-handling areas).	Disposal prohibited, except when: a. the ship is underway; b. oil content of the effluent before dilution does not exceed 15 ppm; c. ship has appropriate oil pollution control equipment (e.g. filters, alarm, automatic shut-off).	Disposal prohibited, except for processed bilge water when: a. (in the case of oil tankers) bilge water does not originate from cargo areas or is mixed with oil cargo residues; b. the ship is underway; c. oil content of the effluent before dilution does not exceed 15 ppm; d. ship has appropriate oil pollution control equipment (e.g. filters, alarm, automatic shut-off).
Oil or oily mixture from ships of less than 400 GRT, excluding oil tankers.	Disposal is discouraged and prohibited except when oil content of the effluent before dilution does not exceed 15 ppm.	Disposal prohibited, except when oil content of the effluent before dilution does not exceed 15 ppm.
Oil sludge (from holding tanks).	Disposal prohibited.	Disposal prohibited.
Oily rags, used oil filters and similar.	Disposal prohibited.	Disposal prohibited.
Noxious Liquid Substances in Bulk (NLS)(Annex I1) Note: Liquid substances have been defined by the IMO as either NLS (in one of four categories A, B, C or D) or as 'other' liquid substances which are not considered harmful.		
NLS, including residues or mixtures containing NLS.	. Category A prohibited. . Categories B, C and D under certain conditions, including not less than 12 nautical miles from nearest land.	. Category A prohibited. . Categories B and C under certain conditions slightly more stringent than for external to Special Areas, including not less than 12 nautical miles from nearest land. . Category D, same as for outside Special Areas.
Harmful Substances Carried in Packaged Forms (Annex II1)		
Disposal of harmful substances carried in packaged form, including empty packages.	Discharge prohibited (NB: Annex III does not define special areas).	Discharge prohibited (NB: Annex III does not define special areas).

Waste Type	Disposal Outside Special Areas	Disposal Within Special Areas
Sewage (Annex IV) [not yet in force]		
Comminuted and disinfected sewage from ships of 200 GRT, or less if certified to carry more than 10 persons.	Disposal prohibited except when ship is: a. > 4 nautical miles from nearest land; b. underway at a speed not less than 4 knots.	NB: Special Areas have no application under Annex IV.
Sewage which is not comminuted or disinfected from ships of 200 GRT, or less if certified to carry more than 10 persons.	Disposal prohibited except when ship is: a. 12 nautical miles from nearest land; b. underway at a speed not less than 4 knots.	n/a
Treated sewage (in an IMO approved sewage treatment plant).	Nil restrictions.	n/a
Garbage (Annex V)		
Plastics.	Disposal prohibited.	Disposal prohibited.
Floating dunnage, lining and packing materials.	> 25 nautical miles from nearest land.	Disposal prohibited.
Paper, rags, glass, metal, bottles, crockery and similar refuse.	> 12 nautical miles from nearest land.	Disposal prohibited.
All other garbage including paper, rags, glass, etc. comminuted or ground.	> 3 nautical miles from nearest land.	Disposal prohibited.
Food waste not comminuted or ground.	> 12 nautical miles from nearest land.	> 12 nautical miles from nearest land.
Food waste comminuted or ground.	> 3 nautical miles from nearest land.	> 12 nautical miles from nearest land.
Mixed refuse.	Determined by the most stringent conditions applying to any single component of the mixture.	Disposal prohibited.
Toxic or noxious materials.	Disposal prohibited.	Disposal prohibited.

2.2.2.2 Requirements for Port Reception Facilities

Accession to MARPOL 73/78 obligates signatories to ensure the provision of waste reception facilities in ports adequate to appropriately meet the needs of vessels *normally* using them. This requirement is mainly addressed in general terms, although quite specific requirements are stipulated for selected categories of ships and/or their cargoes and their associated wastes (those covered by Annexes I and II).

IMO Waste Reception Requirements

General requirements stipulated by the IMO for reception facilities are:

- Reception facilities should be of sufficient capacity so as to be capable of receiving those wastes and mixtures likely to be handled at that port. This includes wastes arising from the loading or unloading of ships, as well as from ship refit or repair. Factors to consider include the sizes and types of vessels using the port, and the number of ship visits;
- Ships should be able to discharge wastes without causing any undue delay to their programme. Ideally, wastes should be able to be discharged while the ship is gainfully employed in some other role, such as loading or unloading;
- Appropriate waste transfer and collection equipment should be provided by the port, such as hose connections and garbage chutes;
- Formalities for the use of reception facilities, such as health, customs and quarantine procedures, should be simplified in order to expedite the transfer of waste from ship to shore;
- Fees for the collection and disposal of wastes should be set so as not to prove a disincentive to proper waste management;
- The treatment and ultimate disposal of wastes landed by ships should be conducted in an environmentally responsible manner; and
- Separate ports within a region should cooperate in the reception of ship-generated waste. This is particularly the case in areas where ports may refuse to accept certain wastes. Failure to cooperate in these circumstances may compel ships to discharge wastes at sea illegally in the absence of satisfactory shore disposal options.

Specific waste reception requirements for oily wastes (Annex I) and noxious liquid substances (Annex II) are mandated by MARPOL 73/78. For example, some of the circumstances under which oily waste reception facilities *must* be provided are:

- ports and terminals at which oil (other than crude oil in bulk) is loaded at an average quantity in excess of 1,000 tonnes per day;
- ports having ship repair yards or tank cleaning facilities;
- ports and terminals which handle ships provided with sludge tanks (i.e. ships of 400 GRT or greater, constructed in accordance with MARPOL 73/78 requirements); and
- ports which accommodate ships with oily bilge waters and other residues which cannot be discharged in accordance with MARPOL 73/78 requirements (i.e. any ship less than 400 GRT not fitted with an oily water separator).

Although not required at present, once Annexes IV and VI come into force, then ports shall also be required to provide appropriate reception facilities for sewage, ozone depleting substances and engine exhaust cleaning residues.

Parties to the Convention are required to notify the IMO of details of waste reception facilities provided within their ports. Should ships encounter waste reception facilities or procedures which are considered to be inadequate, then the Master is encouraged to submit a report of the alleged inadequacy, through his/her national government, to the IMO for review and initiation of rectification action if warranted.

Noting that Annex VI is not yet in force, and that shipment of bulk quantities of noxious liquid substances (addressed by Annex II) is not a feature of shipping within the Pacific islands region, this project does not address Annexes II or VI waste management issues.

2.2.3 London Convention

The *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972* (London Convention) is concerned with 'sea dumping', which is the act of taking material to sea specifically with the intention of disposing of it at sea, either

by dumping or incineration. The Convention addresses such activities as the dumping of dredge spoil, sewage sludge and municipal garbage, and the scuttling of ships. It does not address wastes generated during the normal conduct of ship activities (these are covered by MARPOL 73/78).

The 1996 Protocol to the London Convention essentially revises and refines the original Convention. It is intended that the 1972 agreement will eventually be usurped as more nations adopt the 1996 Protocol.

The London Convention is relevant to this project in-so-far as it regulates options for the disposal of ship-generated waste once it has been landed in port. For example, ship-sourced oily wastes or organic pollutants which may have accumulated in a port cannot be disposed of by sea dumping. Alternatively, bulky, inert wastes, such as damaged sea containers, may be dumped at sea provided stringent conditions are met.

2.2.4 Tokyo Memorandum of Understanding

The Tokyo MOU provides for regional coordination of Port State Controls by nations in the Asia-Pacific area. The MOU has a Secretariat and also supports a database for the collation and exchange of information. Only three Pacific island nations, Fiji, Papua New Guinea and Vanuatu, are currently parties to the Tokyo MOU, as are Australia and New Zealand. The United States of America and the Solomon Islands are Observers.

2.2.5 OPRC 90

The *International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990* is focused upon providing cooperative, regional responses to combat oil pollution in the event of a spill. An important distinction between MARPOL 73/78 and OPRC 90 is that the former is concerned with preventing marine pollution in the first instance, whereas the latter concentrates upon response after the fact. Nevertheless, a fundamental tenet of OPRC 90 is the reduction of risk of oil spill incidents, with a mechanism of obliging Parties to OPRC 90 to also implement the requirements of MARPOL 73/78.

2.2.6 UNCLOS III

The ability of any nation to exercise regulatory controls over its claimed territorial seas is founded upon international convention. The *United Nations Convention on the Law of the Sea 1982* (UNCLOS III) is the principal instrument for the delineation and codification of the maritime rights and responsibilities of sovereign nations. UNCLOS III is primarily concerned with maritime jurisdiction, rights of navigation, economic activities in littoral waters and similar issues. It also stipulates a general duty for signatories to protect and preserve the marine environment (ANZECC, 1995).

UNCLOS III requires signatories to cooperate in international fora and implement complementary national laws to prevent, reduce or otherwise control pollution of the marine environment from all sources, including vessels. The convention provides for the implementation of Flag and Port State controls. It also furnishes a legal basis for nations to impose vessel pollution control regulations within their EEZs which are more stringent than those promulgated by international laws (e.g. MARPOL 73/78).

2.2.7 SPREP Convention and Protocols

The SPREP Convention is formulated upon a regional desire to preserve and protect the marine and coastal environmental values and resources of the Pacific islands region. The Convention is predicated upon a general recognition that many international treaties and agreements do not adequately address the specific circumstances or conditions of the region, nor take due account of the cultures and traditions of Pacific island peoples. The geographical coverage of the SPREP Convention is defined as all 20 of the Pacific island nations and territories covered by this project, plus Tokelau, Pitcairn, New Zealand and the east coast of

Australia; coverage includes the 200 mile EEZs.

Within its range of requirements, Parties to the convention are obligated to observe and implement relevant international laws, plus the SPREP Convention itself, concerning the sea dumping of wastes and the prevention, reduction and control of pollution from vessels and terrestrial sources. Technical cooperation and the exchange of information within the framework of the Convention is also addressed, including the establishment of bilateral or multilateral agreements designed to achieve the objectives of the SPREP Convention.

The Convention allows for the establishment of annexes designed to address specific issues. Two such annexes have been developed to date: the Pollution Emergencies Protocol (*Protocol Concerning Cooperation in Combating Pollution Emergencies in the South Pacific Region*); and the Dumping Protocol (*Protocol for the Prevention of Pollution of the South Pacific Region by Dumping*).

The Pollution Emergencies Protocol is mainly concerned with regional cooperation for the protection of the Pacific islands region in the event of marine pollution incidents. The protocol also places an obligation upon participating nations to prevent and reduce the risk of these marine pollution incidents, by means such as appropriate legislation, training and education, contingency planning and the provision of relevant equipment and administrative arrangements.

The Dumping Protocol effectively extends and adapts the London Convention for a tailored application to the Pacific islands region.

2.2.8 Status of International Marine Pollution Conventions Within the Pacific Islands Region

A summary of the current state of accession of the various international agreements concerned with marine waste management is presented in Table 4. It should be noted that even though a nation may not be a member of the IMO, it can still agree to abide by IMO treaties.

Table 4: Application of International and Regional Agreements on Marine Waste Management to the Pacific Islands Region

State	IMO	MARPOL 73/78				Tokyo	OPRC 90	London Convention		UNCLOS	SPREP		
	Member	I & II	III	IV	V	MOU		LC 72	1996 Protocol	III	Convention	Dumping Protocol	Pollution Protocol
American Samoa	Note 1	Note 1	Note 1		Note 1	Note 1	Note 1	Note 1			+	+	+
Cook Islands	Note 2	Note 2	Note 2		Note 2	Note 2		Note 2		+	+	+	+
Federated States of Micronesia										+	+	+	+
Fiji	+					+					+	+	+
French Polynesia	Note 3	Note 3	Note 3	Note 3	Note 3		Note 3	Note 3		Note 3	+	+	+
Guam	Note 1	Note 1	Note 1		Note 1	Note 1	Note 1	Note 1			+	+	+
Kiribati	+							+					
Marshall Islands	+	+	+	+	+		+				+	+	+
Nauru	+							+		+	+	+	+
New Caledonia	Note 3	Note 3	Note 3	Note 3	Note 3		Note 3	Note 3		Note 3	+	+	+
Niue	Note 2	Note 2	Note 2		Note 2	Note 2		Note 2					
Northern Marianas	Note 1	Note 1	Note 1		Note 1	Note 1	Note 1	Note 1			+	+	+
Palau										+	+	+	+
Papua New Guinea	+	+	+	+	+	+		+		+	+	+	+
Samoa	+									+	+	+	+
Solomon Islands	+					Note 4		+		+	+	+	+
Tonga		+	+	+	+		+	+		+			
Tuvalu		+	+	+	+						+	+	+
Vanuatu	+	+	+		+	+	+	+	+				
Wallis & Futuna	Note 3	Note 3	Note 3	Note 3	Note 3		Note 3	Note 3		Note 3	+	+	+
France	+	+	+	+	+		+	+		+	+	+	+
New Zealand	+	+	+		+	+		+			+	+	+
United States	+	+	+		+	Observer	+				+	+	+
Australia (Note 5)	+	+	+		+	+	+	+	+	+	+	+	+

Notes:

1. US territory. Although the US has not formally advised the IMO of the extension of coverage of IMO treaties to US territories, US Federal laws which embody IMO treaty obligations apply in these territories. Therefore, IMO treaties to which the US is a Party extend to US Pacific territories.
2. Self-governing in free association with New Zealand (with New Zealand responsible for foreign affairs). New Zealand has not formally advised the IMO of the extension to the Cook Islands and Niue of treaties to which New Zealand is a Party. The coverage of such treaties in the Cook Islands and Niue is, therefore, indeterminate.
3. French territory. France has not formally advised the IMO of the extension to French Pacific territories of treaties to which France is a Party. The coverage of such treaties in these territories is, therefore, indeterminate but have been assumed to apply.
4. Solomon Islands' Observer status to Tokyo MOU pending acceptance.
5. Although not within the Pacific islands region, Australia has been included as it is a Party to MARPOL 73/78 and the Tokyo MOU, so may play a role in ship waste management within the Pacific islands region.

A Synopsis of IMO and ANZECC Guidelines for Ship Waste Reception

The pertinent aspects of the IMO and ANZECC requirements and best practice recommendations for waste reception facilities and procedures are:

- Opportunities should always be sought for waste minimisation through reduction at source, reuse or recycling.
- The ultimate fate of wastes accepted from vessels should be environmentally acceptable (e.g. it is senseless for a port to accept wastes from ships and then dump the waste material at sea).
- Ports, boat harbours and marinas should possess a management plan incorporating a section on waste management. This plan should include procedures for recording the amounts and types of waste received (to continually assess the adequacy of facilities), as well as any incidents (such as spills, overflows or unexpected peaks in demand for services).
- Waste reception facilities and procedures should be of adequate capacity to receive the expected quantities and categories of wastes.
- Procedures should be set and facilities sited so that they are easily accessible and do not cause undue delay to vessel operators.
- The design and construction of facilities need to take account of factors such as: port, vessel and waste characteristics; hazard and risk assessment; occupational health and safety and public health and safety requirements; quarantine requirements; emergency response and clean-up procedures; signage and instructions for use; adequate illumination; and ease of access.
- Adequate containment of waste is required, including: liquid wastes in the event of spill, leak or overflow or stormwater ingress; exclusion of birds and other vermin; and the prevention of wind blown loss of the waste material.
- Proper training and instruction is required for port staff, and adequate information should be provided for use of the facilities by vessel operators.
- The provision and operation of waste reception facilities and procedures should be regularly reviewed and updated as necessary.

3. SHIP-GENERATED WASTES

3.1 Characteristics and Sources of Ship Wastes

Vessels generate a range of waste materials as a consequence of their routine activities. In broad terms, vessel-generated waste may be considered to have one of three origins: waste associated with maintenance and operation of the vessel (e.g. lubricating oil, fuel sludges, paint chips and used engine components); domestic wastes generated by passengers and crew (e.g. food waste and associated packaging, sewage, stationery and printed material); and cargo-associated wastes (e.g. hold sweepings, packing materials, pallets, drums, containers and oil tank residues) (Plate 3).

Plate 3: Accumulation of Cargo-associated Wastes in a Small Pacific Island Port

For the purposes of regulation and management, vessel-generated wastes are generally categorised according to type, with the principal classifications being garbage, oil, sewage and hazardous materials. These categories are often further sub-divided.

3.1.1 Oil and Oily Wastes

Oily wastes originate from:

- lubricating oil and hydraulic oil (used or leaked);
- fuel residues;
- oil sludges (such as from fuel purifiers);
- oily bilge water;
- oil contaminated ballast water;
- oily tank washings;
- oily cargo losses (such as seepage from cargo-handling pumps); and
- used oil filters and oily rags.

Most oily wastes are in the liquid phase, except for oil filters and oily rags which are solid wastes. With the exception of these solid components, oily wastes can be effectively sub-divided into two broad categories. These are:

- concentrated oil wastes (e.g. used lubricants and hydraulic oil, contaminated fuel oil, and oil sludges); and
- oily mixtures, most commonly in a water medium (e.g. oily bilge water, tank washings, oil-contaminated ballast water).

Oily wastes may also contain a range of impurities, particularly the oily mixtures. Typical impurities are detergents, degreasers, engine additives and greases. In addition, oil sludges commonly feature an elevated proportion of solid impurities.

Apart from tankers, oily wastes are principally generated in machinery areas, although some may also derive from cooking oils used in galleys or oils carried as cargo in packaged form. Machinery sourced oily wastes originate from spills or leaks of fuel, hydraulic fluids and lubricating oil, and are also generated during routine maintenance and repair activities such as engine repairs, lubricating oil changes and oil filter replacement. Oily wastes from spills and leaks tend to accumulate in bilges, resulting in oily bilge water. Oily wastes from maintenance

activities are more likely to be collected and stored in some form of container or a waste oil tank in larger vessels. In some vessels, waste oil may be disposed of by draining into the bilge, to be subsequently discharged to sea when bilges are pumped.

In addition to the usual machinery-related sources, tankers also generate cargo-related oily wastes. These are associated with spills and leaks from pumps, valves and liquid cargo transfer systems, tank washings and, in older tankers, ballast water which has not been segregated from cargo tanks. Oily waste may also be generated at the shore receiving facility during cargo transfer operations between ship and shore, such as when a water slug is used to separate different products (diesel and motor spirit, for example) which are pumped ashore through a single line. Cargo-associated oily wastes also include damaged oil storage containers, such as 205 L drums of mineral oils or smaller drums of cooking oils.

Oily sludges result from the purification of fuel oil. The lower the quality of the fuel, the greater proportion of it will be removed by fuel purifiers and accumulated as sludge. Sludge production is primarily influenced, by the rate of fuel consumption, efficiency of the purifiers and the quality of fuel. Fuel oil can also become contaminated, typically with water, rendering it unsuitable for use. In this event the contaminated fuel also needs to be treated as an oily waste.

Many small boats are fitted with automatic bilge pumps. These are a safety feature, particularly for boats which remain unattended for extended periods. If bilge water in these boats contains oily residues, then this too is discharged whenever the pump operates. The operation of automatic bilge pumps while boats are in the enclosed waters of harbours and marinas has the potential to produce localised oil pollution. Two-stroke outboard motors present an additional source of marine oil pollution from oily exhaust residues, particularly motors operating in a less than optimum condition.

3.1.2 Garbage

Much of the garbage generated in ships and boats is analogous to that generated in a residential setting, namely domestic wastes such as food and associated packaging, paper, cardboard, disposable products and other consumer items. This sort of garbage is generated in both commercial and recreational vessels and the amount produced is generally a function of the task/s undertaken by the vessel, the number of people onboard and the duration of the voyage.

Food waste and associated packaging form a significant proportion of the garbage generated in ships, particularly those which operate overnight or longer. It is a reasonable assumption that vessels engaged in day trips would not generate as great an amount of garbage, or food wastes in particular. By virtue of the quantities involved and its putrescible nature, food waste can be difficult to manage. Food waste and associated packaging also present a quarantine risk when it has an overseas origin, or has been mixed with foodstuffs of overseas origin. Within the Pacific islands region, garbage sourced from overseas vessels which contains foodstuffs is generally treated as quarantine waste.

Elements of the garbage waste stream are materials which can be recycled, such as aluminium cans, paper, cardboard and certain plastics. Other components, such as partially damaged shipping containers, and wooden pallets, may be suitable for reuse.

Some garbage generated in vessels is of a hazardous and/or toxic nature, including dry and wet cell batteries, pressure pack containers, and receptacles containing residues of noxious substances such as greases, oils, solvents, paints, adhesives and engine additives. Medical wastes, with associated biological and sharps hazards, are also produced in ships, particularly those carrying many onboard, such as cruise liners and large warships.

Merchant vessels can produce a significant amount of cargo-associated garbage, particularly packaging wastes (damaged

containers, broken pallets, empty drums, dunnage, steel strapping, used lining and packing materials) and cargo residues (deck and hold sweepings, spillages).

Fishing vessels may also be a source of significant amounts of garbage. This can include used nets and trawl gear, marker buoys, bait boxes and the plastic packing straps used to bind these boxes. Litter and debris from commercial fishing activities has been recognised as a persistent and widespread problem in oceanic and coastal zones. Larger fishing vessels, and support ships, undertake varying degrees of fish processing on board, and generate solid (and liquid) waste products. Bycatch, of non-target species, can also be considered as a form of garbage from fishing boats if it is not returned to the sea while still alive, although disposal at sea is likely to be preferable to returning the by-catch to land.

MARPOL 73/78 permits most types of garbage to be disposed to sea, provided the discharge is beyond the minimum mandated distance from nearest land (see Table 3). No plastics or toxic or hazardous materials can be discharged to sea. The geography of many Pacific island states, with many small islands and islets, and rocks and reefs exposed at low-water means that the mandated distances for disposal of garbage may be much further out to sea than might otherwise be expected. The practical consequence of this is that coastal shipping may rarely be in a position where even food waste, with the least stringent disposal criteria, can lawfully be discharged to sea.

3.1.3 Special, Hazardous and Noxious Wastes

As noted in Section 3.1.3, vessels also generate a range of noxious and hazardous wastes, or materials which otherwise require special treatment. These are usually solids or liquids, but also include gaseous products. Wastes may be present as toxic, flammable, explosive, corrosive, poisonous, radioactive or infectious hazards. Many of the materials associated with hazardous and noxious wastes are Persistent Organic Pollutants.

Special, hazardous and noxious wastes are frequently mixed with general garbage and often appear to be innocuous. Typical items which may be encountered in vessel-generated waste include batteries, pressure pack containers, greases, oils (packaged), solvents, acids, paint, paint chips, adhesives and engine additives. Medical wastes, with associated biological and sharps hazards, also need special handling and disposal (and can present an additional quarantine risk).

In the case of livestock carriers, special wastes may also include animal-related wastes such as urine and faeces, and any carcasses. Similarly, fishing vessels may generate special wastes in the form of putrescible catch residues, bycatch, processing wastes, or bulky fishing gear requiring special handling.

Certain cargoes, such as bulk or packaged liquid chemicals (e.g. empty CCA [wood preservative] containers), and fertilizers will produce cargo and packaging residues requiring special handling and disposal. In the case of bulk liquid chemical residues, dedicated shore reception facilities are mandated by Annex II of MARPOL 73/78. Noting that few, if any, bulk chemical loading facilities exist within the Pacific islands region, the management of bulk liquid chemical wastes is beyond the scope of this project. In any case, most chemical carriers return their waste to the point of origin as a matter of course.

3.1.4 Sewage

Sewage is typically considered as human excreta directed into urinals and toilets, but is defined by the IMO to also include drainage from onboard medical premises and spaces containing living animals. Importantly, any material that is mixed with sewage is to be treated as sewage. In some boats this may include greywater and dishwater that is drained into common holding tanks. It should also be considered that a fishing vessel's catch may generate sewage wastes or wastes with the characteristics of sewage, particularly during unloading or deck washdown. Although not considered to be sewage within the IMO

definition, this material needs to be handled and treated as sewage to ensure that it does not degrade port water quality.

There are a number of different ways in which vessel-sourced sewage can be treated and/or disposed of. Smaller boats have no need for a head (marine toilet) and so typically do not have one fitted. As a general rule, small boats, especially recreational boats, will only be fitted with a head if they are capable of, and intended to be used for, overnight journeys. Small vessels sometimes rely upon chemical toilets. These disinfect the sewage but require periodic emptying.

Some sewage is discharged from vessels in raw, untreated form, while other vessels are fitted with treatment systems that variously macerate and/or dose the effluent with chemicals or otherwise sanitise it, often with chlorine. More elaborate ship systems include biological treatment systems. Treatment arrangements often include holding tanks capable of retaining sewage onboard for limited periods. Ship systems variously employ salt water or fresh water flush systems; these variations complicate the provision of shore reception facilities which must be capable of receiving sewage with increased salinity arising from salt water systems.

Greywater

Greywater is defined as drainage water from dishwashers, sinks, showers, laundries, baths and washbasins. It does not include drainage from toilets or urinals, nor does it include dishwater where dishes and utensils have not been pre-cleaned of at least most food particles.

Greywater is generated in commercial vessels from galley sinks, showers and wash basins, and laundries. Larger recreational boats would also produce limited quantities of greywater.

Some, albeit limited, polluting potential is possessed by greywater. This is generally restricted to the soaps and detergents used in washing, as well as any of the residues removed during the wash process and transported with the greywater to the marine environment; these would include organic matter, fats and greases. It may be assumed that some vessels also dispose of hazardous liquid substances through the greywater system.

3.2 Waste Disposal Options for Vessels

A variety of waste disposal options exist for ships and boats. Waste management procedures are influenced by the:

- types and quantities of waste produced;
- size of the vessel (in relation to weight and space available for waste management equipment or waste storage);
- vessel age (in relation to mandatory waste management features at the time of build and available waste treatment technologies); and
- typical area/s and duration of voyages (in relation to sea disposal options).

The more a vessel can either minimise the volume and/or mass of waste held, or dispose of by alternate means, the more it reduces the amount of waste which must be accepted by shore reception facilities.

Options for onboard treatment are presented in Table 5.

Table 5: Options for Onboard Management of Ship-Generated Wastes

Treatment/ Disposal Method	Garbage					Oily Wastes			Sewage	Comments
	Food	**Paper, cardboard**	**Plastic**	**Glass, metals**	**Other** (e.g. wood, oily rags, medical wastes)	**Sludge**	**Waste oil**	**Oily bilge/ ballast water**		
Sea Disposal (iaw regulations)	+	+		+				+	+	Sea disposal not always possible, depending upon location.
Bins	+	+	+	+	+					Will ultimately require disposal ashore
Incineration	+	+	+ (may be some non-combustible fractions)	+ (may be some non-combustible fractions)	+ (may be some non-combustible fractions)	+	+			
Shredding or Compaction	+	+	+	+						Food waste can be comminuted and de-watered. Garbage containing plastic or noxious materials will ultimately require disposal ashore.
Recycling/reuse			+ (not all plastic is recyclable)	+		+	+	+		Would require to be retained and landed to shore
Storage tanks (e.g. holding, slops or waste oil tanks)	+					+	+	+	+	Will ultimately require disposal to shore or to sea in appropriate area (NB: oily sludges must be discharged to shore)
Oily water filtration, then sea disposal								+		
Sewage treatment, then sea disposal.	+								+	

As denoted by Table 5, a ship fitted with an incinerator, sewage treatment plant, oily water filtration equipment, and holding tanks for food waste and oily waste may only need to discharge wastes to shore reception facilities on an infrequent and irregular basis, and only items which cannot be destroyed onboard or retained until the ship is in an area where disposal to sea is permissible. Modern ships may be fitted with oily waste holding tanks of sufficient capacity to permit many months of operations before requiring pumping. The effective capacity of waste holding tanks can be extended if the ship is also fitted with an incinerator, providing a means of destruction of waste oil. Incinerators are also extremely effective for the destruction of most types of garbage, although various materials, such as plastics, can produce noxious exhausts. It is anticipated that further controls on the composition of ship-incinerator exhaust gases will be imposed with the advent of Annex VI and other national and local regulations.

Many modern ships are fitted with a suite of waste management equipment capable of achieving almost zero discharge to shore. Conversely, a ship which relies solely upon bins and holding tanks (including bilges), and which operates almost exclusively in littoral waters, will require to discharge most, if not all, of its waste material to shore.

With the advent of MARPOL 73/78 and greater awareness of marine pollution issues by government, port authorities, ship owners and operators, modern ships are now fitted with more effective and comprehensive waste management systems (Plate 4). This trend has emerged over the last 20 years or so; it can be expected, that as older ships are retired and replaced by newer ones, that the demand placed on port waste reception facilities by individual ships will diminish. In the interim, however, the Pacific islands region may experience a lag in this evolutionary development, as older ships withdrawn from service in other areas are often transferred to the Pacific. Despite better pollution control fits, the overall demand for port waste reception will be influenced by the total number of ships, and for some ports, the trend towards concentrating wastes and retaining them onboard until arrival at a preferred port of discharge will increase waste reception and disposal demands.

Plate 4: Garbage Treatment Room in a Modern Cruise Liner Operating on Pacific Island Routes

The Pacific islands region must be vigilant of the higher environmental performance standards and tighter enforcement regimes being adopted in other regions. Laxity on the part of Pacific island states could result in the relegation to the Pacific islands region of sub-standard ships unable to meet higher standards imposed in other regions. Regional organisations need to continue to work closely with IMO to ensure the adoption of globally binding legal instruments to regulate shipping.

3.3 Predicted Waste Generation Rates

Estimates of ship waste generation rates are very imprecise and subject to great variability. This variability and imprecision is reflected in the published garbage generation predictions relied upon by various organisations (Table 6).

Estimating Ship-Waste Generation Rates

Waste generation characteristics in ships are influenced by a wide range of factors, many inherently difficult to identify and quantify. Factors confounding the reliability of estimates include variations in:

- the types and amounts of waste generated in vessels, due to differing cultural, legal, economic and technical factors, including national palates;
- vessel cargoes and operational profiles (e.g. extended duration deep-ocean fishing as opposed to short duration coastal fishing trips);
- age and state of maintenance of ships and equipment, plus differing operating procedures;
- the types of fuel and lubricating oil used;
- sea disposal practices, in relation to the sorts and quantities of waste materials that are retained onboard, and for how long;
- onboard waste management equipment, and procedures for its operation;
- the types and quantities of wastes ships will request to land in a given port, influenced by the types of waste the port is able to accept; and
- the focus, objectives, intensity and detail of research undertaken in order to arrive at the predicted waste generation rates (e.g. a survey aimed at measuring the total waste stream in a ship will gain different results compared to one which has the objective of determining how much waste needs to be discharged to shore, in lieu of disposal at sea).

In the case of oily wastes, few estimates are given in the literature. Some predictions are given for fuel sludge production rates, but these are based upon imprecise and often anecdotal information, and are drawn from such disparate sources of information and data collection techniques that there is no meaningful way to normalise the data and produce a reliable estimate. Furthermore, fuel sludge is only one component of the total suite of oily wastes.

There is a similar paucity within the literature of predictions of sewage production rates. Greywater is often combined with sewage, with greywater drainage routed to a ship's sewage system, augmenting total flow rates. One possible indicator is the design capacity of sewage treatment systems fitted to merchant ships, which are often based on a sewage flow rate of 70 L/pers.day. This may be a useful indicator for modern merchant ships, and possibly passenger vessels, where freshwater for crew use is in plentiful supply. The prediction of 70 L/pers.day of sewage (including greywater) is inaccurate, however, when applied to vessels where freshwater is at a premium, such as warships and yachts and some fishing vessels, and for other vessels which only operate for short periods at a time (i.e. not overnight). Noting the great variability and low level of confidence of ship waste generation rates, composite estimates have been made for the purposes of this project (Tables 7 and 8). These are based on published waste predictions and best professional judgement, and have only been relied upon to provide approximate, order of magnitude estimates.

Table 6: Comparison of Estimated Daily Garbage Generation Rates

All rates in kg/pers.day of garbage.

	IMO		IMO Caribbean Initiative	US National Research Council			Deerberg Systems	UK Maritime Safety Agency	Ports Corp. of Queensland Study	Royal Australian Navy		United States Navy
Ship Type	Merchant	Passenger	All ships (operating overnight)	Pleasure boats	Fishing vessels	Merchant, passenger and others	All ships	All ships	All ships	Ships with crews > 100	Ships with crews = < 100	All ships
mixed garbage	1.5	3.0	2.0	0.5	1.85	2.0		2.0 – 3.5	3.76 – 4.65			
metal, glass, some plastics, other							1.50			0.26	0.26	0.21
paper, cardboard							1.00			0.32	0.32	0.57
plastics										0.13	0.13	0.08
food wastes							0.75			0.95	0.60	0.88
galley and domestic wastes								Note: could range from 1.0 to 4.0				
Total	1.5	3.0	2.0	0.5	1.85	2.0	3.25	2.0 – 3.5	3.76 – 4.65	1.66	1.31	1.74

Table 7: Composite Estimated Daily Garbage and Sewage Generation Rates

Vessel Type	Daily Waste Generation Rates			
	Garbage (kg/pers.day)			Sewage (L/pers.day)
	Food waste	Other garbage	Total Garbage[1]	
Merchant			1.5	70 [2]
Passenger (international cruise liner)	1.5	1.5	3.0	70
Passenger (domestic inter-island)			1.5	30
Passenger/charter (day-trips)			0.5	30
Fishing Vessels (oceanic)			1.8	40
Fishing Vessels (coastal)			1.0	minimal
Miscellaneous work vessels			0.5	10
Yachts/pleasure craft			0.5	20
Warships (crew > 100)	1.0	0.7	1.7	50
Warships (crew = < 100)	0.6	0.7	1.3	50

Notes:

1. Average density of garbage is about 0.2 kg/L (200 kg/m^3). Actual density is influenced by composition of garbage (e.g. food waste is usually about 0.6 kg/L) plus any pre-treatment onboard, such as compaction, de-watering, shredding or separation of recyclable materials.
2. Estimate does not include livestock carriers.

Table 8: Estimated Oily Waste Generation Rates

Oily Waste Generation Categories	Vessel Displacement (tons)						
	> 401 [4]	401 - 1,000	1,000 - 2,000	2,001 – 15,000	15,001 – 40,000	40,001 – 70,000	> 70,000
Oily Bilge Water [1, 2, 3] (m^3/trip)	5 - 10	10	nil	nil	nil	nil	nil
Sludge and waste oil [5] (tonnes/day)	0.01 [6]	0.05 [6]	0.1 [6]	0.2	0.3	0.4	0.5
Sludge and waste oil, [7] (m^3/day)	0.01 [6]	0.05 [6]	0.09 [6]	0.18	0.27	0.35	0.45

Notes:

1. Does not include tank washings, or non-segregated ballast water (usually arising in tankers and only at loading ports).
2. Assumes ships engaged in domestic trading within Pacific island states (ie. < 1,000 t) unlikely to be fitted with oily water separators.
3. Assumes all larger vessels fitted with pollution control equipment mandated by Annex I of MARPOL 73/78.
4. For yachts and small motor boats, waste oil is only likely to amount to 50 L or less for every few hundred hours of engine operation.
5. Actual amount of sludge is influenced by quality of fuel, efficiency of purifiers and concentrators, and onboard destruction [eg. by incineration, if fitted].
6. Nil reliable estimates. Predictions based upon best professional judgement.
7. Specific density of sludge typically about 0.95 to 0.97 kg/L (950 to 970 kg/m^3). Specific density of lubricating oil typically of the order 0.7 to 0.8 kg/L. Considering uncertainties of total composition of the waste oil stream and the degree of precision of data, sufficient to assume density of sludge/waste oil stream as 0.9 kg/L (0.9 t/m^3).

4. CURRENT MANAGEMENT OF SHIP-RELATED WASTE IN THE PACIFIC ISLANDS REGION – FIELD SURVEY FINDINGS

This section provides an overview and summary of the profiles of shipping, ports and ship's waste management within the Pacific islands region. It is limited to common regional trends and characteristics observed during the field studies and desk surveys.

Individual reports have been prepared for each nation and territory encompassed by PACPOL SW1. The State reports present information on the state in question and draw conclusions where warranted on:

- shipping and port activities;
- current ship's waste management practices and issues;
- current terrestrial waste management practices and issues;
- status of international marine pollution treaty obligations; and
- relevant national legislation.

The reports are supported by pertinent background information on geographic, economic and political factors. To the greatest extent practicable, consistent information was collected in surveyed ports, following a standard protocol; a copy of the survey protocol is provided in Annex B. Individual State reports are presented in Annex C, while the detailed waste reception estimates for the ports surveyed are presented in Annex D.

It is worthy of note that the PACPOL ships' waste management initiative was universally well-received in all of the Pacific islands visited. This was particularly the case in the smaller, less-developed States. Authorities consulted were generally enthusiastic to proceed with Phase 3 of PACPOL SW1, the implementation of the recommended improvement strategies to be identified and developed in Phases 1 and 2. One possible vehicle for implementing Phase 3 of the project is via a number of 'appropriate' practice demonstrations at selected Pacific island ports.

4.1 Overview

Many Pacific island coastlines are heavily polluted by garbage, including plastics and other persistent materials while small oil slicks are a common feature of the port and marina areas within the region. Most oil incidents in the region are caused by deliberate discharges of waste oil rather than shipping incidents. In 'sink' areas of ocean current convergence, such as the inter-tropical convergence zone (ITCZ), vast rafts of accumulated marine debris are known to occur. Much of the debris is derelict (discarded or lost) fishing equipment, including nets, ropes and plastics. This marine debris can have severe impacts on marine life and seabirds, including threatened or endangered species.

The IMO has designated the Pacific islands region as an 'area of concern'. This has arisen due to the low rate of acceptance by regional governments and administrations of treaties such as MARPOL 73/78, exacerbated by fragmentary observation of the concomitant implementation responsibilities by those nations which have become parties. It is a major objective of both the IMO and SPREP through PACPOL to have all island nations within the region accede to and implement relevant IMO marine environment protection conventions.

The national implementation of MARPOL 73/78 and other IMO agreements requires the drafting and proclamation of local enabling legislation. Given the difficulty for many Pacific island nations to undertake this task, SPREP has developed model legislation appropriate to the region which meets the requirements of the IMO treaties and can be readily adapted to suit individual national requirements. The intent of this initiative is to facilitate the drafting process and for the coordinated application by nations within the region of MARPOL 73/78 and other marine environment protection conventions.

A further requirement of MARPOL 73/78 is for parties to provide requisite reception facilities and to advise details of these facilities to the IMO for dissemination. This information is published by the IMO and distributed in printed form and via the Internet. Noting that six Pacific island nations and metropolitan nations are currently Parties to the convention, to date, only Papua New Guinea and the United States of America territories of American Samoa and Guam appear to have furnished such information to the IMO.

The provision of adequate ships' waste reception facilities is the single biggest hurdle to island nations within the region becoming party to or implementing MARPOL 73/78. The provision of waste reception facilities is capital intensive and is often not justifiable on a cost benefit basis given the small volume of shipping in many ports. In a number of the smaller island nations (in particular the atoll nations) their physical geography and remoteness severely limits waste management and disposal options. It is unreasonable and impractical to require small island nations who are struggling to manage their own domestic waste to provide facilities for the reception of wastes generated by international shipping. Nations within the region need to consult with the IMO and arrive at an arrangement that is both appropriate to the region and individual national waste management capabilities that will facilitate the overcoming of this hurdle.

Different components of the spectrum of responsibilities for the correct handling and disposal of ship-sourced wastes, plus surveillance and enforcement, are shared between government, private companies and individuals. Parties with regulatory, assistance and compliance responsibilities include:

- vessel masters and crews;
- ship owners and operators;
- shipping agents;
- port regulators and operators (including yacht clubs);
- national government agencies (e.g. environmental departments, port and marine authorities, quarantine agencies);
- municipal authorities (waste collection and disposal); and
- contractors engaged in activities such as port operations, stevedoring, ship repair and the collection and disposal of waste.

One of the expected outcomes of PACPOL is a regime of recommended waste management fees at all ports within the Pacific islands region.

Details of the individuals and organisations consulted during the field surveys and background research are presented in Annex E.

4.2 Profile of Shipping Within the Pacific Islands Region

In relation to ships' waste management, there are two distinct functional groupings:

- International -Those ships which travel between Pacific island ports and ports external to the region; and
- Domestic -Those ships which operate exclusively between islands or the coastal waters within a single country.

There is a third functional grouping called transit shipping. This comprises ships which pass through the EEZs of countries within the region but do not call into regional ports. Regional ships' waste issues related to this group are limited to their contribution to marine debris through littering and inappropriate or illegal sea disposal of wastes at sea. Marine debris is a major issue for the region but is largely beyond the scope of this report.

Within these two functional groupings there are nine major categories of shipping/boating activities that have been identified within the Pacific islands region. These are:

International

- cruise liners;
- merchant ships;
- oil, petroleum product and gas tankers;
- international fishing fleets; and
- ocean-going yachts.

Domestic

- domestic inter-island/coastal trading vessels;
- large tourist and inter-island ferries;
- domestic fishing fleets; and
- local charter and tourist vessels.

Other categories of ships operating within the region are:

- bulk carriers for phosphate in Nauru, metallic ores in New Caledonia and Papua New Guinea, and sugar and wood chips in Fiji;
- naval, police and other patrol vessels;
- harbour support vessels (e.g. barges, lighters, pilot boats, tugs);
- small private pleasure crafts; and
- other vessels (e.g. research ships)

4.2.1 International Shipping

4.2.1.1 Cruise Liners

Cruise liners visiting Pacific island ports and anchorages can be further classified as those which call at Pacific island ports while in transit through the region (e.g. from Australia to the Panama Canal, with visits to Fiji and French Polynesia *en route*), and those that operate dedicated services within the Pacific islands region, typically also including Australia and New Zealand. A third category is constituted by the large cruise ships based in Papeete and sailing almost exclusively within French Polynesian waters. Many of the Pacific ports of call of cruise liners are not in established harbours, but in anchorages with particularly appealing beaches or islands. Port calls are typically of less than 12 hours duration, with occasional overnight stays.

Predicted Trends in Pacific Cruise Ship Activities

The worldwide growth in the popularity of cruises has not yet impacted on the Pacific islands region to any great extent. This is expected to change in the near future, and will result in larger ships, carrying up to 2,000 or more passengers plus crew, visiting more Pacific island ports and anchorages on a more regular and frequent basis. Two trends with regard to cruise liner types engaged in the Pacific market may emerge:

- Older ships withdrawn from the busier markets (Caribbean and Mediterranean) may be transferred to the Pacific. These vessels would have less effective pollution control fits than newer ships, and thus may place a greater emphasis on the requirement to periodically land waste ashore.
- Bigger, newer ships will operate in the Pacific region, particularly during northern hemisphere off-peak seasons. These ships will typically carry more passengers and crew. Although they will have better pollution control equipment than the older ships, they are also likely to collect and accumulate more recyclable materials and other wastes that cannot be destroyed onboard or disposed of at sea. Thus, although requiring to land waste less often, it may be anticipated that the quantities of waste to be accepted by reception facilities in a single transfer will rise commensurately. The physical size of these new generation ships and resultant requirements for channel and basin clearances and wharf capacities may preclude their visiting all but a small number of the larger ports within the region.

4.2.1.2 General Merchant Ships

These can be divided into two sub-categories. The first is merchant shipping visiting Pacific island ports while *en route* either to/from Australia/New Zealand from/to the eastern Pacific (mainly North America), or east Asia (e.g. Japan, Korea and China). The other is merchant shipping engaged in dedicated Pacific island trading, often linking the region with external ports (e.g. routes originating in Australia or New Zealand and visiting New Caledonia, Tuvalu, Wallis and Futuna and Fiji on a regular service).

Merchant cargo traffic calling on Pacific island ports is generally geared

containerised cargo vessels with limited amounts of break-bulk cargoes, ro-ro ships and vehicle ferries (the latter two classes restricted mainly to the larger ports). There is little international inter-island trade in the Pacific because of the similarity in the goods that are produced by the Pacific islands states. Imports into any of the Pacific islands states almost universally originate from outside the Pacific islands region, and exports from any of the Pacific islands states are similarly destined for points outside of the Pacific islands region. Trade between Pacific island states is virtually exclusively trans-shipment of commodities originating outside the Pacific island region. The Pacific islands region reflects a general trade imbalance, with both the values and quantities of imports far exceeding those of exports. In practical terms this marked imbalance results in a large proportion of ships, and containers, returning empty from the region. Opportunities to employ this unused capacity to transfer waste from ports unable to properly manage such wastes to ports that have better waste management facilities should be evaluated.

Container ships and other freighters are typically less than 10,000 tons displacement, although bigger ships, mainly operating on the trans-Pacific services, call on the larger ports. Apra in Guam, and Saipan in the Northern Mariana Islands are the only ports within the Pacific islands region equipped with container cranes; all other ports rely upon geared ships for loading and unloading (although a small container crane is currently located in Papeete).

Over the past two decades, dedicated cargo-liner services and through carriers calling at selected island ports have displaced the small conventional island traders which formerly dominated the Pacific island trade. In concert with global patterns, the total volume of cargo within the Pacific islands region is expanding and services are becoming increasingly containerised, with a diminishing proportion of break-bulk cargoes. It is anticipated that this trend will continue, with an escalation in the number of bigger, faster container services calling on the principal regional ports. Trans-shipment services operating smaller ships will link the minor ports in the region with the fast services. For example, Suva, Noumea and Apra would be serviced by fast container services between Asia, the United States of America, Australia and New Zealand, while ports in the Solomon Islands, Tonga and the Federated States of Micronesia, for example, will increasingly be bypassed by the fast services and increasingly receive all of their container traffic from the regional Pacific island hubs. These developments may also encourage a growth in 'tramp' services. The development of fast trunk services with feeder links will be accelerated should principal ports within the region, such as Suva, Noumea and Papeete, equip their wharves with container cranes. This would permit non-geared ships to call at these ports, while simultaneously limiting the proportion of container ships operating within the region capable of calling at the smaller ports not equipped with the required container-handling gear.

Notwithstanding the emerging dominance of trunk and feeder services for the container trade, ships will continue to provide direct services to smaller ports to deliver or be loaded with specialist cargoes. Prominent examples are tuna exports from American Samoa, bulk sugar from Fiji, timber from the Solomon Islands, nickel from New Caledonia, and refrigerated produce from Tonga.

With only a few exceptions, Pacific states import far more container loads of goods than are exported. The result is the carriage of significant amounts of empty container capacity around the region. Options to make better use of this excess capacity for waste transfer between states should be investigated.

4.2.1.3 Oil, Petroleum Product and Gas Tankers

A 'hub and spoke' architecture is already largely in place for the distribution of oil and petroleum products within the Pacific islands region. With few exceptions, oil transported within the Pacific islands region is refined product, mainly aviation fuel, diesel and petrol and lubricating oils. Most

tankers are less than 10,000 tons, and frequently less than 5,000 tons. Oil and petroleum product movement by ship within the Pacific islands region is based upon a pattern of regional distribution hubs with smaller scale feeder services to outlying islands. Vuda Point in Fiji acts as the hub for Melanesia and Polynesia, as does Apra in Micronesia. Tankers of up to 40,000 tons or more visit the regional oil terminals, with regional services operated by the smaller product tankers. Oil and petroleum products are also supplied direct from Singapore and Australia. Smaller oil distribution hubs are centred upon Lae, Noumea and Papeete.

Small gas tankers operate on a similar system, albeit with routes originating external to the Pacific islands region. Regular delivery services transport LPG from Australia or New Zealand to Melanesian and Polynesian islands, while Micronesian islands are supplied from Japan and South East Asia.

4.2.1.4 International Fishing Fleets

These are almost exclusively involved in tuna fishing (longliners, purse-seine boats, pole-and-line boats) with less intensive shark fishing. Japanese, Korean, Taiwanese, Chinese and United States boats constitute the bulk of the international fishing fleet. The FFA coordinates regional regulation of foreign fishing activities within the Pacific islands region. In any one year, between 900 and 1,200 foreign fishing vessels may be registered by the Forum Fisheries Agency for access to the region, although the actual number licensed and operating within the region is usually far less. Foreign fishing fleets often operate in company with larger 'motherships'. Fishing vessels will transfer their catch to the 'mothership' for refrigerated storage, and in some cases processing. The 'motherships' can also replenish and reprovision fishing vessels, extending the period with which they can remain in the fishing grounds. Tankers are also chartered to rendezvous with and re-bunker international fishing vessels on the high seas.

The activities of 'motherships', operating in support of tuna fishing fleets, have the potential to cause localised marine pollution. This is particularly the case when these ships remain in lagoon or harbour waters for extended periods.

Improving the Marine Pollution Performance of Foreign Fishing Vessels Operating in the Pacific Island Region

Tuna fisheries represent one of the most important resources available to Pacific island states. Recognising the economic value of the tuna fishery, and the migratory nature of the fish stocks, most Pacific island states cooperatively regulate access to this resource through the offices of the Forum Fisheries Agency (FFA). The FFA seeks to provide a consistent framework for the management and control of fisheries resources. This is primarily achieved through the mechanisms of:

a. operating a register of boats approved to operate within the EEZs of Forum-member nations, and

b. formulating and assisting with the implementation of, a consistent framework for the allocation of fishing licences and the monitoring and reporting of FFV activities.

The actual licensing of FFVs to operate within national waters remains the sovereign responsibility of FFA member nations, with licences (mostly) issued to FFVs which are pre-registered with the FFA.

In 2002, 1,116 individual vessels were registered with the FFA, of which 959 were fishing vessels, and another 116 'motherships' or refrigerated fish carriers (see Table). Many of these vessels are old, and a significant proportion, especially longliners, are below the 400 ton displacement (for non-tankers) mandated by the IMO as the threshold for the fitting of oily water separators.

Type	Number Vessels Registered With FFA	Average Displacement (min.-max.) (t)	Average Age (min.-max.) (yr)	Average Complement
LONGLINERS	728	200 (13-737)	14 (1-34)	15
Purse-Seiners	189	1,030 (88-4,400)	17 (1-35)	24
Pole and Line Boats	40	475 (329-741)	12 (2-30)	29
Net Boats	2	590 (480-700)	24 (23-25)	31
Search/Anchor/ Light Boats	26	45 (31-87)	21 (5-29)	6
Bunker Ships	15	1,700 (486-3,406)	22 (6-32)	14
Motherships/ Fish Carriers	116	3,120 (132-13,876)	22 (2-41)	21
Total/Average	1,116	673	15	18

Of the 1,116 vessels on the register in 2002, a total of 219 wore the flags of nations which are not signatories to MARPOL 73/78 (Cook Islands [2], El Salvador [1], FSM [5], Fiji [7], Kiribati [1], Solomon Islands [3] and Taiwan [200]), with a further four belonging to nations which are Parties to the Convention although not to Annex V (Canada [1], Indonesia [2] and Malta [1]). The most significant source of non-compliant ships is Taiwan, with 200 FFA-registered vessels.

Agreement and implementation of uniform fisheries management measures, and their consistent application across all FFA-member states, is a protracted process. Notwithstanding the long lead-times involved, incorporation of marine pollution prevention requirements as a pre-condition for FFA-registration is a valid long-term approach to reducing ship-sourced pollution in the Pacific islands region, particularly noting that FFVs are considered as one of the main sources. To achieve FFA registration, boats could be required to demonstrate the fitting of pollution prevention equipment, and the observation of appropriate procedures, as mandated by MARPOL 73/78. This measure would be especially appropriate for boats below the IMO's 400 ton threshold requiring the fitting of oil pollution prevention equipment, which are nevertheless obliged to retain oily wastes onboard for appropriate disposal ashore. This same FFA pre-registration tests could be applied to FFVs from non-MARPOL 73/78 signatory nations, thereby effectively exercising a form of Port State control. To achieve full effectiveness, however, these measures would need to be applied universally across all FFA-member nations, so as to avoid some member states providing havens of less-stringent pollution-prevention requirements. Additionally, those FFA-member nations not yet signatories to the appropriate Annexes of MARPOL 73/78 would need to rectify this deficiency.

The FFA has already initiated action to improve pollution prevention measures in FFVs, as have individual nations fishing in the waters of Pacific island nations. Japanese boats now use 'plastic-less' bait boxes, reducing at source an otherwise significant generator of plastic waste. FFA inspectors, borne in fishing vessels to report catches and compliance with licence conditions, also report on incidents of improper discharge of wastes, using MARPOL 73/78 pollutant discharge requirements as the performance benchmark. Incidents of non-compliance are recorded on a *pro forma* reporting form, forwarded to FFA headquarters in Honiara. Most non-compliant discharges involve the pumping of oily bilge water or the disposal to sea of plastic garbage. FFA inspectors often report non-compliant discharges even from vessels fitted with incinerators and other pollution control equipment.

4.3.1.1 Ocean-Going Yachts

These are often itinerant vessels with small live crews aboard that sail from one island to another. This is usually undertaken independently, but several annual yacht races and regattas are held annually, tending to congregate yachts. The mobility of these itinerant yachts is restricted during the cyclone seasons, when the vessels tend to lay up in well protected harbours for extended periods. Yachts are also available for charter at locations within the Pacific islands region, most notably in Fiji and New Caledonia. Many yachts sailing within the region tend to visit uninhabited anchorages, remote from population settlements. Several dozen yachts may visit the more popular remote anchorages in a season. Avenues for reception ashore of wastes from vessels in these remote anchorages are essentially non-existent. Yachts, however, generally have low environmental impact, reinforced by a good awareness of marine pollution prevention among those who sail in them.

4.3.2 Domestic Shipping

4.3.2.1 Domestic Inter-island/Coastal Trading Vessels

Domestic inter-island/coastal (and in Papua New Guinea, estuarine) trading by small ships is a feature of the region, often in mixed cargo/passenger carrying services. This is particularly the case in those States with population and economic activity dispersed among many islands, such as Fiji, Kiribati, Papua New Guinea, Solomon Islands and Vanuatu. Many of these vessels are essentially 'tramp steamers' taking opportunistic cargoes. Services provided are, therefore, often irregular in terms of both routes and sailing schedules. The coastal, estuarine and inter-island trading fleets of the region are characterised by small, often aging ships (Plate 5).

Plate 5: Typical Small Coastal Trading Ship, Alongside in Port Vila

The exact number of small ships operating in the region, principally in domestic trading, is difficult to quantify, although a 1992 study found over 600 ships of 10 tons or greater (including fishing vessels) were registered in the 13 Pacific island nations existing at that time (Table 9).

Table 9: Domestic Shipping Registered in Pacific Island Nations (1992)

Nation	Vessels from 10 to 1,000 GRT	Vessels Greater than 1,000 GRT	Total
Cook Islands	12	3	15
Federated States of Micronesia	20	-	20
Fiji	123	7	130
Kiribati	23	-	23
Marshall Islands	13	2	15
Nauru	-	-	nil
Niue	-	-	nil
Papua New Guinea	180	12	192
Samoa	11	-	11
Solomon Islands	155	1	156
Tonga	21	-	21
Tuvalu	2	1	3
Vanuatu	29	-	29
Total	**589**	**26**	**615**

(SPREP, 1997a: 1)

4.3.2.2 Large Tourist and Inter-island Ferries

These vessels operate in a limited number of locations within the Pacific islands region but can involve relatively large ships carrying up to several hundred passengers, sometimes with cargo. Examples include services between Tahiti and Moorea in French Polynesia, Apia and Pago Pago, and Suva and the outlying Fijian islands.

4.3.2.3 Domestic Fishing Fleets

These are generally small boats, typically operating in coastal waters and rarely staying out longer than one night. The domestic fishing fleets also include a small proportion of larger vessels capable of operating further offshore and for longer periods of time. Some of the Pacific island states are currently expanding their oceanic fishing fleets in order to better exploit the resources of their EEZs.

Large numbers of smaller domestic (mostly fishing) boats exist within the Pacific islands region. These are typically powered by outboard engines, and only engage in voyages of short duration. Individually these boats generate minimal amount of wastes.

4.3.2.4 Local Charter and Tourist Vessels

Local charter and tourist vessels are small vessels providing diving, fishing and cruising services, sometimes involving overnight journeys. A feature of the tourist vessels is that their principal areas of operation are frequently dispersed away from the major population centres, and concentrated instead in areas with tourist attractions or desirable attributes. Voyages are typically of short-duration and during daylight hours, and the number of passengers and crew may be less than 10 or up to several dozen. Some diving and fishing vessels provide live-aboard trips which can extend for several days. The number of these boats and the level of their

activities can be expected to intensify as the tourist market grows within the Pacific islands region.

Some of the States within the region already support large flotillas of small to medium size vessels engaged in the tourism industry (fishing, diving and pleasure cruising). Vessel sizes range from less than 10m length overall (LOA) to several hundred tonnes. These vessels may carry less than 10 to over a hundred or more passengers. Trips are generally of short duration and during daylight hours, although trips on live aboard vessels may extend for several days. Vessels engaged in the tourist trade are often based in locations dispersed from the major ports and may operate in remote areas. The number of these vessels within the region can be expected to increase as tourist and resort numbers grow.

4.3.3 Other Vessels

Other activity in the region includes naval and police patrol vessels and harbour support boats such as tugs, lighters and pilot boats. Except for the major ports, numbers of these latter crafts are minimal. With the exception of French Navy corvettes, patrol boats and auxiliaries based in French Polynesia and New Caledonia, the largest government patrol vessels are the 22 Pacific Island Patrol Boats, of 165 tonne displacement. These have been supplied to all of the Pacific island nations except Niue. Other navies active in the region are those of Australia, New Zealand and the United States.

Large naval ships, including aircraft carriers and amphibious ships, individually carrying many thousands of personnel, also operate in the Pacific area. These vessels generate considerable quantities of waste and may visit any of the larger ports in the Pacific islands region on an infrequent basis. Visits tend to be concentrated into a small number of ports, with the main regional activity being that of the United States Navy centred upon Guam.

A limited trade in dry-bulk cargo is also conducted within the Pacific islands region. This trade is centred upon a handful of ports and limited range of cargoes. Examples include nickel ores and concentrates from New Caledonia, phosphate from Nauru and sugar and woodchips from Fiji. In what may be considered a quasi-bulk operation, copra is loaded by hopper into bulk carriers in Melanesian ports, such as Luganville, Vanuatu; loading of a 10,000 ton carrier can take in excess of seven days.

4.4 Profile of Ports Within the Pacific Islands Region

There are four types of ports within the Pacific islands region. These are:

- large commercial ports;
- small government ports;
- specialised bulk loading ports; and
- small boat harbours and marinas.

A limited number of major national ports, such as Alofi in Niue, are restricted to roadstead operations for the movement of containers and other cargo to and from ships. Many roadstead operations continue in smaller ports in the outlying islands of states such as French Polynesia and the Cook Islands. Similarly, in may Pacific island ports the transfer to shore of petroleum products and LPG occurs using subsea flowlines or floating hoses while the tanker is at a mooring.

Some Pacific island ports are operated entirely by a single body, such as a government agency or commercial organisation. In other ports, individual wharves and boat harbours may be operated by a range of entities, including government organisations and private concerns. Government agencies may include port authorities and defence/police agencies. Private organisations are typically shipping and stevedoring companies, large industrial concerns, oil companies, fisheries bodies, ship repair yards, tourism operators and yacht clubs.

Slow cargo-handling rates are characteristic of most Pacific island ports, particularly the smaller ones. This is mainly attributable to the rudimentary cargo-handling equipment available and the reliance upon ships' own gear for container movements in all but a

handful of ports. Inefficient stevedoring procedures as well as equipment reliability, administrative and cultural factors also contribute to the modest rates. The result is that merchant ships visiting most of the ports in the region experience extended stays alongside while loading/unloading for a given cargo, compared to ports in developed nations. Ships may also need to periodically remain at anchor while awaiting a berth during which time waste (oil, sewage and garbage) can accumulate due to the prohibition of discharges into coastal waters.

4.4.1 Large Commercial Ports

These are large, busy ports, often with multi-faceted operations, providing shipping and port services on a regional scale. These ports are characterised by a large proportion of ship movements originating from, or departing for, ports external to the Pacific islands region, with a commensurately high degree of trans-shipment of incoming cargoes to other ports in the region.

These ports are often run by statutory port authorities who operate these ports on a commercial basis. The level of involvement of these port authorities vary with those that carry out all port operations to those that only fulfil a regulatory and asset owner role with port services being provided by private contractors or other third parties.

4.4.2 Small Government Ports

These can be considered as small ports with regular, albeit, not necessarily frequent, services which typically connect them with other ports in the immediate region. These ports characteristically only provide services to the island on which they are situated and other islands in the near vicinity. Some of these smaller ports are only capable of roadstead operations for visiting freighters (Plate 6).

Plate 6: Roadstead Operations at the Small Port of Alofi, Niue

Small government ports are basically established and operated as essential national infrastructure in order to fulfil governments' social and economic obligations to their people. Such ports fundamentally exist for reprovisioning and transportation purposes and operations are funded, or heavily subsidised, through central government.

4.4.3 Specialised Bulk Loading Ports

A few specialised, limited - purpose, ports also exist within the Pacific islands region. These facilities are privately owned bulk loading facilities. Examples of ports and their cargoes are:

- metallic ores – Papua New Guinea and New Caledonia;
- phosphate – Nauru; and
- sugar and woodchips – Fiji (Lautoka and Malau).

4.4.4 Small Boat Harbours and Marinas

There is a large number of small boat harbours and marinas throughout the Pacific islands region. These variously service small commercial vessels, fishing boats and private recreational crafts such as yachts and motor cruisers. Some of the small boat harbours are large, modern facilities (such as in Noumea), while others are essentially provide a small sheltered anchorage for minor crafts.

Small boat harbours may be single-purpose facilities or cater for multiple users. An example of the former would be a yacht club marina, while the latter would be a small local port which may be used by private craft, ferries, tourist charter vessels and domestic traders. Some of the small boat harbours and marinas in the Pacific islands region are owned and operated by government, while others are run by private organisations (such as some of those for fishing boats) and others by clubs (such as yacht club marinas).

A feature of many small boat harbours, particularly those engaged in tourist activity, is that they will be in areas of high tourism and recreation value, and thus remote from main population centres.

4.5 Current Status of Ships' Waste Management Measures in the Pacific Islands Region

Specific characteristics and common underlying factors pertaining to shipping and ships' waste management within the Pacific islands region became apparent during the research and field surveys. Salient findings are summarised in this section according to category.

4.5.1 General Ship Waste Generation Characteristics

Although each category of shipping presents its own waste management challenges, observations and assessment of the field data suggest that in most instances domestic inter-island trading and international fishing vessels and, to a lesser extent, ferries are most problematic with regard to waste management.

The estimates presented in Tables 6, 7 and 8 have been applied to ships typical of the Pacific islands region and used as the basis for modelling waste generation characteristics. These are presented in Table 10.

Table 10: Estimated Rates of Potential Demand for Waste Reception Arising from Ships Normally Using Pacific Island Ports

Vessel Type	Indicative Number of Persons Onboard	Indicative Displacement (t)	Sludge and Waste Oil [1] m^3/day (at sea before arrival)	Oily Bilge Water [2, 3] amount per ship visit (m^3)	Garbage [1] kg/ day (at sea before arrival)	Sewage [4, 5] m^3/day (in port)
Merchantmen [3]	18	3,000 – 20,000	0.18	n/a	27	1.3
Tankers [3]	15	2,000 – 20,000	0.18	n/a	22	1.0
Cruise Liners [3]	600 – 1,500	10,000 - 20,000	0.27	n/a	1,800 - 4,500	42 – 105
Inter-island Traders	15 - 20	100 - 250	0.05	5	22 - 30	0.4 – 0.6
Island Ferries (large)	600	1,500	0.05	10	900	n/a
Inter-island Ferries	100	250	0.05	2	150	n/a
Tourist Charter Boats	10 - 20	n/a	0.01	n/a	5 - 10	n/a
Warships (very large) [3]	1,000 – 6,000	20,000 – 100,000	0.18	n/a	1,700 – 10,200	50 – 300
Warships (large) [3]	200	2,500	0.18	n/a	340	10
Warships (small)	20	100 - 250	0.01	5	26	1.0
Fishing (oceanic)	18	250 – 1,000	0.02	10	32	0.7
Fishing ('mothership')	18	2,000 - 4,000	0.05	10	50	0.7
Fishing (local)	2 - 5	n/a	0.005	n/a	2 - 4	n/a
Local workboats	2 - 5	n/a	0.01	0.05	2 - 4	n/a
Yachts (itinerant)	3	n/a	n/a	n/a	1.5	0.06
Local craft (day trips)	2	n/a	n/a	n/a	1	n/a

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (e.g. incineration, compaction, shredding).
5. Does not include tank washings or non-segregated ballast water.
6. Older ships not fitted with IMO approved pollution control equipment may need to discharge to shore the oily bilge which is produced while alongside/at anchor.
7. Assumes vessels not fitted with sufficiently large holding tanks or approved sewage treatment plants.
8. 1 m^3 = 1,000 L.

A key finding of the field survey is that international shipping rarely requests waste reception in the majority of Pacific island ports. Generally speaking, cruise liners and international merchant shipping are modern, well-run ships which can comply with MARPOL 73/78 requirements (in general) and are capable of managing garbage, oily wastes and sewage in a manner which is unlikely to have adverse environmental impact on coastal areas. These ships are also typically capable of retaining wastes onboard until arrival at a port external to the region that is properly equipped for waste reception.

On balance, domestic fishing vessels, local tourist vessels and ocean-going yachts produce minimal quantities of waste. Management problems are therefore, commensurately minor.

Pacific Inter-Island Trading Vessels as a Source of Ship's Waste

Small coastal steamers, typically ranging in size from about 50 GRT to 400 GRT, appear to present the most difficult waste management challenge for Pacific island ports. The fundamental reason for poor pollution prevention performance of these vessels is their typically advanced age and the less rigid regulatory environment prevailing at the time of their construction. Other operational and maintenance factors also contribute. Common characteristics that compound the environmental performance of these vessels are that they:

- generally operate in a less stringent regulatory environment than does international merchant traffic;
- often lack even rudimentary marine prevention pollution equipment;
- are often engaged in transporting passengers, which may number many dozens;
- are not built, operated or maintained to the same standards as international merchant shipping, thereby inherently generating more waste as a consequence of routine operations;
- have relatively large crews which live onboard while the vessels are in port;
- almost exclusively carry break-bulk cargoes loaded/unloaded by hand or with only basic mechanical aids, thereby spending relatively extended periods alongside in port; and
- operate virtually exclusively between small island ports and in coastal waters, presenting minimal, if any, opportunity for retaining waste for landing at a port suitably equipped for waste reception, or disposal as appropriate on the high seas.

As well as domestic trading vessels, large international fishing boats, including their support vessels, present major sources of ship-sourced waste for ports from where they operate, including waste associated with the fish catch. International fishing vessels within the Pacific islands region may operate exclusively on the high seas without visiting a Pacific island port, as is the case with those operating in Tuvalu's EEZ; in these circumstances it is important that these vessels are able to properly deal with their waste, including retaining that waste onboard that is not suitable for discharge at sea (such as plastics). In Micronesian states, international fishing fleets often operate from anchorages in lagoons without actually coming alongside in the port. Alternatively, some Pacific ports form important bases of operations, such as Pago Pago in American Samoa; in these instances the port must be capable of accepting and properly dealing with both the operational wastes generated by the fishing vessels and that arising as a result of any maintenance activities while in port.

Ferries represent a potentially significant source of waste, principally garbage, owing to the large number of passengers which many ferries operating within the region are capable of carrying. Nevertheless, many trips are of relatively limited duration, meaning that minimal garbage is generated by passengers.

Estimates have been made of the *total theoretical potential* annual demand for waste reception at surveyed ports. These are based upon observed shipping patterns and the composite estimates presented in Tables 7 and 8 (Section 3.3). Table 11 provides a regional overview of predicted annual waste generation by port based on the volume of shipping through each port and the waste generation estimates for those vessels.

Table 11: Estimated Potential Annual Demand for Waste Reception in Pacific Island Ports

Nation/Territory	Port	Waste Component					Comments
		Sludge/ Waste Oil [1]	Oily Water [2]	Garbage [1]		Sewage [3]	
		(m^3)	(m^3)	(t)	(m^3)	(m^3)	
American Samoa	Pago Pago	469	4,890	813	4,065	6,628	May expect maintenance and catch wastes from fishing fleet.
Cook Islands	Avarua	57	295	15	74	510	
Federated States of Micronesia	Chuuk, Weno	332	5,115	728	3,638	3,543	
	Kosrae, Okat	99	357	126	632	370	
	Pohnpei, Kolonia	306	4,510	757	3,787	5,745	
	Yap, Colonia	91	1,547	203	1,017	1,805	
Fiji	Denarau Marina	78	3,000	230	1,151	101	
	Labasa/Malau	103	201	31	155	91	
	Lautoka	361	2,025	213	1,065	1,638	
	Suva	691	6,838	895	4,473	8,995	
	Vuda Point	65	*	15	74	307	* Also significant oil tank washings.
French Polynesia	Papeete	4,186	25,705*	2,936	14,680	9,281	* Also oil tank washings.
Guam	Apra	866	3,140*	1,009	5,046	6,602	* Also significant oil tank washings.
Kiribati	Betio	347	4,350	458	2291	1,442	
Marshall Islands	Majuro	370	5,603	999	4,993	6,882	
Nauru	Aiwo	131	20	20	100	191	
New Caledonia	Noumea	915	2,780*	1,381	6,907	10,410	* Also oil tank washings.
Niue	Alofi	116	20	59	296	288	
Northern Marianas	Saipan	292	1,880	547	2,737	1,689	
Palau	Koror	180	3,610	233	1,164	1,515	
Papua New Guinea	Lae	375	2,410	102	512	928	
	Port Moresby	572	2,780	216	1082	2,981	
Samoa	Apia	325	840	175	876	1,172	
Solomon Islands	Gizo	101	2,930	140	698	676	
	Honiara	1,287	17,263	2,072	10,360	4,908	
Tonga	Nuku'alofa	201	845	267	1,335	2,910	
Tuvalu	Funafuti	51	340	107	534	929	
Vanuatu	Luganville	249	9,138	221	1,105	3,042	
	Port Vila	274	4,120	581	2,906	7,026	
Wallis and Futuna	***Nil data***						

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. incineration, compaction, shredding).
2. Does not include tank washings or non-segregated ballast water. Total may be inflated by other ships, not fitted with IMO approved pollution control equipment, which may need to discharge to shore oily bilge which is produced while alongside/at anchor.
3. Cell shaded if port water quality is considered degraded or vulnerable to sewage inputs from vessels.

Detailed waste demand estimates for individual ports are presented in Annex D. It is stressed that these predictions are based upon imprecise models and incomplete data. Results are indicative only and intended to quantify the order of magnitude of potential demand for waste reception. Results presented in Table 11 and Annex D are not expected to link with actual demand, as this is further influenced by a raft of additional variables not incorporated in the models available.

4.5.2 Legal Aspects

Most Pacific island countries are not party to MARPOL 73/78. The requirement for signatory nations to provide waste reception facilities is difficult in technical, financial and ecological terms for many States within the region and acts as an impediment to wider acceptance and application of MARPOL 73/78 within the Pacific.

Immature suites of national laws (particularly in the areas of maritime issues, environmental management and waste management), are a feature of the region. Most nations have limited ability to draft and enact new laws. PACPOL's model marine pollution prevention legislation has been developed with the intention of facilitating drafting of enabling legislation. It aims at adoption of effective and compatible marine pollution prevention laws across the region.

Most nations within the region have limited capability for compliance inspection, monitoring, surveillance and enforcement of marine pollution laws. There has been minimal notification to the IMO of existing reception facilities, as is required by MARPOL 73/78.

Various international treaties, as well as national taxation and customs requirements impose barriers to the transfer of waste within the region. This is an important issue for discussion if a regional approach to ships' waste management is to be adopted. In the case of tax and customs barriers, these may be counter-productive and result in adverse environmental outcomes.

The discharge by vessels of garbage, sewage, sullage and oily wastes within port waters is banned by local regulations in most of the ports surveyed, although these prohibitions are not always enforced.

4.5.3 Delineation of Responsibilities

Coordination of services and dialogue between all stakeholders is generally poor. This should be improved between shipping operators and agents, port and marina operators and other relevant parties, such as oil companies and municipal authorities, regarding ship's waste management. This will result in a greater alignment between port and municipal authorities and others on waste management issues, with subsequent improvements in the capture and proper disposal of ship-sourced wastes.

4.5.4 Port Waste Reception Facilities and Practices

Effective ships' waste reception practices exist, albeit as isolated cases, within the Pacific islands region. Examples include the collection of garbage, quarantine wastes and waste oil, and the collection and filtering of oily bilge water. Papeete, Noumea (Plate 7), Apra, Suva and Pago Pago are considered the best equipped of all the Pacific island ports to accept wastes; some ports effectively have no effective waste reception capabilities (Plate 8).

Plate 7: **Garbage and Waste Oil Collection Facilities at a Small Boat Harbour in Noumea**

Plate 8: **Lack of Effective and Enforced Waste Reception Procedures Often Results in Wastes Being Dumped Either at Sea or at a Port**

There is minimal prospect for smaller ports to accept all wastes from the full range of shipping (e.g. in Tuvalu, Kiribati, Northern Mariana Islands, Federated States of Micronesia and probably also the Cook Islands and Niue). Papeete and Noumea were the most active ports with regard to the willingness and ability to accept all types of waste from both international and domestic shipping. In both of these ports, responsibility for waste collection and disposal is undertaken by contractors. A summary of waste reception facilities available in the principal ports of the Pacific islands region is presented in Table 12. This includes an assessment of the adequacy of the services provided.

Most ports surveyed lacked waste or environmental management plans or documented procedures.

The field surveys revealed only a limited number of instances of international shipping requesting transfer of waste to shore in ports other than Noumea and Papeete. Locations experiencing infrequent demand for waste reception services were: Guam (naval vessels) PNG (passenger liners, tankers and naval vessels) and Vanuatu (passenger liners). Many ports in the region refuse to accept waste from international shipping, or only accept it in extenuating circumstances.

Large ships, fitted with pollution control equipment such as oily water separators, shredders, compactors or holding tanks, can retain wastes until arrival at ports external to the Pacific islands region. Alternatively, they can discharge appropriate wastes while in transit on the high seas, as permitted by MARPOL 73/78. These ships are able to accumulate waste for extended periods, so any requirement to transfer wastes to shore arises less frequently but involves greater quantities.

In many ports, all garbage collected from international shipping is treated as quarantine waste. Although this waste may contain foodstuffs and associated packaging, a large proportion is material which poses no quarantine risk (e.g. metals, non-food packaging, engine room wastes). The practice of treating all overseas sourced waste as quarantine material should be reviewed.

Table 12: Summary of Existing Waste Reception Facilities in Pacific Island Ports

Island State	Port	Waste Reception Services								Comments
		Oily Wastes			Sewage	Quarantine	Garbage	Recyclables	Hazardous and Noxious Waste	
		Slops (tank washings, ballast)	**Oily Bilge Water**	**Sludge and Waste Oil**						
American Samoa	Pago Pago	No	Yes (ST)	Yes (ST)	No	Yes	Yes		No	
Cook Islands	Avarua	No	No	Yes	No	Yes	Yes (D)	No	No	Shore ablutions provided for yachts
Federated States of Micronesia	Chuuk, Weno	No	No	Yes (D)	Yes (D)	Yes	Yes (D)	No	No	
	Kosrae, Okat	No	No	Yes (D)	Yes (D)	Yes	Yes (D)	No	No	
	Pohnpei, Kolonia	No	No	Yes (D)	Yes (D) (ST)	Yes	Yes (D)	No	No	
	Yap, Colonia	No	No	Yes (D)	Yes (D) (ST)	Yes	Yes (D)	No	No	
Fiji	Denarau Marina	No	No	No	No	Yes (A)	Yes (D)	No	No	Shore ablutions provided for yachts
	Labasa/Malau	No	No	No	No	No	Yes (D)	No	No	
	Lautoka	No	No	Yes (D)	Yes (D)	Yes	Yes (D)	No	No	
	Suva	Yes	Yes	Yes	No	Yes	Yes (D)	No	No	
	Suva – Yacht Club	n/a	n/a	Yes	No	Yes (A)	Yes	Al, plastic	No	Shore ablutions provided for yachts
	Vuda Point – Oil Terminal	Yes (P)	Yes (P)	Yes (P)	No	No	Yes	bottles, plastic, oil	No	
	Vuda Point – Marina	No	No	Yes	Yes (ST)	No	Yes	Al, bottles, plastic	No	
French Polynesia	Papeete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Guam	Apra, Commercial	Yes (D)	Yes	Yes	Yes (ST)	Yes	Yes (D)	No	Yes	
	Apra, Military	Yes	Yes	Yes	Yes (P)	Yes	Yes	Yes, all	Yes	
Kiribati	Betio	No	No	No	No	Yes	Yes (D)	No	No	
Marshall Islands	Majuro, Commercial	No	No	Yes (D)	Yes (ST)	Yes	Yes	No	No	
	Majuro, Fishing	No	No	Yes	No	No	Yes	No	No	
Nauru	Aiwo	No	No	No	No	Yes	Yes (D)	No	No	

Island State	Port	Waste Reception Services								Comments
		Oily Wastes			Sewage	Quarantine	Garbage	Recyclables	Hazardous and Noxious Waste	
		Slops (tank washings, ballast)	**Oily Bilge Water**	**Sludge and Waste Oil**						
New Caledonia	Noumea	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Excellent facilities provided for yachts. Quarantine waste measures possibly ineffective.
Niue	Alofi	No	No	No	No	Yes	Yes (D)	No	No	
Northern Mariana Islands	Saipan	No	Yes (ST)	Yes (ST)	Yes (ST)	Yes	Yes	No	Yes	
Palau	Koror, Commercial	No	No	Yes (ST)	Yes (ST)	Yes	Yes (D)	No	No	
	Koror, Fishing	No	No	Yes (ST)	Yes (ST)	Yes	Yes (D)	No	No	
Papua New Guinea	Lae	Yes	Yes	No	No	Yes	No	No	No	
	Port Moresby		Yes	No	No	Yes	Yes (D)	No	No	
Samoa	Apia	No	No	Limited	No	Yes	Yes (D)	No	No	
Solomon Islands	Gizo	No	No	No	No	Yes	Limited (D)	No	No	
		No	No	No	No	Yes	Yes(D)	No	No	
Tonga	Nuku'alofa	No	Yes	Yes	No	Yes	Yes (D)	No	No	
Tuvalu	Funafuti	No	No	Limited	No	Limited	Yes (D)	No	No	
Vanuatu	Luganville	No	Yes (ST*)	Limited	No	Yes	Yes	No	No	
	Port Vila	No	Yes (ST*)	Limited	No	Yes	Yes	No	No	
Wallis and Futuna	***Nil data***									

Notes:
A = Quarantine waste accepted by prior arrangement (e.g. on arrival of a major international yacht race)
D = domestic shipping only
P = discharged through pipe connection to shore
ST = sullage/septic collection truck
ST* = potential exists for collection by sullage/septic collection truck, but this is not current practice

Quarantine waste is often collected, stored, transported and destroyed in a manner that provides little certainty that any organisms or viruses of concern in the material have been prevented from escaping into the environment at large. Quarantine barriers in some States concentrate upon threats to public health and agriculture, with little focus upon risk to protection of local biota and biodiversity.

Domestic inter-island traders present significant challenges for the prevention of marine pollution. This is by virtue of their numbers, that many are old and not fitted with modern pollution control equipment, and/or are not operated in an efficient manner. The operating profiles of these ships, confining their activities to littoral waters, also affords few opportunities for the lawful discharge of wastes in open sea areas.

Many ports, particularly smaller ones, have no facilities for the collection of waste of any sort from domestic shipping. Difficulties exist in transferring waste from ships lying at moorings or engaged in roadstead operations.

With regard to sewage discharge from vessels, harbour water quality has deteriorated, or has the potential to do so, in:

- Pago Pago, American Samoa
- Weno, Chuuk State, Federated States of Micronesia
- Kolonia, Pohnpei State, Federated States of Micronesia
- Suva, Fiji
- Papeete, French Polynesia
- Majuro, Marshall Islands
- Noumea, New Caledonia
- Funafuti, Tuvalu
- Port Vila, Vanuatu

The control of sewage discharge from vessels in these harbours ranges from desirable to imperative depending upon the harbour characteristics and the numbers of vessels that use the port. Of these ports, Pago Pago, Papeete and Noumea were considered to have effective sewage management regimes in place. Improved control measures are required in the other ports listed. At current levels of shipping and boating activity, none of the other ports surveyed indicated an immediate need for control of sewage discharges from vessels.

Barring the use of heads while vessels are in port, as enforced by the US Coast Guard, can be an effective means of controlling sewage discharges in ports.

The transfer of many wastes between ports is impractical by virtue of storage and handling problems, as well as quarantine requirements. While recyclables (such as aluminium), hazardous materials and waste oil (provided the latter two meet stringent environmental conditions for their shipping) could be transferred, little scope exists to transfer general garbage, especially putrescible fractions.

4.5.5 Inspection, Compliance Checking and Enforcement

In overall terms, ship inspection, compliance checking and enforcement measures in the Pacific islands region are piecemeal and cannot be considered to be effective. Many nations lack the necessary legislative powers or technical expertise to conduct effective programmes. Efforts are being made, and some nations, such as Vanuatu, are working to establish effective regimes. This observation is applicable to all Pacific island ports with the exception of the activities of the USCG in the ports of the American territories, and possibly French authorities in the French territories, inspection, compliance checking and enforcement in Pacific island ports is piecemeal and suffers from the lack of an effective and coordinated approach.

A purely regional ship inspection regime may not effectively capture small domestic trading vessels that operate solely within jurisdictions which rely upon inspections to be undertaken by neighbouring States. Noting this, any effective regional scheme should aim to improve inspection and reporting capabilities within the Pacific island states with a large register of vessels engaged virtually exclusively in internal trade, such as Papua New Guinea and the Solomon Islands.

4.5.6 Fee Structure and Cost Recovery Mechanisms

Fees for the collection and disposal of wastes and the provision of waste management services (e.g. bins on wharves or shore ablutions) are imposed by some port authorities and waste collection operators in the region. Different regimes and pricing structures exist and variously include:

- direct charges levied by waste collectors, typically based upon the quantity of waste received and/or the frequency of collection;
- fees imposed for waste inspection or compliance surveys, such as by quarantine authorities; and/or
- incorporation of waste management fees within general port and wharf dues or marina fees.

The first two methods are the most common practices, with the latter system mainly employed by smaller boat harbours. In many ports no fees (either discrete or otherwise) were imposed for waste management and no services were provided.

4.5.7 Education, Training and Awareness

Awareness, training and education of mariners and port operators within the region, with respect to marine pollution and its prevention, need to be improved. The various national maritime training colleges can assist by emphasising marine pollution prevention in their course curricula. PACPOL is working with the maritime training colleges to address this.

A range of information programmes targeting marine pollution prevention are in place within the region. Mechanisms for distribution of this information include posters and pamphlets. SPREP is active in promoting awareness of marine pollution issues.

4.5.8 Monitoring, Audit and Review

Great difficulties apply in extracting useable information from estimates of ships' waste generation rates. This is exacerbated by incomplete data on management aspects such as shipping movements, duration of voyages, waste disposal practices (i.e. amount of waste material discharged to sea or destroyed onboard, or held for disposal at a later port). The reliance upon assumptions in the absence of those data further dilutes the value of the predictions.

No reports of alleged inadequacy of port reception facilities have been notified to field research personnel for any of the ports surveyed. It may be surmised that this is more likely a case of nil reporting action to the IMO, as opposed to no dissatisfaction with available facilities or procedures.

4.6 Conclusions

The conclusions of the port surveys and other research efforts are detailed in this section. These findings lead directly into PACPOL SW1 Output Two. Conclusions on the current status of ship's waste management in the Pacific islands region are:

- Effective control of marine pollution in the Pacific islands region is hampered by inconsistent application, and enforcement, of relevant conventions, particularly MARPOL 73/78.
- Various responsibilities incumbent upon Parties to MARPOL 73/78, principal of which are the provision of reception facilities, the enactment of complementary national enabling legislation and the exercise of Port and Flag State Controls, are acting as a deterrent to acceptance of the convention by Pacific island states. In particular, it is unrealistic to expect coral atoll islands to accept waste (including garbage) from international ships.
- Only a few individual States within the Pacific islands region are capable of effectively dealing with ship-generated waste. Inter-state and wider regional cooperation needs to be emphasised and the IMO must relax the requirement for Parties to MARPOL 73/78 to provide adequate reception facilities in their own right if

Pacific island states are to accede to the convention.

- SPREP should encourage all of its 21 Members to become Parties to MARPOL 73/78 as a minimum. In the case of metropolitan countries governing SPREP member territories, application of MARPOL 73/78 may need to be formally extended to cover Pacific island territories or those governing in free association. When States do become signatories to the convention, this act should be augmented by enactment of suitable national enabling legislation, and implementation of effective compliance checking and Port State Controls.
- The IMO should be lobbied to relax waste reception requirements for island states unable to reasonably meet the requirements by reason of geographical circumstances.
- The possibility of declaring a modified 'Special Area' in the Equatorial doldrum regions of the Pacific islands region, specifically prohibiting the disposal to sea of floating materials, should be investigated in consultation with the IMO.
- Responsibility for waste management in Pacific island ports is often fragmented, with minimal cooperation between affected parties. This causes gaps and overlaps in responsibilities as well as inefficiencies. The result is ineffective waste management practices and incomplete management oversight.
- The most problematic sources of ship-generated waste are the small motor vessels engaged in domestic, inter-island trading. International fishing vessels are probably the next biggest source, although they tend to concentrate in a limited number of Pacific island ports.
- Foreign Fishing Vessels and their 'motherships' requesting access to Pacific island fishing grounds are not currently required to demonstrate compliance with ships' waste management requirements.
- With few exceptions, ship waste reception facilities and procedures within the region are generally inadequate, and often non-existent. Quarantine waste handling and destruction measures are ineffective in some states, possibly negating the imposition of the barrier controls (e.g. transport in open trucks, burning in pits); recycling is a marginal proposition for smaller, outlying islands; some commendable oil recovery measures are in place but these need to be significantly enhanced and more widely subscribed to; and procedures for segregating and properly dealing with special/hazardous wastes require improvement throughout the region.
- In many instances, no ships' waste reception facilities are provided. This may be acceptable for international shipping (but not in all circumstances), but is inappropriate for domestic shipping and promotes inappropriate waste disposal.
- With only a few exceptions, Pacific States import far more container loads of goods than are exported. The result is the carriage of significant amounts of empty container capacity around and out of the region. Options to make use of this excess capacity for waste transfer between States should be investigated.
- Any waste management solutions will be more effective, and probably of greater longevity, if based on appropriate technology with inherently low maintenance requirements. Cultural and social sensitivities must also be recognised.
- Zero-acceptance of all waste from international shipping is a realistic option for some ports, and may in fact be an imperative.
- Zero acceptance of wastes from domestic vessels is not a realistic option for any port, as this will only encourage indiscriminate and potentially damaging disposal at sea.
- As a minimum, ports within the Pacific islands region need to establish waste reception facilities for domestic shipping and boating. Adequate facilities should be provided for garbage, oily wastes and hazardous

materials. Reception facilities for international shipping need only be provided in selected locations.

- Procedures for the collection and proper disposal of waste oil should be provided in ports within the Pacific islands region. Waste oil could be held for export to a second country for reuse or recycling, or used locally as a fuel, lubricant or preservative coating. Use as a dust or weed suppressant should cease.
- Facilities for the collection, separation and disposal of oily bilge water should be established in selected ports within each nation/territory, such that all domestic shipping has reasonable access to such facilities. A possible solution is arranging for bilges to be pumped by existing liquid waste collection trucks, provision of a static oil water separator, and collection of recovered oil.
- Facilities should be established for the separate collection and proper handling of special and hazardous wastes, such as lead-acid batteries, oily rags and filters, paint, and engine additives.
- Procedures for the handling and disposal of quarantine wastes should be improved as necessary to ensure their effectiveness.
- Opportunities for recycling, principally of aluminium cans, should be identified and encouraged. This would invariably involve export of recyclable material to another nation, such as Japan or Australia, for materials recovery.
- Ports where water quality and vessel-sourced sewage discharge have been noted as a definite or possible problem are:
  - Pago Pago, American Samoa
  - Weno, Chuuk State, Federated States of Micronesia
  - Kolonia, Pohnpei State, Federated States of Micronesia
  - Suva, Fiji
  - Papeete, French Polynesia
  - Majuro, Marshall Islands
  - Noumea, New Caledonia
  - Funafuti, Tuvalu
  - Port Vila, Vanuatu

These ports should limit adverse effects by regulating all pollutant discharges and by other means, such as the provision and mandatory use of shore ablution facilities.

- Management of terrestrial waste is a challenge for many of the island states within the Pacific islands region. This is attributable to technical, economic and cultural reasons, and also lack of suitable and available land in the case of the physically small states.
- Any improvements in ships' waste management are likely only to be achieved in concert with improvements in terrestrial waste management.
- A regional regime of mandatory fees for port waste disposal services should be established. Fees should be set on a national or regional basis and applied in a manner which promotes rather than deters proper waste disposal.
- The insular nature of a substantial proportion of shipping within the Pacific islands region lends itself to a regional regime of compliance checking. Noting the active ship inspection programmes exercised by nations such as Australia, a regional inspection and reporting regime could be established to link with, and build upon, these existing regimes. A regional arrangement would synchronise inspection efforts, while avoiding duplication and improving the comprehensiveness of coverage.
- A regional inspection regime may not effectively capture small domestic trading vessels which operate solely within jurisdictions which rely upon inspections to be undertaken by neighbouring states. Noting this, any effective scheme should also provide technical assistance to improve inspection and reporting capabilities within the Pacific island states, especially those with a large register of vessels engaged virtually exclusively in internal trade, such as Papua New Guinea and the Solomon Islands.
- Active education and information programmes should be established, such as through the various national maritime training institutions, informing seafarers of marine pollution

issues and management, reduction and avoidance measures.

- Collection and disposal of waste can be improved, and the rate of generation minimised, through more effective education of seafarers in the region.
- There is a dearth of statistics and information available regarding waste reception and generation in Pacific ports and shipping. The lack of data is indicative of the current management situation and reflects the low priority given to ships' waste and complicates the formulation of appropriate management responses.

The Waste Management Challenge of High Seas Fishing Fleets

Significant potential demand for ship waste reception is presented by the extensive activities of tuna fishing fleets operating from Pacific island states, particularly the small island states of Micronesia. Tuna 'motherships', often displacing several thousand tons, can remain in the inshore waters of lagoons for up to six to eight weeks at a time, and in some instances, more than 15 'motherships' plus their attendant fishing vessels may be at anchor in a single lagoon at any one instant. Although tuna vessels may not actually come alongside in island ports, their stay within the lagoon nevertheless puts them in a zone where the discharge of most, if not all, categories of waste which may be permitted by MARPOL 73/78 in open ocean areas is precluded by the close proximity to nearest land.

It appears that fishing vessels, particularly the 'motherships' rarely discharge waste to shore in the Pacific islands ports. This suggests, that the vessels either have significant onboard waste holding capacity (such as sludge and waste oil tanks) and/or treatment facilities (such as sewage treatment plants, oily water separators and incinerators), or they are in breach of MARPOL 73/78 requirements. Verification of whether these vessels comply with MARPOL 73/78, and the national legislation of the States they are visiting, can only be achieved via an effective regime of Port State inspections.

It is unlikely that full compliance with MARPOL 73/78 can be achieved by tuna 'motherships' while at anchor in lagoons. If Pacific island states are to permit extended stays in their waters, then it is incumbent upon the host governments which are party to MARPOL 73/78 to provide 'adequate' port waste reception facilities. This may involve the use of barges or lighters to collect wastes (mainly garbage and waste oil) from these vessels while they remain at anchor.

5. APPROPRIATE MEASURES TO IMPROVE SHIP WASTE MANAGEMENT IN PACIFIC ISLAND PORTS

5.1 Overview

This section reviews possible reception and treatment measures for ship-generated waste which could be adopted by Pacific island ports and provide *adequate* services to regional shipping. Legal aspects and the merits of demonstration projects are also reviewed.

Determining Adequacy of Port Waste Reception Facilities and Procedures

The IMO has determined that:
To achieve adequacy the port should have regard to the operational needs of the users and provide reception facilities for the types and quantities of wastes from ships normally using the port.

(IMO, 2000; 5)

In practical terms, the IMO summarises adequate facilities as those which:

- fully meet the needs of ships regularly using them, and their characteristic waste streams;
- are available during a ship's visit to the port and do not cause undue delay to ships;
- do not hinder the activities of other port users;
- are conveniently located and easy to use;
- do not provide mariners with a disincentive to use them;
- comply with national, local and other legislation applying to waste management;
- do not present a health or safety hazard to port users or the general public;
- contribute to the improvement of the marine environment; and
- allow for the ultimate disposal of ship-generated waste to occur in an environmentally sustainable manner.

Reception facilities and procedures, reuse and recycling possibilities, and ultimate disposal options are examined for oily wastes, garbage (including quarantine items) and special/hazardous wastes. Options for the management of sewage are also addressed.

In assessing the various options, and when not stated otherwise, it is implicit that end disposal can occur in an environmentally sustainable manner (i.e. appropriate handling, treatment and ultimate fate of the wastes once they are removed from the port area and enter the wider waste stream of the particular State. It is acknowledged that this is not always the case at present in the Pacific islands region, and it is for this reason that PACPOL SW1 should be considered a component of the wider suite of programmes to improve all facets of waste management in the Pacific islands region.

In planning and implementing ship waste management programmes it is important to recognise the broad dichotomy of shipping in the Pacific islands region, namely:

- domestic shipping, which operates virtually exclusively within the waters of a single State; and
- international shipping, which moves between Pacific island states, and in many cases, ports external to the region.

Analysis of these shipping patterns identifies various strengths, weaknesses, opportunities and threats (i.e. SWOT analysis) to effectively manage waste. These are summarised in Table 13.

Table 13: SWOT Analysis of Ship-Generated Waste Management Characteristics in the Pacific Islands Region

	Domestic Shipping	International Shipping
Strengths	Generally subject to legal regime of State within which they trade.	Generally well equipped with pollution control equipment.
Weaknesses	Vessels are typically old and generally not well equipped with pollution control equipment. Limited options to retain wastes for lawful discharge on high seas or transfer to shore at a suitably equipped port. Legal systems of States in which they operate, including compliance and inspection regimes, may be ineffective.	May fly flag of nation not a Party to MARPOL 73/78, thereby avoiding normal pollution control obligations. Any garbage which comes ashore may need to be treated as quarantine waste.
Opportunities	Generally centre activities on one or two ports, providing option to base waste reception and management systems at those ports.	Able to retain waste for lawful discharge on high seas or disposal at another port. More exposed to international inspection and compliance monitoring regimes. Possibility exists to use excess cargo capacity to transfer wastes from one port to another.
Threats	Non-compliance and unlawful pollutant discharges in coastal waters. Generally limited inspection and compliance enforcement regimes in Pacific island states.	May unlawfully discharge wastes on high seas.

5.1.1 Accommodating Limited National Means in Port Waste Reception Planning

The limited institutional, technical and economic means of most Pacific island states, and the severe physical constraints imposed in many by the lack of land available for waste disposal purposes, conspire to create a situation where individual States are almost uniformly unlikely to be able to accept and adequately deal with all waste generated by ships visiting their ports. Therefore, planning for ship waste reception in Pacific island ports must recognise and accord with two cardinal precepts. These are:

- Some Pacific island states have no option but to refuse to accept some categories of ship-generated waste.
- A cooperative regional approach is essential if durable and sustainable improvements are to be realised. This is equally true in terms of legal instruments, port waste reception and waste treatment and disposal.

5.1.2 'Appropriate Practice'

The fundamental consideration for the management of shipping waste in the region is to implement a system which is technically, economically and culturally suitable and appropriate for the Pacific islands. 'Appropriate practice' should be considered as solutions which are practicable and achievable for the Pacific islands region, rather than slavish acceptance of 'best practice' measures adopted from overseas which may pose inherently unrealistic expectations. As has been the experience with past development projects, initiatives which are not compatible with Pacific island norms frequently falter.

'Best practice' systems may be ill-suited for the waste reception and disposal needs of many Pacific island ports, by virtue of the cost and engineering requirements inherent to these technologies. Suitable systems and procedures for Pacific island ports, can be more appropriately considered within the paradigm of 'appropriate practice', which seeks achievable solutions by matching

waste management requirements with technical and economic capabilities.

With regard to the actual technical means of waste reception, treatment and disposal (including collection, storage and transport methods), a range of often sophisticated, and highly effective options is available. However, the more capable systems typically involve complex machinery, requiring greater effort in operator training, process controls and maintenance requirements, as well as elevated costs.

While highly capable systems may be considered to represent world 'best' practice, also available are less complex and cheaper methods - in terms of capital, operating and maintenance costs - albeit often less effective. Nevertheless, more rudimentary systems are generally capable of containing or treating waste to prevent undue risk of harm to the environment and public health.

The Caribbean Response to Marine Pollution

A comprehensive and holistic package of initiatives has been identified as required to achieve durable improvements to marine waste management and marine environmental quality in the Caribbean. These include:

- Promoting the active participation of more countries and agencies within the region in endeavours to improve marine waste management.
- Developing a Wider Caribbean Strategy that integrates land-based solid waste management with those associated with vessel-generated marine debris.
- Design an effective and comprehensive marine debris communication network in the wider Caribbean, and creation of a database of relevant enabling entities in the region which clearly states their objectives and work programme.
- Developing a strategy for conducting a marine debris outreach campaign.
- Establishing a region-wide public education campaign and incorporate marine debris information in schools.
- Assisting cruise and merchant shipping lines to comply with MARPOL 73/78.
- Conducting workshops on marine debris and solid waste management.
- Organising clean-ups of debris on the Caribbean coasts.
- Conducting pilot economic impact studies on the effects of marine debris to Caribbean economies.
- Promoting accession to MARPOL 73/78 by Caribbean states.
- Promoting pilot projects that demonstrate integrated approaches for reducing marine debris in areas of particular importance for ecosystem conservation.

Many of these recommendations have been incorporated in an IMO-supported programme known as the Wider Caribbean Initiative for Ship-generated Waste (WCISW). The WCISW is similar in purpose and application to PACPOL

There is good reason why Pacific island ports should not be expected to match the best levels of service provided by ports in developed nations (notwithstanding that ports in many developed nations are not meeting their obligations despite being full signatories to MARPOL 73/78 and similar conventions). Instead, Pacific island states need to tailor solutions to their own particular needs and capabilities when implementing MARPOL 73/78.

5.2 Waste Reception and Treatment Options

In providing adequate waste reception services, ports must be capable of accepting the types and quantities of waste generated by vessels normally using that port. Few Pacific island ports usually handle shipping which is likely to generate particularly unusual wastes requiring specific collection

and disposal measures. Most only need to be able to handle wastes to be generally expected from orthodox shipping. These are:

- oily wastes;
- garbage (including domestic rubbish, dunnage and packing materials);
- quarantine wastes (including foodstuffs and some types of medical waste); and
- special, hazardous or otherwise noxious wastes (usually in modest quantities, such as batteries, engine additives, solvents, paints and medical waste).

Some ports in the region also need to have measures in place to divert vessel-sourced sewage from entering the marine environment. This does not apply to all ports, only to those with poorly flushed harbours or anchorages where port water quality is susceptible to pollution from vessel-sourced sewage.

A critical factor for many Pacific island ports is their limited physical and technical means to properly deal with various categories of ship waste. These constraints have been considered when formulating recommended improvement strategies. This factor also has to be considered by international fora when mandating obligations for compliance with international legal instruments.

Waste Reception in the Port of Singapore

Singapore is one of the world's busiest ports, accepting more than 90,000 ship visits annually. The port engages private contractors to handle oily wastes including oil/water mixes, slops, sludge and tank cleaning water. These are collected either by barge or by discharge at berths with facilities to accept contaminated wastewater. The wastes are transported to the Slops Reception Centre for treatment and disposal.

The Singapore Port Authority does not accept Annex II wastes; the chemical industry is expected to handle all of its own chemical waste.

Singapore does not accept sewage, and the nation has not ratified Annex IV. It is expected that ocean-going vessels will have suitable treatment facilities and/or holding tanks so that discharge within Singaporean waters is not required.

Garbage is collected by barges operating throughout the port. Ships are charged a fixed port fee whether they use the service or not. Garbage collected from ships is either incinerated or incorporated into the overall waste stream of Singapore.

More detailed information on types and sources of ship-generated wastes is presented in Section 3.

5.2.1 Oily Wastes

Port reception, treatment and disposal measures need to take account of the characteristics of ship-generated oily wastes, as noted in Section 3.1.1. Most vessel-sourced oily wastes are in the liquid phase and fall into two broad categories. These are:

- concentrated oil wastes; and
- oily mixtures, most commonly in a water medium.

Oily wastes may also contain a range of impurities such as detergents, degreasers, engine additives, greases and solids, particularly the sludges and oily mixtures. Some oily wastes, are solid such as, used oil filters and oily rags.

5.2.1.1 Waste Oil

Waste oil can be collected in ports in small containers, drums or tanks, or collected directly by suitably equipped pump/tank combinations on trucks or barges, dependent upon demand for reception. In larger ports, direct connection to shore waste oil collection systems installed in wharves is another option.

A range of possible uses exist for waste oil, both formal and informal, virtually all of which are currently practised to some extent in the Pacific islands region. Typical uses are detailed in Section 1.3.2.3. The most common informal uses appear to be as a corrosion inhibitor, as dust and weed suppressant and as fuel. There are also some, albeit limited programmes within the region, for recovery and recycling of waste oil. The environmental acceptability and sustainability of all but the last two mentioned of these uses is often doubtful. There also exists the possibility of adverse effects upon human health from inappropriate uses, especially considering the impurities likely to be present in the oil. The use of waste oil, suitably treated, as a fuel is considered the optimum disposal scheme for Pacific islands. Recycling waste oil in this manner eliminates the waste while providing a substitute for fuel oil, a non-renewable resource. Not all waste oil is suitable for use as fuel, and that which is suitable also produces sludge residues as a result of purification. Nevertheless, the residual quantities of unsuitable waste oil and sludge are significantly less than the original, making the final disposal of this fraction easier to achieve.

A viable alternative disposal option for Pacific island states is incineration (Plate 9). Small incinerators, possibly mobile, could be established to destroy waste oil, provided these are located, maintained and operated efficiently to prevent air pollution. This option may be particularly attractive where export of waste oil for treatment is not feasible or viable due to economic or legal constraints. Some waste oil incinerators are in place in Pacific island states, although their reliability has sometimes proved less than optimal.

Plate 9: Waste Oil Incinerator in Fiji

An effective system for Pacific island ports would be to provide collection facilities for waste oil, coupled with a cooperative scheme which transferred the waste to an oil recycling or reuse stream. Dependent upon the demand, collection receptacles can be as simple as 205 L drums placed in suitable positions. These would suffice for most

small vessels and be suitable for marinas, small boat harbours and fishing boat harbours (for small coastal fishing boats). Larger vessels may require cranes to transfer drums of waste oil to shore, or else could pump waste oil direct to shore connections or into a suitably equipped barge or truck.

Waste oil reception systems require a collection scheme which ensures that collection containers are regularly checked and emptied/replaced as required to avoid overfilling. Furthermore, any collection and temporary storage system needs to be closed to avoid fumes, and reduce the risk of fire or of filling with rainwater, and should be within a bunded enclosure to contain any spills or leaks. Waste oil collection stations for small boats can often be conveniently and cheaply established at refuelling facilities (Plate 10). Waste oil collection services for larger vessels could be fixed shore connections in larger ports, but a suitably equipped truck or barge can suffice.

Plate 10: Simple Waste Oil Reception Facilities can be Conveniently Co-located with Small Boat Refuelling Facilities

Eventual transfer of the waste oil to an appropriate reuse or recycling stream may involve export to a major port within the region, or else to one external to the region, such as in Australia or New Zealand. Alternatively, waste oil reuse and recycling opportunities may exist within a particular Pacific island, but this is only likely to be the case for the larger States.

Two transfer schemes are already in place within the Pacific islands region where waste oil is collected in 205 L drums and transferred as deck cargo to ports overseas. Examples of these are the transfer of waste oil from Vanuatu and Tuvalu to Fiji. Larger schemes involve collection of bulk waste oil and its export, such as that in place for the shipment of waste oil from Kosrae, FSM to Nauru.

A summary of current and potential waste oil recovery and treatment schemes in the Pacific islands region is presented in Table 14. The table also presents possible waste oil transfer (import/export) routes,

based upon current shipping patterns within the Pacific islands region and major destinations external to it.

Table 14: Synopsis of Current and Potential Waste Oil Recovery and Treatment Schemes in the Pacific Islands Region

State	Current or Potential Domestic Waste Oil Treatment/Disposal	Potential Capacity to Act as Regional Waste Oil Import Centre	Potential Opportunities to Export Waste Oil	Current Status of Waste Oil Management
Pacific Island States				
American Samoa	Use as supplementary fuel in tuna canneries	Potential capacity, limited by US EPA regulations controlling import of oily wastes.	n/a	Effective domestic recovery and reuse programme.
Cook Islands	Limited domestic capacity other than waste oil incineration.	Nil.	Export to Fiji and/or enhance export programmes to New Zealand.	Limited export to New Zealand.
Federated States of Micronesia	Limited domestic capacity other than reuse in power stations and waste oil incineration.	Nil.	Possible to re-export waste oil excess to domestic treatment capacity to Guam (notwithstanding US EPA regulations) and Nauru.	Limited reuse in power station in Chuuk. Limited export to Nauru from Kosrae. Most waste oil unaccounted for.
Fiji	Potential for reuse in power stations, mines, steel furnaces and sugar mills.	Considerable potential to act as regional treatment centre and receive waste oil from Melanesian and Polynesian sub regions.	Possible to re-export waste oil excess to domestic treatment capacity to Australia or New Zealand.	Currently processes domestically sourced waste oil and also accepts limited quantities from Kiribati, Tuvalu, Vanuatu, Tonga and Cook Islands.
French Polynesia	Reuse locally.	May have some capacity to accept waste oil from neighbouring States.	n/a	Currently re-processes domestically sourced waste oil.
Guam	Waste oil recovery and treatment facilities in place.	Well suited to act as Micronesian regional centre for waste oil processing, but this is precluded by US EPA regulations controlling import of oily wastes.	Possible to re-export waste oil excess to domestic treatment capacity to United States, Singapore or Japan.	Effective domestic recovery and reuse programme.
Kiribati	Limited domestic capacity other than waste oil incineration.	Nil.	Export to Fiji.	Limited export of waste oil to Fiji.
Marshall Islands	Limited capacity for reuse for fuel in coconut plant and power station.	Nil.	Possible to re-export waste oil excess to domestic treatment capacity to Guam (notwithstanding US EPA regulations) and Nauru.	Limited recovery and reuse for fuel in coconut plant and power station.
Nauru	Can reuse recovered oil in mines.	Can accept waste oil from neighbouring States.	n/a	Disposing of domestically sourced waste oil, with waste oil also accepted from Kosrae, FSM.
New Caledonia	Waste oil recovery and disposal facilities in place.	Potential to accept from Vanuatu and Wallis and Futuna.	n/a	Disposing of domestically sourced waste oil.
Niue	Limited domestic capacity other than waste oil incineration.	Nil.	Export to Fiji.	Limited incineration of waste oil.

Northern Mariana Islands	Limited domestic capacity other than reuse in power stations and waste oil incineration.	Nil.	Possible to re-export waste oil excess to domestic treatment capacity to Guam (notwithstanding US EPA regulations) and Nauru.	Some reuse in power station.
Palau	Limited domestic capacity other than reuse in power stations and waste oil incineration.	Nil.	Possible to re-export waste oil excess to domestic treatment capacity to Guam (notwithstanding US EPA regulations) and Nauru.	Some reuse in power station.
Papua New Guinea	Potential for reuse in power stations, mines, lime kilns and timber mills.	Could act as regional centre, dependent upon level of internal demand.	Possible to re-export waste oil excess to domestic treatment capacity to Australia.	Limited internal recovery and reuse. Limited export to Australia.
Samoa	Potential to expand current limited recovery and treatment scheme.	Could accept wastes from Tokelau.	Possible to re-export waste oil excess to domestic treatment capacity to American Samoa (notwithstanding US EPA regulations).	Limited internal recovery and reuse.
Solomon Islands	Potential for reuse in power stations, mines and timber mills.	Limited.	Possible to re-export waste oil excess to domestic treatment capacity to Australia.	Not known.
Tonga	Limited domestic capacity other than reuse in power station and waste oil incineration.	Nil.	Export to Fiji.	Limited export of waste oil to Fiji.
Tuvalu	Limited domestic capacity other than waste oil incineration.	Nil.	Export to Fiji.	Waste oil incinerator inoperative. Limited export of waste oil to Fiji.
Vanuatu	Potential for reuse in timber mills and abattoirs.	Nil.	Export to Fiji, New Caledonia or Australia.	Limited export to Fiji.
Wallis and Futuna	Limited domestic capacity other than waste oil incineration.	Nil.	Export to Fiji or New Caledonia.	Not known.
Neighbouring States				
Australia	n/a	May be able to accept from Melanesia and parts of Polynesia.	n/a	Shell considering importing waste oil from Vanuatu. Some imports from PNG.
New Zealand	n/a	May be able to accept from Polynesia and parts of Melanesia.	n/a	Some imports from Cook Islands.
Japan	n/a	May be able to accept from Guam.	n/a	Not known.
Singapore	n/a	May be able to accept from PNG, Guam and Fiji.	n/a	Not known.
United States	n/a	May be able to accept from Guam.	n/a	Some processed sludge residues accepted from American Samoa.

5.2.1.2 Oily Water

Oily water wastes typically occur in greater quantities than does waste oil. This is inherent to their origin, normally as bilge water or tank washings. An effective oily water waste recovery scheme will be capable of collecting oily wastes from vessels, transferring it to an appropriate treatment system ashore, and then

recovering and separately disposing or recycling the water, oil and solids components in an environmentally acceptable manner.

Most oily water waste encountered in Pacific island ports arises may be expected from bilges and, to a lesser extent, slop tanks. It may also derive from dirty ballast water or from oil tank washings, but these potential sources are limited to only a very small number of Pacific island ports. Transfer of oily water mixtures from vessels over 400 tons can be achieved via the IMO mandated standard discharge connection, in ships so fitted. For small vessels, use of low-capacity pumps (including hand pumps) discharging direct to drums may constitute an adequate reception system.

As with waste oils, discharge to shore of oily water can be accomplished direct to fixed shore connections, but again these arrangements are only viable at larger and more sophisticated ports. A more utilitarian option is discharge into a suitably equipped barge, truck or trailer mounted system.

Oily water must be treated to separate the oil fraction from the water fraction and other impurities. Assuming effective separation the filtered water can then be disposed while the waste oil component is concentrated and subsequently made available for separate recovery. Ideally, the recovered oil would be in a condition suitable for inclusion with a waste oil stream destined for some form of reuse or recycling. Oily water separation and filtration also generate recovered solids, but volumes are relatively small, simplifying final disposal.

Many municipalities in the Pacific islands region rely upon septic systems for the treatment and disposal of sewage, with septage collection trucks subsequently a feature of the waste disposal services available in many port areas. Although less than optimal, septic collection trucks may have utility as an alternative means of pumping oily bilges and transferring the oily water mixture to a separation and treatment facility. This is only the case provided there is careful tank washing to prevent the waste mixing with sewage prior to oil separation, and the entry of oil into septic systems. Therefore the feasibility of using local tanker trucks to provide a transfer service for oily water warrants further investigation.

The IMO *Comprehensive Manual on Port Reception Facilities* describes a number of alternative oily water waste treatment systems. These range from the simple to the elaborate, such as settling tanks, lagoons, plate separators, skimmers, flocculation systems, flotation systems, filters, hydrocyclones, centrifuges, molecular coalescence systems and biological treatment; these individual components can also be combined in treatment trains.

Plate separators and settling tanks, employing the concept of gravity separation, are the most straightforward systems. Simpler systems are typically cheaper to establish and operate and require less-intensive maintenance and operation procedures, while still achieving acceptable performance. These systems should be enclosed, or at least sheltered, to prevent ingress of rainwater and subsequent overflowing and loss of oil contaminated water. However, water released from these systems is unpolished and can contain both dissolved and free components of oil that produce surface sheens, odours and tainting.

Depending on the mixture and its particular components (such as detergents and degreasers), oil can be contained within emulsions that permit it to pass through simple gravity separation systems. Emulsions can be overcome by the use of more sophisticated treatment trains, such as one involving the application of flocculants and additional mixing and settling stages. Full effectiveness of these systems is dependent upon proper control of factors such as flocculant dosage rate, pH and agitation speed. The result is a relatively complex system with increased capital, operational and maintenance costs compared to simpler gravity separation systems.

A cheaper and often satisfactory emulsion removal measure is the inclusion of filters in the final stage of gravity treatment. For example, disposable filters can be installed immediately before the water phase outlet.

The primary objective of PACPOL SW1 is to reduce the amount of ship-sourced pollution entering the marine environment. Noting this, what is required is a programme which can capture oily mixtures and provide a degree of purification which reduces the oil content before the residual water is discharged to the receiving environment. This must be achieved within the context of technical and economic realities. Therefore, it is considered that simpler systems, such as settling tanks and plate separators, offer the most utilitarian and cost-effective option for many Pacific island ports.

The target for the maximum oil-in-water content of the water effluent should be the IMO standard of 15 ppm. Gravity separation systems are usually capable of reducing oil in water content to between 20 ppm and 100 ppm, with the performance of a system enhanced by increasing residence time. Therefore, system design capacity for any particular Pacific island port should aim to achieve a residence time of two to four days. Extended retention times should also be avoided, as these can permit bacterial degradation of the oil, with attendant odour generation. Actual residence time will be influenced by the rate of demand for oily water collection, and treatment rates can be normalised to some extent by installing a storage/settling tank at the front end of the treatment train.

The performance of any oily water separator system should be periodically monitored. If the final concentration of oil in the separated water in systems is significantly in excess of 15 ppm, then filters could be used as a means of final polishing. This is an effective, although less than optimal option, as the use of filters will require additional materials (and costs), extra operations effort and environmentally acceptable disposal of the used filters. A conceptual diagram of a suitable system for Pacific island ports is presented in Figure 2.

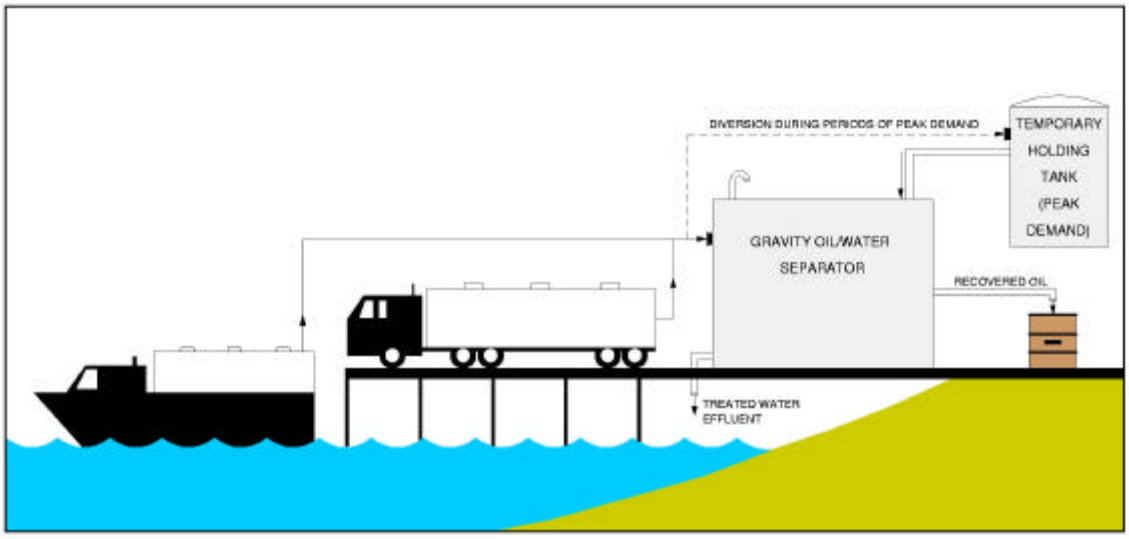

Figure 2: Conceptual Diagram of Reception and Treatment Facility for Oily Water Mixtures in Pacific Island Ports

As indicated by the field surveys, inter-island domestic trading vessels and international fishing vessels are the most likely sources of oily water waste to be dealt with by Pacific island ports. Domestic trading vessels typically centre their activities upon a limited number of ports in each State (e.g. Colonia, Kolonia, Okat and Weno, FSM; Betio and Kiritimati, Kiribati; Honiara, Gizo and Noro in the Solomon Islands; Luganville and Port Vila in Vanuatu), and international fishing vessels also tend to concentrate in a limited number of Pacific island ports. Noting these operating profiles, the commissioning of oily waste reception and treatment facilities in selected ports should be able to capture a high proportion of the oily waste mixtures generated by these ships. However, this scheme would only be effective if there was a complementary education, inspection and enforcement programme to ensure that these vessels did not discharge oily mixtures to sea in-between visits to the reception ports.

5.2.1.3 Oily Rags and Used Filters

Oily rags and used oil filters contain oil which may be highly mobile in the environment, and subsequently pose long-term contamination problems if incorporated in the general garbage stream and disposed to landfill. Lined landfills are not available in most of the Pacific islands, so oily rags and filters need to be collected and treated separately to the general garbage stream. A suitable option is to divert these wastes for collection with special and hazardous wastes, as described in Section 5.2.4.

5.2.2 Garbage (including Recyclable Materials)

5.2.2.1 General Garbage

General garbage is usually the simplest and cheapest component of the spectrum of ship-generated waste to manage. The positioning on a pier or wharf of any form of receptacle for the collection of garbage, coupled with a collection service commensurate with the amount and frequency of waste deposited, will be adequate for the bulk of non-international vessel traffic at most Pacific island ports. In the case of larger quantities of garbage, transfer direct to a truck or skip is a practical and effective option.

The prevention of garbage discharge to sea requires its retention onboard until transfer to shore at a suitably equipped port. Although disposal to sea is acceptable and lawful in some instances (dependent upon location and type of garbage) there are many circumstances where it is not, particularly

for coastal shipping. Therefore, garbage management strategies need to encourage vessel operators to provide suitable bins or bags onboard and train crews to use them, particularly for plastics, batteries and buoyant materials such as cardboard and wrapping. Hessian bags, recycled fertiliser bags, mobile garbage bins or similar items can be used to collect and contain garbage and will also reduce the risk of spillages during transfers to shore. Where large quantities of garbage are transferred, spill trays or chutes bridging the gap between vessel and wharf should be available (Plate 11). Hinged spill trays along a wharf face also minimise spillages during bulk cargo loading and unloading operations.

Plate 11: Garbage Being Transferred Direct to a Truck via a Chute

Bin type, capacity, number, siting and their emptying cycle at a port is obviously dictated by the type and number of vessels that use it. Galvanised bins, painted 205 L drums or mobile garbage bins (i.e. 'wheelie' bins) may be sufficient for most marinas and small fishing boat harbours, whereas waste skips are more appropriate for commercial wharf areas, where large items such as dunnage and broken pallets often require disposal. Whatever bin types are deployed, they should have covers to reduce flies and odours, prevent wind scatter, and exclude rainwater ingress, birds and vermin. They should also be capable of containing any leachates exuded by the garbage.

Suitable receptacles may include open 205 L drums, although these may be difficult to handle when full and can also collect rainwater unless lids or covers are provided. Small skips, ideally with prop-up lids are available and are generally easier to use than drums, although they are more costly to provide. For large ports or particularly busy marinas and fishing harbours, a garbage station provides further advantages by allowing convenient separation of oily and hazardous wastes from the general waste stream. Garbage stations should contain clearly marked receptacles suited to the items being separated, and within a fenced, weather sheltered compound that can be illuminated to provide safe 24 hour access and use.

The simple provision of garbage receptacles will be ineffective if the bins are not emptied on a sufficiently regular basis. This can be achieved either by suitably equipped contractors or by including the port precincts on municipal garbage collection rounds. A procedure should also be in place to arrange garbage collection in addition to the routine schedule should demand exceed normal capacity.

Some ports will be required to dispose of particular types of garbage that are specific to the type of vessels it services. Examples include discarded fishing nets and unserviceable gear, empty oil drums and damaged, unserviceable shipping containers. Items of this nature may be too bulky or unwieldy to include in the general garbage stream, so particular procedures may be required. The port should also consider the 'user-pays' option for the disposal of large, bulky or unusual items. In the case of used fishing gear, collection and disposal procedures may include separate receptacles or a dedicated collection service. Similarly, shipping containers, used drums and similar items may also need specialist collection and disposal, although reuse opportunities may exist.

Provided that oily wastes and other noxious and environmentally hazardous material have been removed from garbage, disposal to a suitably operated landfill should be an environmentally acceptable option. However, constraints on landfill capacity in some of the Pacific island states means that even disposal of innocuous garbage to landfill may not be a sustainable option. Little latitude exists for refusing garbage from domestic shipping, but the demand for landfill capacity can be reduced if general garbage is not accepted from international shipping. This is a workable and reasonable option for small island states.

The demand for landfill capacity can also be reduced if green waste is diverted from the general garbage stream from domestic shipping. This material may be suitable for livestock feed (e.g. pigs and chickens) or composting. Separate collection of green waste from international shipping is not a viable option owing to quarantine requirements.

Controlled sea dumping at a designated deep water site of larger, bulky inert objects, such as unserviceable sea containers, is another disposal option for small island states. Sea dumping should only be undertaken in a manner consistent with the London Convention and SPREP Dumping Protocol.

5.2.2.2 Recyclable Materials

The complexity of potential capture and treatment regimes for recyclables depends on the range and types waste materials most frequently requiring management. Recyclable materials, such as paper, cardboard, glass, certain plastics, aluminium, lead, copper and similarly valuable metals can be managed by simple collection service from designated bins in a manner similar to the general garbage service, provided that:

- they are properly segregated from the general garbage stream (preferably at source);
- separate collection and storage arrangements can be arranged; and

- the various types of material destined for recycling can be economically transferred or back-loaded to the respective recovery/recycling facilities that may exist within or beyond neighbouring states.

Limited capacity exists within the Pacific islands region for materials recycling, and most schemes will involve export to locations beyond the region. Generally speaking, separate collection bins are required for each category of material, and these materials may then be expected to enter different waste transfer routes, dependant upon their ultimate destination.

Recycling schemes are vulnerable to contamination of materials by ineffective segregation, and can easily become a cost burden if volumes captured are not large enough. Recycling schemes are also susceptible to movements in commodity prices and processing costs. In a worst case situation, collected recyclables can rapidly accumulate at collection points if contracted transfer costs exceed returns. Thus caution and careful planning are required if a port or island State wishes to introduce a recycling scheme.

5.2.3 Quarantine Wastes

Many island States have experienced invasions by unwanted pests and diseases, and face the problem of reducing the risk of further incursions by organisms and pathogens that can threaten public health, local crops, domestic animals, and/or reduce the biodiversity of the native plants and animals. Management of quarantineable waste requires considerably more care than general garbage for the following reasons:

- Once landed from a vessel, quarantine waste must be stored, handled and transported in a manner which limits the risk of escape of exotic organisms, propagules or spores of unwanted species (such as weeds, fungi, insects, snails and human, animal and plant diseases). Isolation involves preventing not only releases, but also access by potential vectors such as local insects, birds, rats and mice. Isolation can be achieved by using appropriate air-tight bags, enclosed receptacles, covered trucks and secure storage compounds.
- The quarantine material must be destroyed or disposed in a manner which either eradicates or contains the items of risk. This may be achieved by a variety of means, such as high temperature incineration, autoclaving (sterilisation by steam), or deep burial, possibly with chemical treatment, in a lined landfill.

The management of the quarantine waste stream is made problematic by the inclusion of items which would not otherwise pose a quarantine risk, but does so once it is combined with (and hence contaminated by) the quarantine waste. Such material unnecessarily adds to the volume required to be handled and transported, and typically introduces materials which are more difficult to destroy, thereby greatly adding to the overall cost of quarantine (and port) waste disposal.

Effective management of quarantine waste by small island states should therefore include:

- judicious application of quarantine requirements to the overall waste stream, with the objective of excluding materials which pose no quarantine risk;
- refusal to receive higher risk quarantine items such as food wastes, medical wastes, or sewage; and
- inspection and verification of the procedures and equipment of contracted or municipal operators who have been designated to handle quarantine wastes.

5.2.4 Hazardous and Special Wastes

Vessels generate a range of solid, liquid and sometimes gaseous wastes that are noxious and hazardous. Items that are toxic, flammable, explosive, corrosive,

poisonous, radioactive or infectious require special handling to minimise fire, explosion, and other human health and safety risks. Waste items may present specific or combined hazards, particularly if they become mixed together (e.g. fertiliser or chlorine oxidants with acids or solvents). Adequate segregation of incompatible hazardous wastes during reception and subsequent handling is a paramount consideration.

Typical hazardous or noxious items in both large and small vessel waste include discarded batteries, pressure pack containers, greases, oils, filters, oily rags, solvents, acids, paint, paint chips, adhesives, engine additives, insecticides and vermicides. Many of these items are poisonous and contain heavy metals or Persistent Organic Pollutants, and can easily pollute groundwater if transferred to unlined tips. Medical wastes, with associated biological and sharps hazards, also need special handling and disposal (and can present an additional quarantine risk; see Section 5.2.3).

Ships with hazardous cargoes, such as packaged liquid chemicals and fertilisers, can generate packaging and spillage residues requiring special handling and disposal. Livestock carriers and fishing vessels can also generate hazardous and noxious wastes, with animal-related wastes such as urine, faeces, straw and carcasses from the former, and putrescible by-catch, processing waste, discarded bait and other fishing-related residues from the latter.

Only a limited number of ports are likely to be requested to accept more specific wastes such as fishing by-catch, animal wastes, and chemical containers. In these circumstances, port authorities should establish suitable facilities and procedures commensurate with the characteristics of the demand.

The single most important requirement is to divert these materials from the general garbage stream, but their subsequent safe management can be costly in large ports because of the volume and diversity of wastes that require separate handling, storage and disposal/treatment requirements. In the case of hazardous wastes from international ships, an acceptable solution for Pacific island ports may be non-reception. This is obviously not an option for domestic vessels, although the amount of hazardous waste generated by the domestic fleet and cruise yachts should be relatively minor at most Pacific island ports.

For most ports, the small amounts expected can be managed by providing a separate, bunded collection points with areas clearly delineated for groups of items requiring separated storage. Materials collected in the hazardous waste collection area should be clearly labelled to aid identification.

Medical wastes can be collected in dedicated containers, if there is sufficient demand, or else specially collected for transfer to the local hospital waste management scheme following notification to port management.

Only a limited number of ports are likely to be requested to accept more specific wastes such as significant quantities of fishing by-catch or animal wastes. In these circumstances, port authorities should establish suitable facilities and procedures commensurate with the characteristics of the demand.

Reception procedures for hazardous and special wastes will only be effective if vessel-operators are aware of their existence and the need to separate these wastes from general garbage. This can be achieved via effective education and dialogue, supported by relevant port regulations.

Subsequent treatment or disposal of these materials needs to be undertaken in a manner that avoids environmental harm. In many cases, this will likely involve accumulation with other hazardous materials generated in the State, for subsequent inclusion in wider special and hazardous waste management schemes.

5.2.5 Sewage

Management of vessel-sourced sewage waste is only a relevant consideration for a select number of Pacific island ports, essentially those where water quality is degraded by, or is vulnerable to pollution by sewage from vessels. In these instances, ports need to implement controls to limit sewage discharges. Management options are:

- Prohibiting the discharge of sewage from vessels when in port waters, unless vessels are fitted with an approved sewage treatment systems that is operated correctly. Vessels which frequently visit the port and upon which crews normally reside while in port should be encouraged to install holding tanks so that they can retain sewage for discharge in open waters.
- Regulating the number people living onboard vessels in harbour and/or their duration of stay.
- Providing an emptying and wash-out point for chemical toilets (particularly at small boat harbours and marinas).
- Providing onshore ablution facilities (toilets as a minimum, but preferably with showers and laundry facilities and a cooking area) for vessels in port; and
- If technically feasible and there is sufficient demand, providing sewage collection facilities ashore (e.g. wharf connections, sewage tank pump-out facilities and/or points for the emptying of chemical toilets). Treatment may be via a suitably sized package treatment facility within the port, pump-out by sullage truck, or connection direct to a municipal sewage system.

For operational and cargo-related sewage wastes (such as fish and livestock wastes), port operators should ensure that suitable measures are in place to prevent the discharge or spillage of these wastes into port waters. This can be achieved by using hoppers, or enclosed nets for the transfer of fish catch between vessels and the wharf, with chutes or drip-trays suitably placed to catch spillage. Deck drains on livestock carriers should be blocked to prevent direct discharge to port waters. The decks of fishing vessels and livestock carriers should not be washed down where run-off will enter into port waters.

5.2.6 Summary of Waste Reception Facilities Suitable for Pacific Island Ports

It is instructive to consider waste reception facilities as a system of individual components, with the range and number of these components matched to the particular profile of demand for the port. Components of the total system applicable for the majority of Pacific island ports are:

Waste oil: clearly marked 205 L drums, waste oil tanks, or discharge direct to truck or barge mounted tanks, with appropriate transfer equipment (e.g. portable containers, hand pumps and/or motorised pumps).

Oily waste mixtures: fixed tank/s or discharge direct to road or barge mounted tanker, with transfer to appropriate oil-water separation facilities as well as transfer equipment (e.g. hand pumps or motorised pumps).

Garbage: covered bins, skips or discharge direct to truck, with appropriate transfer equipment (e.g. via garbage chutes, crane slings).

Extraordinary or non-routine wastes (e.g. old fishing nets, unserviceable shipping containers, animal carcasses): collection and disposal services as appropriate to the expected type and quantities of extraordinary waste.

Recyclable materials: designated bins or skips as appropriate for proper segregation of recyclable materials, with segregation preferably occurring at source (i.e. prior to landing).

Quarantine wastes: sealable, impervious bags, enclosed bins or discharge direct to covered truck, with appropriately secure transfer, storage and disposal arrangements. ***Hazardous/noxious/special wastes:*** special bins and/or bunded waste deposit stations, with suitable measures in place for notification and recording of the

quantity and type of material involved (to ensure proper handling and disposal and adequate segregation of incompatible materials).

Sewage wastes: shore ablution facilities and amenities (toilets, showers, cooking facilities, laundries), and/or shore sewage connection points, holding tank pump-out stations, portable toilet cleaning stations.

Adoption of the component concept facilitates waste reception planning and management, with the type and level of each component tailored to demand. Waste reception facilities must be linked with appropriate collection and treatment/disposal arrangements.

Two examples of generic sets of arrangements, for a medium to large port, and for a small port (such as a boat harbour or marina) are presented in Table 15.

Table 15: Generic Waste Reception Arrangements for Large and Small Ports in the Pacific Islands Region

	Large Port	Small Port
Waste Oil	Waste oil tanks or discharge direct to road or barge mounted tanker. Waste transferred (possibly involving export to) to a waste oil recovery centre.	205 L drums or small waste oil tanks for collection, suitably located, such as at a refuelling jetty. Waste transferred (possibly involving export to) to a waste oil recovery centre.
Oily Waste Mixtures	Collection tanks or discharge direct to road or barge mounted tanker. Oily mixture treated in a stand-alone gravity separation system. Recovered oil to enter national waste oil treatment stream; recovered solids disposed as noxious waste; filtered water discharged via outflow to port waters (assuming suitable quality of effluent).	Most likely unnecessary, but could be recovered in drums and transferred to nearest oily waste processing facility (e.g. in the local port).
Garbage	Bins and skips in wharf areas for disposal of non-quarantine garbage, emptied as necessary, either by contractor or municipal authorities. Garbage not accepted from international shipping in ports of small atoll states. Discharge of garbage direct to a collection truck, with appropriate transfer equipment (e.g. garbage chutes) available for ships transferring large quantities of garbage.	Bins and skips in wharf areas for non-quarantine garbage, emptied as necessary, either by contractor or municipal authorities.
Recyclable Materials	Bins or skips as appropriate for proper segregation of recyclable materials.	Bins provided as appropriate for proper segregation of recyclable materials.
Quarantine Wastes	Sealable impervious bags, enclosed bins or discharge direct to covered truck. Enclosed quarantine bins on wharf for ships on extended visits.	Generally collected from vessels upon arrival and transferred ashore in sealable impervious bags, or direct to enclosed vehicle. Enclosed quarantine bins should also be available on the wharf for quarantine materials not collected at initial reception.
Hazardous/ Noxious/ Special Wastes	Special bins and/or bunded waste deposit areas, with suitable procedures for notification and recording of quantity and type of waste material and segregation of incompatible materials.	Special bins or bunded waste deposit areas, with suitable measures for segregation of incompatible wastes and notification and recording of the quantity and type of material. Alternatively, could be accepted on demand following specific request to harbour authorities or waste contractors.

Extraordinary/ Non-routine Wastes	Collected and dealt with on occurrence.	Collected and dealt with on occurrence.
Sewage	Controls to ensure non-discharge of sewage by vessels in harbour. Shore toilet and ablution facilities for crews, especially those of domestic trading vessels.	Controls to ensure non-discharge of sewage by vessels in harbour. Shore toilet and ablution facilities (as a minimum, and possibly also laundry and cooking facilities), as well as portable toilet cleaning stations if demand warranted.

5.3 Improving the Regulatory Framework

5.3.1 Need for a Region-Wide Response

While a Pacific island state can choose to regulate and control the waste generated by its domestic fleet at any time and without recourse to international agreements or conventions, effective management of the waste presently discarded by international shipping requires a coordinated and region-wide response.

A Uniform Approach to Ship Waste Management in European Union Ports

The Member States of the European Union (EU) have combined to draft a directive with the intention of ensuring a major reduction in marine pollution by the provision of adequate ship waste reception facilities in all EU ports, including recreational ports and marinas. Additionally, the directive requires all ships, fishing vessels and recreational craft visiting these ports to make use of the facilities provided. More specifically, the directive:

- requires all ports and marinas to provide adequate reception facilities for ship-generated waste and cargo residues;
- requires a waste-management plan to be developed for each port which is to be monitored and approved by EU Member States;
- ensures that fee systems adopted by ports will encourage vessels to use the facilities rather than discharge their wastes at sea;
- obliges every visiting vessel to deliver all wastes and residues to the reception facilities unless the master can prove that there is sufficient storage space for the proposed voyage;
- requires ships to notify their intention to use facilities and quantities of waste on board before arriving in port;
- requires Members States to monitor compliance with the directive and apply sanctions, detaining the vessel when deemed to be necessary; and
- requires authorities to forward information on non-compliance to other EU ports which such ships may intend to visit.

(European Commission, 1998)

The first step is to achieve, at the least a harmonious legal framework for the control of vessel-sourced pollution across the region. This requires as many State jurisdictions as possible to become Parties to ratified, relevant international conventions and regional agreements. The framework can then be optimised by passing national enabling laws which are synchronised between States, in order to establish a consistency for shipping operating within the region. Finally, the application of the legislation should be accompanied by the implementation of a suitable programme of inspections and compliance checking, the efficiency and effectiveness of which can be enhanced by a regional scheme of ship reporting, inspection and enforcement measures. These steps are addressed in the following sub-sections.

5.3.2 Broadening the Application of International Marine Pollution

Conventions Within the Pacific Islands Region

It is a stated aim of SPREP, via the PACPOL initiative, to have all Pacific island states accede to and ratify all relevant IMO and SPREP conventions addressing marine pollution prevention. PACPOL SW1 has identified achievement of this objective as a priority. Table 16 is annotated to display those gaps in the present coverage of international agreements to the Pacific islands region; these show those agreements to which current non-signatory nations should accede to as a minimum to ensure the effective implementation of PACPOL SW1.

Complementary national enabling legislation is fundamental to the effective implementation of international agreements such as MARPOL 73/78 and other marine pollution prevention conventions. The Pacific island states may be categorised into three groups with regard to national enabling legislation for marine pollution prevention conventions, namely those States where:

- effective and comprehensive national enabling legislation is in place for conventions to which the state is a Party;
- national enabling legislation is in place for conventions to which the state is a Party, although the legislation does not effectively address all of the required aspects of those agreements; and
- no national enabling legislation is in place for conventions to which the State is a Party.

Lastly, there are those States which are not a party to relevant conventions. Once they become parties to the appropriate conventions, complementary national enabling legislation will need to be enacted, or existing relevant laws amended as necessary to reflect treaty requirements.

5.3.3 Focusing International Regulations Upon the Pacific Islands Region

Another option for regional measures is for governments and administrations to stipulate tighter rules for shipping operating within the region, using either existing international regulations, or modifying as appropriate for the particular environmental characteristics of the region.

For example, when permitting international fishing vessels to operate within their waters, Pacific states could make proper management of vessel-generated waste a condition of entry to their fishing grounds. Waste management and marine pollution prevention requirements, covenants or performance standards could be incorporated into the licences. Verification could be provided via independent certification by a third party auditor (such as Lloyds or Det Norske Veritas [DNV]) to the effect that the vessels have marine pollution equipment and operational procedures as required by and consistent with MARPOL 73/78.

Accumulation and rafting of floating marine debris is reported to occur in the Equatorial doldrums. Ships contribute to this debris, noting that MARPOL 73/78 permits the discharge to sea of floating materials when greater than 25 nm from land but not in a Special Area. To limit ship-sourced contributions to this rafting, the possibility of declaring a modified Special Area in the Equatorial regions of the Pacific islands region, specifically prohibiting the disposal to sea of floating materials, could be investigated in consultation with the IMO.

5.3.4 Inspection, Surveillance, Compliance Checking and Enforcement Measures

The importance of cooperation by Pacific island states with other regional inspection authorities cannot be overstated, since not all Pacific island ports are or will be capable of receiving all types of waste from international shipping. For example, by checking the contents of a ship's slop tanks at the port of departure and comparing them with the level on arrival at the next port and checking the Oil Record Book, regulatory authorities can determine whether any unlawful discharge to sea has occurred. Similarly the Garbage Record Book can be checked at the arrival port to determine what has been discharged *en route* and, for

example, whether plastics have been retained on board and what is the intended final disposal method and where.

In the case of oil, it should be noted that many of the local and inter-island vessels operating in the Pacific islands region are under 400 GRT and Annex I of MARPOL 73/78 stipulates that the Flag State is responsible for:

> *ensuring that such vessels are equipped as far as practicable and reasonable with installations to ensure the storage of oil residues on board with their discharge to reception facilities or into the sea after suitable separation and treatment*.

No such variation is permitted under Annex V of MARPOL 73/78; this consideration is particularly relevant in the case of plastics which must be either incinerated or retained onboard for transfer to shore.

As noted, some of the larger Pacific island states (Fiji, Papua New Guinea and Vanuatu) are already Parties to the Tokyo MOU. Extension of this MOU to more Pacific island states, together with appropriate staffing and training of inspection personnel, should ensure a higher degree of compliance with the relevant discharge requirements, particularly as they apply to oil and garbage.

Applying a Cooperative Framework of Port State Controls in the Pacific Islands Region

The insular nature of a substantial proportion of international shipping activity within the Pacific islands area lends itself to a regional regime of compliance checking. Active ship inspection programmes are exercised by nations such as Australia, New Zealand and the United States; these are consistent with the Tokyo MOU which is already established across the Pacific basin as a regional inspection and reporting regime.

It can be assumed that since many voyages of the larger ships operating within the Pacific region originate and terminate in Port States that are signatories to the Tokyo MOU, many of the required inspections and checks are already being conducted on a regular basis. Noting this, Pacific island nations should be encouraged to link with, and build upon, these existing regimes. A regional arrangement such as the Tokyo MOU will serve to synchronise inspection efforts, and improve the comprehensiveness of coverage while avoiding duplication of effort and minimising the risk of undue delay for ship operators.

A solely regional inspection regime would not be as capable of capturing small domestic trading vessels operating only within a particular national jurisdiction. Thus any comprehensive scheme should also include inspection programmes specifically targeted at domestic shipping. Such programmes would fall under the jurisdiction of the Flag State in which these vessels are registered and operated, and be supported by appropriate national laws and regulations.

Regional cooperation with ship inspection authorities such as the Australian Maritime Safety Authority, the New Zealand Maritime Safety Authority and the United States Coast Guard can also be used as a vehicle to train inspectors. Cooperation and liaison of this nature enhances training and technical assistance and skills transfers, with consequent improvement in inspection and reporting capabilities within individual Pacific island states.

In an holistic sense, inspection and compliance checking for ship waste management should extend to the handling and ultimate disposal of ship-generated waste once it is landed. These functions are beyond the scope of MARPOL 73/78 and similar international conventions (unless the waste is reloaded for sea dumping in which case the London Convention on sea dumping becomes relevant). Accordingly, the inspection and enforcement regime for the terrestrial side of the waste management continuum needs to be founded on

appropriate national statutes and municipal regulations.

Routine surveillance of shipping is a common tool for deterring unlawful waste discharges and identifying and prosecuting ships which fail to observe the regulations. A regional surveillance network is already in place over much of the Pacific islands area. This programme, coordinated through the FFA, is principally focused upon fishing activities within the Pacific islands region. Nations contribute naval and maritime aviation assets to routine patrol of the region. Typical surveillance platforms include the Pacific Forum class patrol boats operated by many of the Pacific island nations and long-range maritime patrol aircraft of the air forces of Australia and New Zealand. This patrol programme provides a suitable basis for enhancing surveillance of the Pacific islands region with the intent of deterring, in the first instance, and detecting any ships responsible for improper waste disposal at sea. To improve overall effectiveness, maritime surveillance efforts and the reporting of alleged breaches of discharge regulations should be linked with the compliance inspection and enforcement regime for the Pacific islands region.

Table 16: Application of International and Regional Agreements on Marine Waste Management to the Pacific Islands Region, with Recommendations for Rectifying Current Gaps in Coverage

State	IMO	MARPOL 73/78				Tokyo	OPRC 90	London Convention		UNCLOS	SPREP		
	Member	I & II	III	IV (Note 1)	V	MOU		LC 72	1996 Protocol	III	Convention	Dumping Protocol	Pollution Protocol
American Samoa	Note 2	Note 2	Note 2		Note 2	Note 2	Note 2	Note 2			·	·	·
Cook Islands	Note 3	Note 3	Note 3		Note 3	Note 3		Note 3		·	·	·	·
Federated States of Micronesia		+	+		+	+				·	·	·	·
Fiji	·	+	+		+	·					·	·	·
French Polynesia	Note 4	Note 4	Note 4	Note 4	Note 4	Note 5	Note 4	Note 4		Note 4	·	·	·
Guam	Note 2	Note 2	Note 2		Note 2	Note 2	Note 2	Note 2			·	·	·
Kiribati	·	+	+		+	+		·			+	+	+
Marshall Islands	·	·	·	·	·	+	·				·	·	·
Nauru	·	+	+		+	+		+		·	·	·	·
New Caledonia	Note 4	Note 4	Note 4	Note 4	Note 4	Note 5	Note 4	Note 4		Note 4	·	·	·
Niue	Note 3	Note 3	Note 3		Note 3	Note 3		Note 3			+	+	+
Northern Mariana Islands	Note 2	Note 2	Note 2		Note 2	Note 2	Note 2	Note 2			·	·	·
Palau		+	+		+	+				·	·	·	·
Papua New Guinea	·	·	·	·	·	·		·		·	·	·	·
Samoa	·	+	+		+	+				·	·	·	·
Solomon Islands	·	+	+		+	Note 6		·		·	·	·	·
Tonga		·	·	·	·	+	·	·		·	+	+	+
Tuvalu		·	·	·	·	+					·	·	·
Vanuatu	·	·	·		·	·	·	·	·		+	+	+
Wallis and Futuna	Note 4	Note 4	Note 4	Note 4	Note 4	Note 5	Note 4	Note 4		Note 4	·	·	·
France	·	·	·	·	·	+	·	·		·	·	·	·
New Zealand	·	·	·		·	·		·			·	·	·

State	IMO	MARPOL 73/78				Tokyo	OPRC 90	London Convention		UNCLOS	SPREP		
	Member	I & II	III	IV (Note 1)	V	MOU		LC 72	1996 Protocol	III	Convention	Dumping Protocol	Pollution Protocol
United States	·	·	·		·	Observer	·				·	·	·
Australia (Note 7)	·	·	·		·	·	·	·	·	·	·	·	·

Key:

· Treaty, convention or body to which the state is already a party.

✚ Treaty, convention or body to which the state should, as a minimum, become a party in order to implement PACPOL SW1 initiatives.

Notes:

1. Noting that Annex IV of MARPOL 73/78 is not yet in force and it is uncertain when this will occur, it is recommended that Pacific island states that are not yet signatories to the Annex to consider retaining that status until such time as Annex IV enters into force. Once in force, all Pacific island states should adopt Annex IV.
2. US territory. Although the US has not formally advised the IMO of the extension of coverage of IMO treaties to US territories, US Federal laws which embody IMO treaty obligations apply in these territories. Therefore, IMO treaties to which the US is a Party extend to US Pacific territories. Nevertheless, the US should formally advise the IMO of the extension of subject treaties to US Pacific territories.
3. Self-governing in free association with New Zealand (with New Zealand responsible for foreign affairs). New Zealand should formally extend coverage of treaties to which it is a Party to the Cook Islands and Niue. This may be accomplished by providing suitable advice to the IMO of the extension.
4. French territory. France should formally extend coverage of treaties to which it is a Party to French Pacific territories. This could be accomplished by providing suitable advice to the IMO of the extension.
5. France should investigate the merits of becoming a Party to the Tokyo MOU in order to improve application of Port State Controls in French Pacific territories.
6. Solomon Islands' Observer status to Tokyo MOU is pending acceptance.
7. Although not within the Pacific islands region, Australia has been included as it is a Party to MARPOL 73/78 and the Tokyo MOU, so may play a role in ship waste management within the Pacific islands region.

Options appropriate to Pacific islands ports for the shore reception and treatment of ship-generated wastes are summarised in Table 17.

Table 17: Summary of Options for Shore Reception and Treatment of Ship-Generated Wastes in Pacific Island Ports

Type of Waste	Overview of Reception and Treatment/Disposal
Waste oil	Collection in dedicated drums or tanks, suitably bunded. Use as supplementary fuel (with suitable pre-treatment) or proper disposal if unsuitable for recycling. NB: this may involve export.
Oily mixtures (mainly oil/water mixtures)	Reception using pump/tank combinations mounted on barges, trucks or trailers. Separation of oil from water. Recovered oil to enter waste oil stream, recovered water to be disposed of (most likely to sea). Recovered solids to be disposed appropriately.
General garbage (non-quarantine)	Collection in bins or skips. Ports to be included in routine municipal garbage collection rounds. Disposal to suitably operated landfill, assuming garbage composition is suitably controlled to exclude noxious elements. Potential exists to divert non-quarantine putrescible components to agricultural uses, such as livestock feed or compost.
Quarantine wastes	Separate collection and handling, ensuring isolation from wider-environment. Disposal via incineration, autoclaving or deep, sanitary landfill
Special/hazardous wastes	Separate collection. Handling and treatment/disposal as required.
Sewage (as required in selected ports)	Provision of shore ablution facilities. If demand is sufficient and technically achievable, provision of shore sewage connection/disposal facilities. May also need facilities for cleaning chemical toilets in small boat harbours and marinas.

5.4 Demonstration Projects

As done in other areas, a number of pilot projects could be used to test and demonstrate improved management of ship-generated wastes in Pacific island ports. Funding for these demonstration projects could be sought from external funding agencies, either as projects in their own right, or linked with larger waste management projects.

National waste management initiatives of metropolitan governments may also provide a source of funding for port waste improvement programmes within Pacific island territories. An example of one such programme is US EPA funding for waste reception facilities in ports; this scheme could be drawn upon to support improvements in waste reception facilities in ports in the US Pacific territories.

Port Waste Demonstration Projects in Developing Nations

In the late 1980s, the IMO in collaboration with the Swedish International Development Agency (SIDA) implemented a pilot project to improve shore reception facilities in selected regional ports. This project involved public education, operator training and provision of capital equipment such as fork lifts, trucks, compactors, road tankers and portable or fixed pumping systems, plus the construction of gravity interceptors for oil/water separation. Another component of the project was the setting of a series of deterrent penalties, to discourage non-compliance, within the port regulations of the demonstration sites. This demonstration programme has been applied in: Vishakhapatnam, India; Takoradi, Ghana; and Puerto Armuelles, Panama.

6. RECOMMENDED STRATEGIES TO IMPROVE SHIP WASTE MANAGEMENT IN PACIFIC ISLAND PORTS

This section presents actions in two broad categories: those which need to be implemented at a regional level; and those which need to be undertaken at a State level. This latter category is further sub-divided into generic measures for Pacific island states, and specific recommendations for individual states.

Effective management of ship-generated waste is a continuum of specific yet inter-related sectoral measures, each the responsibility of a single or number of organisations. Responsible organisations exist at all levels and include international and regional bodies, national and municipal government agencies and the private sector. These spread of sectoral measures and levels of responsibility are recognised in the presentation of the recommended measures.

6.1 Actions for the IMO

To improve ship waste management in the Pacific islands region, the IMO should:

- Encourage and support more comprehensive notification of available waste reception facilities, as required by MARPOL 73/78.
- Encourage and review reports of alleged inadequacies involving Pacific island ports, and cooperate with affected States in rectifying alleged inadequacies.
- Investigate the advantages and practicality of declaring a modified ‘Special Area’ in the Equatorial 'doldrums' (i.e. in the ITCZ) in the Pacific islands region, specifically prohibiting the disposal to sea of floating materials, noting that accumulation and rafting of floating marine debris is reported to occur in this area.
- Note that various responsibilities incumbent upon Parties to MARPOL 73/78, principal of which are the provision of reception facilities, the enactment of complementary national enabling legislation and the exercise of Port and Flag State Controls, are acting as a deterrent to acceptance of the convention by Pacific island states. The IMO should continue to work with SPREP and individual Pacific island states to assist in overcoming these impediments to implementation.
- Relax certain waste reception responsibilities mandated by MARPOL 73/78 for those individual Pacific island states unable to reasonably meet the requirements by reason of geographical circumstances, and encourage and assist in the development of regional waste reception schemes.
- Encourage all international ships entering the Pacific islands region to empty onboard waste holdings (e.g. slops and sludge tanks, hazardous wastes, garbage room contents) at a port external to the region that is suitably equipped for reception before entering the region, or ensure that remaining onboard capacity is sufficient for the period during which the ship will be in the Pacific islands region.

6.2 Actions for SPREP

To improve ship waste management in the Pacific islands region, SPREP should:

- Collate and maintain information on a database of ship waste reception capabilities and procedures in Pacific island ports. A guide to port waste reception facilities in the Pacific islands region should subsequently be established and distributed to ship operators.
- Continue to encourage all member states to become Parties to MARPOL 73/78 and other relevant international and regional marine pollution prevention conventions. In the case of metropolitan countries governing SPREP member territories, application of MARPOL 73/78 may need to be formally extended to cover Pacific island territories or those governing in free association, and to ensure there is subsequent enactment of suitable national enabling legislation, and implementation of effective Port and Flag State Controls.
- Identify and encourage facilities (such as industrial premises and utilities) within the Pacific islands region which have existing or potential capacity to accept waste oil for reuse/recycling.
- Investigate options to use excess container capacity in the Pacific islands region for the transfer between States of waste oil and recyclable materials.
- In cooperation with the FFA and SPREP member governments, enhance arrangements for the identification and reporting of unlawful waste discharges at sea detected by maritime patrol and surveillance forces operating within the Pacific islands region.
- Establish a number of ship waste management demonstration projects in selected Pacific island ports. Representative ports should be selected to showcase and trial the application and operation of effective solutions, as appropriate to the geographical, technical, social and economic circumstances of the State. Suitable ports for demonstration projects would be:
  - large port: Lae or Port Moresby in Papua New Guinea;
  - medium port: Port Vila, Vanuatu or Nuku'alofa, Tonga; and
  - small port: Betio, Kiribati or Funafuti, Tuvalu (noting that the small atoll nation ports experience particular problems with the disposal of all ship-sourced wastes).
- Source appropriate funding for the implementation of the ship waste management demonstration projects.
- Establish and maintain a framework for the exchange between member states, regional fora and the IMO of technical information and experiences in the implementation of PACPOL SW1 recommendations.
- Continue to encourage and coordinate improvements in terrestrially sourced waste management in the Pacific islands region, noting that any initiatives for improvement in management of ship-sourced wastes are constrained by onshore waste management capabilities and procedures in the region.

6.3 Actions for Other International and Regional Fora

- The Forum Fisheries Agency should develop, and assist member states with the implementation of, a policy to ensure that international fishing vessels applying to operate within the Pacific islands region are adequately and appropriately equipped and prepared with regards to the prevention of marine pollution prevention. This could be achieved via the incorporation of specific requirements, covenants or performance standards in access licences. Verification could be provided via independent certification by a third party auditor (such as Lloyds or DNV).
- The Association of Pacific Ports should act as a conduit for establishing dialogue, exchange of information and technical assistance for member ports seeking to improve waste reception arrangements. The Association should also act in a coordination role, especially for the dissemination of port waste reception information and the

development of regional waste reception centres.

- Development assistance agencies should continue to encourage and support improvement of waste management systems in Pacific island states, incorporating the ship-sourced waste stream as appropriate.

6.4 Common Actions for Pacific Island States

6.4.1 Legal Aspects

- States which are not yet parties to MARPOL 73/78 (Table 16) should become so as soon as practicable (e.g. by seeking financial support and technical assistance from developed countries in the region).
- States which are not yet signatories to other conventions relevant to marine pollution prevention (such as the SPREP Convention and Protocols, the London Convention, OPRC 90, and UNCLOS III; see Tables 4 and 16) should accede to them as soon as practicable.
- Once States have become parties to the various international and regional conventions, complementary and effective enabling legislation should be drafted and enacted. SPREP's generic marine pollution bill should be used as a benchmark to ensure the adequacy of national enabling legislation. The enabling legislation should be supported by implementing suitable regulations.
- Existing legislation dealing with shipping, ports, marine pollution and environment protection in Pacific island states should be reviewed to assess adequacy in relation to the particular requirements of MARPOL 73/78 and other relevant agreements.
- Port regulations should be reviewed and amended as necessary to incorporate appropriate and comprehensive marine pollution prevention clauses, with related penalties for non-compliance.
- Laws and regulations dealing with the handling, transport, storage and ultimate treatment/disposal of wastes (i.e. as relevant to PACPOL SW1, once the waste has been landed from a ship and is no longer covered by MARPOL 73/78) should be reviewed and amended as necessary to ensure adequate protection of human health and the environment.
- National capabilities for compliance inspection, monitoring, surveillance and enforcement of marine pollution laws should be enhanced as required to ensure effective implementation of national laws.
- The application of various international treaties, as well as national taxation and customs requirements should be reviewed, and modified if possible and where necessary to remove any counter-productive barriers to the transfer of waste within the Pacific islands region where such transfer would enable a more effective environmental outcome.

6.4.2 Delineation of Responsibilities for Planning and Operations

- Dialogue concerning management of ship-sourced wastes should be improved between shipping operators and agents, port and marina operators and other relevant parties, such as oil companies, regarding ship waste management. This will result in a greater alignment between port and municipal authorities, and others, on waste management issues with subsequent improvements in the capture and proper disposal of ship-generated waste.
- Responsibilities for waste management in individual Pacific island ports should be clearly identified and assigned to responsible parties. This could be achieved by declaring that the relevant port or national maritime authority has the overall coordination responsibility (assuming appropriate legislative authority), with the coordinating authority subsequently delineating individual functions and responsibilities

through a process of dialogue. Responsibilities should be clearly identified in the port environmental or waste management plan, as applicable.

6.4.3 Terrestrial Waste Management Practices

Noting that any initiatives for improvement in management of ship-sourced wastes in the Pacific islands region will be constrained by broader capabilities and procedures for the management of terrestrially-sourced wastes in the region, it is recommended that:

- States recognise and address impediments to improved waste management in the region, such as:
  - institutional weaknesses;
  - inappropriate government priorities;
  - limited community and institutional awareness of waste management problems;
  - limited national technical capacities;
  - limited funding;
  - limited availability of land suitable for waste disposal by landfill;
  - the legacies of poor planning and ineffective implementation of waste management programmes in the past; and
  - a general absence of effective management procedures for hazardous wastes; and limited opportunities for waste reduction and recycling.
- Overseas development assistance programmes and national projects aimed at improving terrestrial waste management in the region employ appropriate technologies and properly address relevant economic, social and cultural issues.
- National technical capacities (with regard to skills, equipment, infrastructure) are targeted as appropriate to improve critical gaps in waste management capabilities (e.g. for the handling, storage and transport of POPs).
- Support be provided for recycling efforts within the region, including the amendment of tax and export/import controls as necessary if these are impediments which prevent potential recycling schemes from attaining viability.

6.4.4 Port Waste Reception and Management Practices

- Waste and/or environmental management plans and/or documented procedures should be developed and implemented for all ports. The generic Environmental Management Handbook for Pacific Island Ports, to be developed by SPREP (PACPOL PO1), will assist in this endeavour.
- When developing ship waste management plans, relevant authorities should note the dispersed operations of many (smaller) vessels in the region and the existence of isolated, yet popular, yacht anchorages. Strategies to address waste from these vessels should be developed, possibly most effectively through promoting awareness of marine pollution prevention among those who sail in these vessels.
- Appropriate pollution prevention clauses should be incorporated into all marina and yacht club berthing agreements and rules.
- Information on marine pollution regulations and waste reception facilities procedures should be included in regional port guides and information handbooks.
- Opportunities to link municipal waste collection services (mainly for non-quarantine garbage) with port waste collection procedures should be optimised.
- Opportunities to involve local industrial enterprises which operate diesel engines or boilers (e.g. meat works, sawmills, sugar mills, mines and mineral processing plants) in the use of recovered oily wastes as supplementary fuel should be investigated and implemented as practicable.
- The utility of employing septic trucks currently engaged in septage collection services, for the collection of oily water mixtures from ships should be evaluated. If found to be technically feasible and operationally acceptable,

then these trucks should be employed in the collection of oily water wastes.

- Facilities and procedures adopted for the management of ship-generated wastes should represent 'appropriate practice'. This can be achieved by employing technologies with minimal capital and operating costs and inherently low maintenance requirements. Cultural and social sensitivities must also be recognised.
- Small coral atoll islands should not accept any waste from international ships (except in extenuating circumstances). International shipping should be required to retain wastes onboard either for lawful disposal at sea or discharge to shore at a more appropriate port.
- Inter-state and wider regional cooperation should be emphasised in port waste management planning. Options include:
  - Encouraging, or otherwise requiring, ships to retain nominated wastes onboard until arrival at a suitably equipped port;
  - Collecting wastes in a port for ultimate transfer to another port for treatment or disposal. Candidate waste categories for export are waste oil, hazardous materials (e.g. POPs or used lead-acid batteries) and selected recyclables (e.g. aluminium).

General garbage is not considered suitable for collection and transfer, owing to difficulties in containment and handling, including hygiene and amenity considerations. Rather than accepting garbage and then simply exporting it, ports unable to adequately dispose of such wastes should only accept it from domestic ships.

- Zero-acceptance of all waste from international shipping is a realistic option for some ports, and may in fact be an imperative.
- Noting recent and emerging developments in merchant shipping patterns, Pacific island ports which are evolving into regional hubs should develop as strategic ship waste reception centres. Hub ports would be able to receive waste from small ships engaged in feeder services and larger ships operating trunk routes. These ports should be capable of accepting the full range of ship-generated wastes. Potential regional ship-waste reception ports are considered to be:
  - Suva, Fiji
  - Vuda Point, Fiji (for tanker traffic)
  - Papeete, French Polynesia
  - Apra, Guam
  - Noumea, New Caledonia

The system of regional reception ports would be augmented by others external to the Pacific islands region, such as those in Australia, New Zealand, Singapore, Hong Kong, Japan and the United States.

- As a minimum, ports within the Pacific islands region need to establish waste reception facilities for domestic shipping and boating. Adequate and technically appropriate facilities should be provided in all ports for garbage, oily wastes and hazardous materials from domestic vessels. Waste reception and treatment services could be focused at ports in each state which were identified as operating hubs for domestic trading vessels.
- Procedures for the collection and proper disposal of waste oil should be provided in nominated ports within the Pacific islands region. Waste oil should treated for reuse or recycling (this may involve export), or used locally as a fuel, lubricant or preservative coating. Use of waste oil as a dust or weed suppressant should cease.
- Facilities for the collection, treatment and disposal of oily bilge water should be established in selected ports within each nation/territory, such that all domestic shipping has reasonable access to such facilities (e.g. at ports acting as hubs for domestic services). A possible solution is arranging for bilges to be pumped by existing liquid waste collection trucks, provision of a static oil water separator, and collection of recovered oil. Recovered oil would subsequently enter the waste oil treatment stream.

- Facilities should be established for the separate collection and proper handling of special and hazardous wastes, such as lead-acid batteries, oily rags and filters, paint, and engine additives.
- Small boat facilities (e.g. jetties and anchorages) should, as a minimum, be provided with bins for collection of garbage, and waste oil collection drums. Waste oil should ideally enter any national waste oil management scheme, or if not practicable, be made available for some environmentally acceptable local reuse, such as for metal preservation. Receptacles for the collection of recyclable materials (such as aluminium cans) should also be provided if a viable recycling scheme is in place for that locationn.
- The definition of 'quarantine waste', and the application of subsequent management practices, should be reviewed to ensure that only materials which actually pose a quarantine risk are diverted to the quarantine waste stream.
- Procedures for the handling and disposal of quarantine wastes should be reviewed and improved as necessary to ensure their effectiveness.
- Opportunities for recycling, principally of aluminium cans, should be identified and encouraged. This would invariably involve export of recyclable material to another nation, such as Japan, New Zealand or Australia, for materials recovery.
- The activities of 'motherships', operating in support of tuna fishing fleets, have the potential to cause localised marine pollution. This is particularly the case when these ships remain in lagoon or harbour waters for extended periods. Maritime and/or port authorities should ensure that tuna 'motherships' remaining for extended periods in national waters adhere to lawful waste disposal practices.
- Trends in international shipping within the Pacific islands region, particularly the operations of cruise liners, should be periodically monitored to ensure waste reception procedures evolve in response to changing demands.
- Ships engaged in international voyages and fitted with IMO approved pollution control equipment such as oily water separators, shredders, compactors or holding tanks, should be encouraged to retain wastes until arrival at ports external to the Pacific islands region or nominated waste reception hub ports within the region. Alternatively, these ships should be encouraged to discharge appropriate wastes while in transit on the high seas, as permitted by MARPOL 73/78, and monitored to ensure compliance.
- When wastes are to be accepted from ships lying at moorings or engaged in roadstead operations, develop and implement adequate means for the transfer of such wastes in a manner which does not endanger human health or the environment.
- Ports where water quality and vessel-sourced sewage discharge have been noted as a definite or likely problem should limit adverse effects by regulating all pollutant discharges and by other means, such as the provision and mandatory use of shore ablution facilities. Ports where harbour water quality has deteriorated, or has the potential to do so, are:
  - Pago Pago, American Samoa
  - Weno, Chuuk State, Federated States of Micronesia
  - Kolonia, Pohnpei State, Federated States of Micronesia
  - Suva, Fiji
  - Papeete, French Polynesia
  - Majuro, Marshall Islands
  - Noumea, New Caledonia
  - Funafuti, Tuvalu
  - Port Vila, Vanuatu

6.4.5 Inspection, Compliance Checking and Enforcement

To establish an effective regime of vessel inspection and checking of compliance with marine pollution prevention requirements, Pacific island states should:

- Become parties to the Tokyo MOU for Port State controls in the Asia-Pacific region, or alternatively, in cooperation with the IMO and SPREP, establish a

Port State Control agreement specifically tailored to the needs and capabilities of Pacific island states. Any cooperative agreements should link with the existing programmes exercised in the region by Australian, New Zealand and US authorities.

- Include regular checking of ships' oil and garbage record books in Port State inspections. This is particularly relevant in view of the low incidence of requests to the Pacific island ports for reception of waste oil, oily wastes and garbage (especially in relation to the disposal of oil slops and plastic materials which are prohibited from discharge to sea and should, therefore, accumulated on board all vessels except those with suitable incinerators).
- Develop and implement Flag State and Port State controls specifically targeted at small domestic trading vessels in those states with large domestic trading fleets.
- Promote international technical assistance to improve inspection and reporting capabilities within the Pacific island states, especially those with a large register of vessels engaged virtually exclusively in internal trade.
- Impose appropriate sanctions, such as seizure or fines, upon vessels found to be not complying with pollution prevention requirements. Pacific island states should adopt and promote reciprocal enforcement arrangements to minimise the possibility of ships escaping sanction.
- Compile and maintain a register of classes and individual ships known or suspected of presenting an unacceptable risk of marine pollution. Ships on the register should be subject to enhanced inspection effort.
- Implement systems for the reporting and investigation of alleged breaches of marine pollution regulations, with regional coordination through SPREP.
- Encourage local shipping operations to fit suitable marine pollution reduction and control systems to vessels.

6.4.6 Fee Structure and Cost Recovery Mechanisms

Individual ports, in concert with SPREP, should develop and implement a system for waste reception fees which is based upon the following principles:

- All vessels visiting a port will be charged waste reception fees whether they elect to discharge waste at that port or not, except for ships in ports which do not accept wastes arising from the particular ship (e.g. an international trading vessel visiting a port which does not accept any wastes from overseas ships).
- Waste management fees charged by ports should be clearly identified and levied separately to other normal port fees such as berthing and wharfage fees.
- Costs will be based upon the types of waste normally expected to be produced by a vessel of that class, with four individual components to the overall charge. The components shall be waste oil, oily mixtures, general garbage (including incidental quantities of hazardous wastes) and sewage (only to be applied in those ports where sewage discharge from vessels has been identified as environmentally significant. Even if reception facilities for sewage are not provided, fees collected will assist in defraying the capital and maintenance costs of shore ablution facilities to be provided by the port).
- Fees for the disposal of waste oil and oily mixtures will be reduced for ships that are fitted with and operate IMO approved pollution control equipment to the satisfaction of maritime authorities. Fees for the provision of sewage facilities (in relevant ports) will be reduced for vessels fitted with IMO approved sewage treatment plants and/or sewage holding tanks.
- Separate and targeted charges will be applied as required for wastes requiring special handling, such as quarantine wastes and quantities of hazardous materials beyond those generated during routine operations.

- No charges should be imposed for the reception of recyclable wastes, provided viable recycling programmes are in place for the particular port (and if no such schemes are in place, then the recyclable material may be entrained with general garbage or else retained onboard until arrival at an alternative port).
- Ships based at or continually operating out of a port should pay fees on a periodic basis (such as quarterly or annually). Other ships calling on ports but not based there should pay fees on the occasion of each visit.
- When imposing fees, ports should ensure that adequate waste reception services are available.

6.4.7 Education, Training and Awareness

- Develop and implement appropriate awareness of marine pollution issues and reduce marine pollution through training and education of ship-owners, mariners and port operators within the region. The various national maritime training colleges can assist by emphasising marine pollution prevention in their course curricula.
- In accordance with Article 17 of MARPOL 73/78, and coordinated by SPREP, arrange for the provision of appropriate training of scientific, technical and ship inspection personnel through IMO assistance programmes.
- Establish active education and information programmes, such as through the various national maritime training institutions, informing seafarers of marine pollution issues and management, reduction and avoidance measures.

6.4.8 Monitoring, Audit and Review

- Statistics and other relevant information regarding the demand for and adequacy of ship waste reception services in Pacific island ports should be recorded and collated. The data should be periodically reviewed to assess the adequacy of management responses and define any necessary modifications.
- Port waste reception arrangements should be periodically audited with the aim of encouraging and quantifying continual improvement of ship waste reception and management procedures.

6.5 Summary of Existing Port Waste Reception Arrangements and Recommended Improvements

A tabular summary of the current status, and recommendations for improvement, of port waste reception facilities and procedures in Pacific island ports is presented in Table 18. The table identifies whether current measures are considered adequate or require review and improvement.

Table 18: Summary of Existing and Recommended Improvements to Waste Reception Facilities in Pacific Island Ports

Island State	Port	Waste Reception Services								Comments
		Oily Wastes								
		Slops (tank washings, ballast)	**Oily Bilge Water**	**Sludge and Waste Oil**	**Sewage**	**Quarantine**	**Garbage**	**Recyclables**	**Hazardous and Noxious Waste**	
American Samoa	Pago Pago	n/a	A	A	I	R	R & I	R & I	I	
Cook Islands	Avarua	n/a	I	R & I	n/a	R	R & I	R & I	I	Shore ablutions provided for yachts
Federated States of Micronesia	Chuuk, Weno	n/a	I	I*, A (D)	R*, A (D)	R	R & I*	R & I	I	
	Kosrae, Okat	n/a	I	I*, A (D)	A	R	R & I*	R & I	I	
	Pohnpei, Kolonia	n/a	I	I*, A (D)	R*, A (D) (ST)	R	R & I*	R & I	I	
	Yap, Colonia	n/a	I	I*, A (D)	A	R	R & I*	R & I	I	
Fiji	Denarau Marina	n/a	R	R & I	A	A (OR)	A (D)	R & I	I	Shore ablutions provided for yachts
	Labasa/Malau	n/a	R	R & I	n/a	R	I*, A (D)	R & I	I	
	Lautoka	n/a	I	I*, A (D)	A	A	I*, A (D)	R & I	I	
	Suva	A	A	A	A	A	I*, A (D)	R & I	I	
	Suva – Yacht Club	n/a	n/a	A	A	A (OR)	A	A	I	Shore ablutions provided for yachts
	Vuda Point – Oil Terminal	A (P)	A (P)	A (P)	A	R	A	A	I	
	Vuda Point – Marina	n/a	n/a	A	A (ST)	n/a	A	A	I	
French Polynesia	Papeete	A	A	A	R	A	A	A	A	Review sewage requirements for itinerant yachts
Guam	Apra, Commercial	A (D)	R & I	A	R	A	R*	I	A	
	Apra, Military	A	A	A	A (P)	A	A	A	A	
Kiribati	Betio	n/a	I	I	n/a	R	A (D)	I	I	
Marshall Islands	Majuro, Commercial	n/a	I	R* & I*, A (D)	R	R	R & I	I	I	
	Majuro, Fishing	n/a	I	R	R & I	R	R & I	I	I	
Nauru	Aiwo	n/a	n/a	R	n/a	n/a	A (D)	R & I	R	

Island State	Port	Waste Reception Services								Comments
		Oily Wastes			Sewage	Quarantine	Garbage	Recyclables	Hazardous and Noxious Waste	
		Slops (tank washings, ballast)	**Oily Bilge Water**	**Sludge and Waste Oil**						
New Caledonia	Noumea	A	A	A	A	R	A	R & I	I	Excellent facilities provided for yacht.
Niue	Alofi	n/a	I	I	n/a	R	A (D)	R & I	I	
Northern Mariana Islands	Saipan	n/a	A	R	A (D)	R	R	R & I	R	
Palau	Koror, Commercial	n/a	I	R* & I*, A (D)	n/a	R	R* & I*, A (D)	R & I	I	
	Koror, Fishing	n/a	R & I	R & I	n/a	R	R* & I*, A (D)	R & I	I	
Papua New Guinea	Lae	A	R	I	n/a	R	I*	R & I	I	
	Port Moresby	n/a	R	I	n/a	A	R* & I*, A (D)	R & I	I	
Samoa	Apia	n/a	I	I	n/a	I	R & I	R & I	I	
Solomon Islands	Gizo	n/a	I (D)	I (D)	n/a	R	I (D)	I	I	
	Honiara	n/a	I	I	n/a	A(R)	R&I (D)	I	I	
Tonga	Nuku'alofa	n/a	R & I	R & I	n/a	R	I (D)	R & I	I	
Tuvalu	Funafuti	n/a	I	I	R & I	R & I	I (D)	I	I	
Vanuatu	Luganville	n/a	R & I	I	n/a	R & I	I	I	I	
	Port Vila	n/a	R & I	I	I	R & I	I	I	I	
Wallis and Futuna	***Nil data***									

Notes:

A = current facilities and procedures assessed as adequate

I = improvement to current facilities and/or procedures required

OR = Quarantine waste accepted on request by prior arrangement (e.g. on arrival of a major international yacht race)

R = current facilities and procedures require critical review to confirm adequacy

* = pertains to international shipping only

D = domestic shipping only

n/a = not applicable

P = discharged through pipe connection to shore

ST = sullage/septic collection truck

7. SUMMARY

Current arrangements for the management of ship-generated waste in the Pacific islands region are piecemeal and of varying quality, ranging from effective and comprehensive in some ports to virtually non-existent in others. Given the intent of MARPOL 73/78 and the technical and economic factors applying in the region, a cooperative regional approach has been identified as the most effective manner in which to minimise the pollution of the marine environment by ships. This programme is being coordinated by SPREP with the assistance of the IMO and the cooperation of SPREP Members.

In order to improve ship waste management in the Pacific islands region, it is essential that SPREP Members uniformly accede to and properly implement MARPOL 73/78. This will provide a range of implementation advantages including:

- guidance for the required legal framework (international, regional, national [and municipal in some cases]);
- harmonised and consistent ship waste disposal regulations;
- opportunities for IMO technical assistance;
- cooperative ship inspection and Port State Control procedures; and
- regionally coordinated port waste reception measures.

Accession to MARPOL 73/78 also carries obligations and responsibilities for signatories, the most important of which is arguably the requirement to provide adequate port waste reception arrangements. Adequacy is broadly defined by the IMO as:

- sufficient capacity to meet demand (in terms of the amount and types of waste) for ships normally visiting that port, and their associated cargoes;
- ability to accept wastes without imposing other environmental impacts (such as spills or leaks, and the environmentally acceptable final disposal or treatment of accepted wastes);
- ease of use of waste reception facilities by vessel operators;
- ability to transfer wastes to shore without causing undue delay to the normal operations of a particular vessel in that port;
- reliability of equipment and procedures; and
- affordability.

Although the focus of the reception and subsequent management of ship-generated waste rests upon the ship – port interface, effective management of this waste stream is a continuum of measures, of which the ship – port interface is but one component. The total package of measures must address:

- the legal framework (international, regional, national [and municipal in some cases]);
- delineation of responsibilities for planning and operations;
- waste reduction at source (i.e. in ships);
- facilities and procedures for waste collection (including coordination between ports and ships, and regional cooperation);
- final disposal options (including reuse and recycling, and the linkage with terrestrial waste management issues);
- fee structure and cost recovery mechanisms;
- compliance checking and enforcement;
- education, information and training;
- monitoring, audit and review; and
- implementation funding.

While improvements to the way in which ship-generated wastes are managed can be made, any advances will be constrained by the capacity of Pacific island states to deal with wastes from all sources (i.e. terrestrial). This finding is consistent with the Caribbean region initiative on ship-generated waste, a project similar in scope and intent to PACPOL SW1.

An important element in the management of ship-generated wastes is the imposition of a suitable structure of waste reception fees. The blanket imposition of such fees is seen as critical by ship operators (in order to deter unscrupulous ship operators from avoiding costs by unlawful disposal) and has been agreed to by SPREP Members. The application of fees, however, must be judicious in order to ensure that they are

realistic for ship operators and really do provide for the proper reception and management of ship waste. The risk is that they could degenerate into an additional cost impost without benefit to ports, ship operators, the environment or the peoples of the Pacific islands region.

A comprehensive suite of recommendations for improving ship waste management in the region is presented in Section 6 of this report. These recommendations are based upon data collected during the PACPOL SW1 port survey programme (Output One) and other research conducted as part of this project. The recommendations are intended to relate the current demand for waste reception of ship-generated waste in the region with patterns of shipping and States' individual and cooperative capacities to deal with the waste. Recommended measures have been framed within the paradigm of 'appropriate practice', which seeks to match waste reception and treatment/disposal requirements with the economic, social, cultural and technical complexities of Pacific island states.

Many of the small island states, particularly the coral atoll islands, are severely constrained in their ability to accept ships' waste. Non-acceptance from international vessels is an achievable option for some Pacific island ports, providing the IMO relax the requirements for MARPOL 73/78 signatories to individually provide reception facilities for the full suite of ship-generated wastes. No alternative, however, exists for the reception of waste from vessels operating purely domestically; either this material is received by ports or it is most likely disposed in an environmentally unacceptable manner (and possibly unlawfully).

Regional cooperation is deemed as essential. This can be achieved by designating selected ports as regional ship waste reception centres, based upon their ability to properly deal with these wastes coupled with their status as significant regional ports. Ports nominated as regional reception centres are:

- Suva, Vuda Point and Lautoka, Fiji;
- Papeete, French Polynesia;
- Apra, Guam; and
- Noumea, New Caledonia.

The function of these ports as regional waste reception centres would be assisted by encouraging ships: to discharge waste at other ports external to the region (such as in Australia, New Zealand, Japan or the United States) before sailing for the Pacific islands; or to retain wastes onboard until returning to an external port from the Pacific islands region.

Regional cooperation is also essential for the reuse/recycling or ultimate disposal of various components of the ship-generated waste stream, principally where national capacity to deal with such wastes is limited or absent. These components are primarily waste oil and hazardous wastes. In most cases, some export of these wastes to designated regional centres or nations external to the Pacific islands region is necessary. Ideally, the management of ship-generated wastes of these varieties will be integrated into larger, fully comprehensive national and regional programmes addressing wastes of these types from all sources.

Although the challenges appear to be great, there is great potential for significant improvements in the management of ship-sourced waste in the Pacific islands region, with a subsequent reduction in the inputs of pollutants to the marine environment. Many gains can be made with the implementation of relatively cheap and simple solutions. More elaborate measures will also be required, but these should be more achievable if implemented in a cooperative manner within the Pacific islands region.

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Appendix A

Review of International
Ship Waste Management Practices

Appendix A

Review of International Ship Waste Management Practices

The need to properly manage ship-generated waste has been addressed in a number of different ways in ports and regions around the world. The current status of marine waste reception facilities and procedures around the world reflects the technical, economic, social and legal conditions of the nations involved, the priority placed upon marine environment protection, and the period of time over which these measures have been in place and able to mature.

International practice in waste management currently ranges through the full spectrum of facilities, i.e. from no facilities at all through to complete waste management arrangements. What needs to be considered first is what is often termed international 'best practice'. This can suitably be defined as providing services that are the best technically available. One can expect that large ports in developed nations would be able to provide complete and comprehensive services to shipping, while small ports in developing nations, such as many in the Pacific islands region would be able to provide only the most basic services. However, this is not always the case. The reasons why many ports in developed nations do not yet provide services to shipping that meet MARPOL 73/78 obligations include:

- the costs to ports of providing services and a reluctance by some vessel operators to meet these costs;
- unwillingness on the part of ports to provide services that are not profitable;
- a reliance on other ports or the ships themselves to dispose of ships' waste;
- reasonable arrangements whereby alternative ports handle waste more efficiently and economically because of existing facilities or economies of scale; and
- national or regional agreements that try to ensure that the needs of ships are met by networking port reception arrangements.

Despite various arrangements that attempt to minimise ship-sourced marine pollution, many ships trading predominantly in the developed world still do not dispose of waste in an environmentally satisfactory manner. Additionally, the provision of adequate port waste reception facilities and procedures has been identified by the IMO and ship operators as an ongoing and widespread problem.

The IMO encourages cooperative regional programmes, such as PACPOL, for the management of ship waste. An example of this is the cooperative effort to enhance marine waste reception facilities and procedures in the Australia/New Zealand region. The ANZECC best practice guidelines for marine waste reception and the guide to waste reception facilities in Australian and New Zealand ports are products of this regional approach.

Overview of World Practice

Historically the IMO has focused upon the provision of adequate port reception facilities for oily ballast, bilge waters and oily residues. A number of studies were conducted on the availability of reception facilities throughout the world, particularly as this pertained to the declaration of 'Special Areas'. However, with the introduction of the MARPOL 73/78 Annex I requirement for Clean Ballast Tanks (CBT) followed by Segregated Ballast Tanks (SBT) for most tankers, the volumes of oily ballast requiring discharge to shore reception facilities has markedly decreased (oily ballast was principally generated by tank washing for change of cargo or prior to entry into repair yards).

Several IMO studies have examined the availability of reception facilities for oily ballast and slops. Although definitive figures are not available for garbage reception facilities the data obtained for oily waste reception should have some correlation in terms of compliance by ports

around the globe. A 1990 IMO study indicated the following:

- Africa: approximately 22% of coastal states have reception facilities for oily wastes.
- Asia (excluding Singapore and Hong Kong): approximately 50% of coastal states have reception facilities for oily wastes.
- Arabian Gulf: approximately 50% of coastal states have reception facilities for oily wastes.
- South and Central America: approximately 60% of coastal states have reception facilities for oily wastes (this includes some countries in the Wider Caribbean Region, and has probably improved since this survey).

In most cases only one or two ports in each country surveyed were actually providing suitable reception facilities for oily wastes.

With regard to reception of ship-generated garbage, it is unlikely that compliance rates exceed those for oil. Anecdotal observations of ports in developing countries show that ship's garbage is often discharged to informal collection areas (either with rudimentary collection receptacles or none at all) on the wharf for eventual pick up by contractors for disposal at a municipal dump. In some ports glass containers are segregated and reused, whilst aluminium cans can represent a source of income and are often collected by children and community groups.

Selected examples of international practices are presented in this appendix.

Singapore

Singapore is one of the busiest ports in the world receiving more than 90,000 ship visits per year. It uses private contractors to handle oily wastes (Annex I), including oil/water mixes, slops, sludge and tank cleaning water. These are collected either by barge or by discharge at berths with facilities to accept contaminated wastewater. The wastes are transported to the Slops Reception Centre where recycling of the material is undertaken.

As with most ports, the Singapore Port Authority does not accept Annex II wastes; the chemical industry is expected to handle all of its own chemical waste. Singapore does not accept Annex IV wastes (sewage) either, and the nation has not ratified this Annex. It is expected that ocean-going vessels will have suitable treatment facilities and/or holding tanks so that discharge within Singaporean waters will not be required.

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With regard to garbage, the Singapore Port Authority provides a service based on the use of barges that operate throughout the port. Ships are charged a fixed port fee whether they use the service or not; this is intended to maximise the use of the service. Garbage collected from ships is either incinerated or incorporated into the overall waste stream of Singapore.

Hong Kong

The port of Hong Kong accepts Annex I and II wastes. These are collected by barges able to separate the different types of waste. These are discharged at a dedicated wharf that can accept the different kinds of wastes along separate discharge lines. The facility is operated by a private company under contract to the Hong Kong government. The company also accepts land sourced chemical wastes so does not rely solely upon shipping for economic viability.

Several other private companies handle oily wastes from oil tankers and some chemical companies accept tank washings after reception of the cargo.

There are no port provided sewage facilities although contractors will pump out sewage if required. Garbage collection is conducted by private firms.

European Union

In 1998 the European Commission promulgated a proposed directive for common rules on port reception facilities for ship-generated waste and cargo residues. The directive was to apply in all ports of the European Union (EU). This proposal underpins the EU commitment to reducing

marine pollution by taking measures to ensure that international rules and standards governing the discharge of ship-generated wastes and cargo residues at sea are fully implemented.

The directive aims to ensure a major reduction in marine pollution by the provision of adequate waste reception facilities in all EU ports including recreational ports and marinas. In addition it requires all ships, fishing vessels and recreational craft visiting these ports to make use of the facilities provided. More specifically, the proposal:

- requires all ports and marinas to provide adequate reception facilities for ship-generated waste and cargo residues;
- requires a waste-management plan to be developed for each port which is to be monitored and approved by EU Member states;
- ensures that fee systems adopted by ports will encourage vessels to use the facilities rather than discharge their wastes at sea;
- obliges every visiting vessel to deliver all wastes and residues to the reception facilities unless the master can prove that there is sufficient storage space for the proposed voyage;
- requires ships to notify their intention to use facilities and quantities of waste on board before arriving in port;
- requires Members States to monitor compliance with the Directive and apply sanctions, detaining the vessel when deemed to be necessary; and
- requires authorities to forward information on non-compliance to other EU ports which such ships may intend to visit.

United Kingdom

In the UK nearly all ports rely on contractors to accept waste from ships, although a few specialist terminals have fixed facilities where this is economically viable for port operators. Due to the costs of contractors it is common for small vessels to leave oil in small containers on the wharf. Most ports do not provide a fixed oil collection tank. Contractors are generally arranged through ships' agents to pump out oily waste either to road tankers or to barges.

Some chemical wastes are accepted by contractors although it is generally expected that these kinds of waste will be handled at the point of origin of the material.

Garbage is collected in industrial skips in most ports. There are a variety of charging arrangements with some ports billing ships separately for garbage disposal and others including this as a fixed fee incorporated into harbour dues.

The UK Department of Transport has published a guide for ports to assist them in establishing adequate reception facilities. The UK Government has also promulgated regulations requiring adequate waste reception facilities in ports. It is also mandatory for ports to have formal waste management plans.

Baltic States

Baltic States have cooperated to have the Baltic Sea declared a Special Area. As required by the IMO, declaration of Special Area status makes the provision of adequate reception facilities incumbent upon littoral states. This has been achieved, and it is understood that the Baltic nations have established a system of mandatory port waste reception fees for all ships visiting ports in the region, similar in concept to that envisaged for ports in the PACPOL Pacific islands region.

United States of America

The US National Academy reviewed MARPOL 73/78 compliance requirements for US shipping and ports, releasing a report on the issue in 1995. The report found that:

- implementation of MARPOL 73/78 commitments via complementary enabling legislation and the harmonisation of these with other relevant laws is essential;
- the provision of adequate port waste reception facilities (including proper strategic planning for) is fundamental to ensuring compliance;

- ship-sourced waste is best integrated with waste from terrestrial sources for most effective ultimate treatment/disposal;
- the United States Coast Guard (USCG) issues Certificates of Adequacy (COA) for waste reception facilities to large commercial and fishing ports, but these are largely subjective assessments as no technical standards are used for assessing adequacy;
- compliance checking and enforcement of both US and foreign flagged vessels is essential; and
- education, training and information about marine waste management needs to be aimed at all organisations and individuals involved with ships and boats (including occasional recreational users and passengers).

Most ports in the US use third party contractors to handle ship-generated waste. Charges associated with these contractors are reported to inhibit their use and lead to dumping at sea. The availability of waste reception facilities for Annex I and II wastes has been published on the IMO Internet site.

The USCG has a rigorous ship inspection programme designed to ensure compliance with US Federal laws. These include a comprehensive suite of national enabling legislation for the various IMO treaties to which the US is a signatory. The USCG Port State inspection programme extends to US Pacific island territories.

Australia and New Zealand

Most port authorities in Australia and New Zealand do not have fixed port facilities for waste reception. In general, they rely on ships or their agents making prior arrangements with local contractors to accept waste. These contractors can generally handle oily waste or sewage but quarantine waste requires special arrangements acceptable to the Australian Quarantine and Inspection Service (AQIS), state authorities and local councils. Quarantine waste is deep buried, incinerated or autoclaved before it is considered to be properly disposed of.

Some ports have instigated fixed port fees for organised garbage collection to discourage the unlawful disposal of waste at sea.

A comprehensive framework for the management of ship-sourced waste is being constructed in Australia, and this is largely complete. Elements of this framework are:

- accession to relevant IMO marine pollution prevention conventions;
- expression of these IMO conventions through effective and comprehensive national enabling legislation;
- an effective and rigorous regime of Flag State and Port State Controls, including effective sanctions and deterrents for non-compliance;
- a programme of surveillance and reporting of alleged breaches of ship discharge regulations;
- a comprehensive education and information campaign;
- an assessment of the demand for and the best means of providing adequate port reception facilities, including for small vessels operating from boat harbours and marinas (i.e. the ANZECC *Best Practice Guidelines for Waste Reception Facilities at Ports, Marinas and Boat Harbours in Australia and New Zealand*);
- a programme of cooperative implementation at the regional level (i.e. with New Zealand), and with other relevant national, state and port authorities, as well as ship owners and operators;
- an assessment of the adequacy of existing port waste reception arrangements and the implementation of a range of demonstration projects to improve such facilities; and
- publication, with regular updating, of a widely available guide to port waste reception facilities in the Australia/ New Zealand region, as well as advice of such facilities to the IMO for subsequent promulgation.

The Caribbean Region

Planning for the management of ship-generated waste in the Caribbean is of particular relevance to the Pacific islands region. The Caribbean has many similarities with the Pacific and ship-sourced pollution is being addressed through a specific regional programme known as the Wider Caribbean Initiative for Ship-generated Waste (WCISW). The WCISW has many parallels with PACPOL, particularly the PACPOL Environmental Awareness Raising (EAR), Conventions and Legislation (CL) and Ships' Waste (SW) project packages.

The Caribbean is confronted by many of the same issues as those found in the Pacific islands region, such as:

- a dearth of infrastructure;
- economic and technical resource constraints;
- immature legislative regimes;
- limited inspection and compliance enforcement capacity; and
- limited awareness by shipping operators and crews of the problems associated with dumping waste at sea.

The mix of vessels in the Caribbean largely replicates those operating in the Pacific islands region but with a greater proportion of cruise liners which tend to generate considerably more waste (particularly garbage) than any other class of vessels (approximately 77% of all ship-generated waste in the Caribbean is from cruise liners).

The WCISW originated from a request by 22 developing countries of the region to the IMO to grant the Caribbean Sea Special Area status. This status was granted by IMO but could only enter into force once the ports in the area demonstrated adequate waste reception capacity. However, many Caribbean countries have yet to ratify MARPOL 73/78 and incorporate its provisions into legislation, so control of ships which pollute seas in the region remains problematic.

WCISW is addressing marine pollution in the following ways:

- provision of awareness training for decision makers;
- provision of technical and legal reports to examine specific issues as they apply in the region;
- preparation of model legislation to enact MARPOL 73/78;
- education programmes; and
- design and development of port waste reception facilities.

Special Area status imposes very strict limitations on garbage disposal at sea. The only ship-generated waste that can be disposed of is ground food waste and that only more than 3 nm off-shore (NB: in other Special Areas food waste may only be discharged when greater than 12 nm from nearest land; the 3 nm delineation applying in the Caribbean therefore represents a departure from normal MARPOL 73/78 requirements). The IMO and the Caribbean countries are, therefore, addressing the critical issue of port waste reception in conjunction with improved management of waste from terrestrial sources.

Another development of the WCISW is the founding of the Caribbean MOU on Port State Control. This is similar in concept and operation to the Tokyo and other MOUs on Port State Controls, and seeks to improve ship compliance through regional cooperation in ship inspections and enforcement, the exchange of information and enhancement of institutional capacities.

The WCISW has recognised that waste from ships is very similar in composition, and only a small proportion of, the terrestrial waste stream in the region. Accordingly, the programme sees the merit in integrating most waste from ports with terrestrial wastes (barring quarantine items).

The WCISW has emphasised that managing ships' waste will be of little benefit if countries do not also manage the pollution of the sea from terrestrial sources.

Application of Pertinent International Practices to the Pacific Islands Region

The brief review of current international practices demonstrates there are no simple or universal prescriptive solutions to waste management, and that each country must

develop its own plans. These plans should, however be developed in cooperation with neighbouring states and be cognisant of the capabilities of others.

It is worthy of note that the majority of arrangements for waste handling are developed in a commercial environment and based on the user-pays principle. The only major difference is in the fee collection arrangements. These are either directly billed to the vessel by a contractor or incorporated in harbour dues. The latter encourages the use of port reception facilities in lieu of sea disposal. Many ship operators may find the cost of effective shore-based management too expensive and will prefer to continue dumping at sea. It is critical that Pacific island ports, where facilities exist or are developed, include a realistic waste management fee in harbour dues, and are prepared to mount an adequate education, inspection and compliance enforcement regime, particularly in the initial phases of implementation.

The PACPOL initiative has many parallels with the WCISW programme and it is pertinent that Pacific island states draw from the experiences and outcomes of the WCISW. PACPOL is proceeding along many of the directions that have been embarked upon by WCISW. These include:

- regional arrangements to quantify the problems and implement management responses;
- encouragement for States to pursue accession to the requirements of MARPOL 73/78, with enactment of complementary national legislation;
- assistance with the development of legal instruments to enforce compliance with MARPOL 73/78;
- education and awareness campaigns; and
- studies of current demand for and provision of port reception facilities and waste disposal arrangements.

For many of the 'low-island' and atoll-based Pacific island states, however, considerable differences exist in the ability to handle waste once it is placed ashore compared with the typical 'high-island' Caribbean nations. These differences include:

- availability of sufficient land for disposal by landfill;
- lack of infrastructure;
- economic status;
- technical resources; and
- the often close proximity of landfill and other treatment works to the groundwater table and shorelines.

There are, however, a number of initiatives from overseas that could be usefully emulated in the Pacific islands region. These include:

- targeted workshops involving SPREP Members to further international cooperation in the handling of both marine and terrestrial waste;
- education and assistance to ship owners, masters and crews to facilitate their compliance with waste management requirements;
- regional cooperation for the reception and disposal of ship-generated wastes;
- development of more effective Port State Controls to identify and sanction non-compliant vessels, including a framework for reporting and information exchange such that member states can share information regarding the performance and status of individual vessels; and
- enhancement and refinement of barrier controls for quarantine waste.

It is not considered that Pacific island states follow the example of the Caribbean and seek to declare Special Area status in the Pacific islands region (with the exception of floating debris in the area of the Equatorial doldrums). Special Area status for the Pacific islands region is not currently justified on environmental grounds, and would impose requirements on ports and shipping in the region that are unrealistic and unlikely to be met. A more pragmatic approach would be for Pacific island states to critically review areas within the region that may warrant special protection, such as extensive archipelagic regions, and to subsequently seek stronger protection of these sensitive areas. This could be organised through the auspices of the IMO or through regional cooperation and the enactment of national legislation.

Appendix B

PACPOL SW1 Port Survey Protocol

Appendix B

PACPOL SW1 Port Survey Protocol

1. PORT PROFILE

1.1 Port/Harbour

Location (Port name)**:**			
Port Operator:			
Port Management Authority:			
Date/s Visited:			
Chart/s No:		**Copy Obtained?** (try to obtain a copy of chart, or at least a map, of the port).	**Y/N**

1.2 Geography

	Name	**Population**	**Area (km^2)**	**Max. Elevation (m)**
Nation/Territory:				
Island (on which port located)**:**				
City/Town:			n/a	

1.3 Physical Geography of Island

Geological Nature	**Details**
High Island Volcanic	
Coral Atoll	
Uplifted Coral Atoll	
Other	

1.4 Details of Personnel Consulted

Name	**Title/Position**	**Organisation**	**Phone No.**	**Fax No.**	**e-mail**

1.5 Port Activities

Nature of Port Activities	Details/Remarks	Seasonality/Other
General Cargo/Break-bulk		
Container		
Ro-Ro		
Dry Bulk		
Tanker (Oil, chemical or other)		
LNG Tankers		
Livestock (import or export, type/s of animal?)		
Island Trading (ie. small cargo)		
Passenger – Overseas		
Passenger – Inter-Island (ie ferries)		
Small Charter Vessels (eg. fishing, diving, pleasure cruising)		
Fishing: International		
Fishing: Local		
Customs, Pilots and Related Functions		
Navy/Police		
Offshore Development/support		
Tugs and Harbour Workboats		
Ship Refit/repair		
Marina/Yacht Club		
Other		
Any anticipated changes to current range or intensity of activities		

1.6 Nature of Port Facilities

Port Facilities	Details	Max. No. Vessels at One Time	Depth (m)
Wharves/piers			
Pens			
Mooring buoys (possibly with liquid/gas cargo transfer lines)			
Dolphin/s (ie bulk loading facility connected to island by conveyors)			
Anchorage	**Distance from Port (km)**	**Max. No. Vessels at One Time**	**Depth (m)**
In addition to alongside facilities			
Anchorage only (ie. port has no alongside berths)			
Lighters/barges	**Type/Size**		**Number**
Any anticipated changes to current range or capacity of existing facilities			

2. VESSEL PROFILE

2.1 Merchant Ships

Vessels Using Port	**Mixed Cargo/ Break-bulk**	**Container/ Ro-Ro**	**Tanker (Oil or other)**	**Dry Bulk**	**Island Trading** (ie. small cargo; < 500 t)	**Other Merchant**
Port Shipping Profile						
Cargo/es						
No. Based in Port						
Average No. Visiting Annually (ie. not based in port)						
Seasonality of Visits/Activity						
Do Vessels Typically Come Alongside, Moor to Dolphin/Buoy or Anchor?						
Typical Duration of Visit (days)						
Typical Duration of Inbound Voyage (days)						
Port/s Typically Arriving From						
Port/s Typically Departing For						
Vessel Profile						
Vessel Size (ie. displacement [t] for ships; length [m] for boats)						
Average (mean/mode)						
Maximum						
Minimum						
Crew Size						
Average (mean/mode)						
Maximum						
Minimum						
No. Passengers						
Average (mean/mode)						
Maximum						
Minimum						
Typical Age of Vessels						
Typical Propulsion System/Fuel						
Other/Comments						
Vessel Marine Pollution Control Equipment (Typical)						
Oily Water Separator/s						
Slops Tank/s (Capacity [m^3])						
Incinerator (indicate for oily sludge and/or garbage)						
Macerator/Grinder with Overboard Discharge						
Sewage Treatment Plant/Marine Sanitation Device/s/Holding Tank						
Other/Comments						

2.2 Passenger Vessels and Government Vessels (Other Than Warships and Oceangoing Naval Auxiliaries)

Vessels Using Port	**Passenger – Overseas**	**Passenger – Inter-Island** (ie ferries)	**Charter Vessels** (eg. fishing, diving, pleasure cruising)	**Police/ Fisheries Patrol**	**Customs and Pilot Boats and Similar**	**Misc. Government Craft**
Port Shipping Profile						
No. Based in Port						
Average No. Visiting Annually (ie. not based in port)						
Seasonality of Visits/Activity						
Do Vessels Typically Come Alongside, Moor to Dolphin/Buoy or Anchor?						
Typical Duration of Visit (days)						
Typical Duration of Inbound Voyage (days)						
Port/s Typically Arriving From						
Port/s Typically Departing For						
Vessel Profile						
Vessel Size (ie. displacement [t] for ships; length [m] for boats)						
Average (mean/mode)						
Maximum						
Minimum						
Crew Size						
Average (mean/mode)						
Maximum						
Minimum						
No. Passengers						
Average (mean/mode)						
Maximum						
Minimum						
Typical Age of Vessels						
Typical Propulsion System/Fuel						
Other/Comments						
Vessel Marine Pollution Control Equipment (Typical)						
Oily Water Separator/s						
Slops Tank/s (Capacity [m^3])						
Incinerator (indicate for oily sludge and/or garbage)						
Macerator/Grinder with Overboard Discharge						
Sewage Treatment Plant/Marine Sanitation Device/s/Holding Tank						
Other/Comments						

2.3 Warships and Oceangoing Naval Auxiliaries

Vessels Using Port	**Aircraft Carriers, Large** (> 500 t) **Amphibious Ships**	**Cruisers, Destroyers, Frigates**	**Submarines**	**Small Surface Combatants/Patrol Vessels**	**Replenishment Supply and Small Amphibious** (< 500 t) **Ships**	**Misc. Naval Craft and Harbour Vessels**
Port Shipping Profile						
No. Based in Port						
Average No. Visiting Annually (ie. not based in port)						
Seasonality of Visits/Activity						
Do Vessels Typically Come Alongside, Moor to Dolphin/Buoy or Anchor?						
Typical Duration of Visit (days)						
Typical Duration of Inbound Voyage (days)						
Port/s Typically Arriving From						
Port/s Typically Departing For						
Vessel Profile						
Vessel Size (ie. displacement [t] for ships; length [m] for boats)						
Average (mean/mode)						
Maximum						
Minimum						
Crew Size						
Average (mean/mode)						
Maximum						
Minimum						
No. Embarked Troops (in Amphibious Ships)						
Average (mean/mode)						
Maximum						
Minimum						
Typical Age of Vessels						
Typical Propulsion System/Fuel						
Other/Comments						
Vessel Marine Pollution Control Equipment (Typical)						
Oily Water Separator/s						
Slops Tank/s (Capacity [m^3])						
Incinerator (indicate for oily sludge and/or garbage)						
Macerator/Grinder with Overboard Discharge						
Sewage Treatment Plant/Marine Sanitation Device/s/Holding Tank						
Other/Comments						

2.4 Fishing Vessels and Work Boats

Vessels Using Port	**Fishing: International**	**Fishing: Local**	**Offshore Support Tenders**	**Research Vessels**	**Tugs and Misc. Harbour Craft** (eg. barges, lighters)	**Other Work Boats**
Port Shipping Profile						
Target Catch/Activities						
No. Based in Port						
Average No. Visiting Annually (ie. not based in port)						
Seasonality of Visits/Activity						
Do Vessels Typically Come Alongside, Moor to Dolphin/Buoy or Anchor?						
Typical Duration of Visit (days)						
Typical Duration of Inbound Voyage (days)						
Port/s Typically Arriving From						
Port/s Typically Departing For						
Vessel Profile						
Vessel Size (ie. displacement [t] for ships; length [m] for boats)						
Average (mean/mode)						
Maximum						
Minimum						
Crew Size						
Average (mean/mode)						
Maximum						
Minimum						
No. Passengers						
Average (mean/mode)						
Maximum						
Minimum						
Typical Age of Vessels						
Typical Propulsion System/Fuel						
Other/Comments						
Vessel Marine Pollution Control Equipment (Typical)						
Oily Water Separator/s						
Slops Tank/s (Capacity [m^3])						
Incinerator (indicate for oily sludge and/or garbage)						
Macerator/Grinder with Overboard Discharge						
Sewage Treatment Plant/Marine Sanitation Device/s/Holding Tank						
Other/Comments						

2.5 Private Pleasure Craft

Vessels Using Port	Private Motor Boats (> 10 m): International	Private Motor Boats (> 10 m): Local	Cruising Yachts: International	Cruising Yachts: Local	Other (give details)	Other (give details)
Port Shipping Profile						
No. Based in Port						
Average No. Visiting Annually (ie. not based in port)						
Seasonality of Visits/Activity						
Do Vessels Typically Come Alongside, Moor to Dolphin/Buoy or Anchor?						
Typical Duration of Visit (days)						
Typical Duration of Inbound Voyage (days)						
Port/s Typically Arriving From						
Port/s Typically Departing For						
Vessel Profile						
Vessel Size (ie. displacement [t] for ships; length [m] for boats)						
Average (mean/mode)						
Maximum						
Minimum						
Crew Size						
Average (mean/mode)						
Maximum						
Minimum						
No. Passengers						
Average (mean/mode)						
Maximum						
Minimum						
Typical Age of Vessels						
Typical Propulsion System/Fuel						
Other/Comments						
Vessel Marine Pollution Control Equipment (Typical)						
Oily Water Separator/s						
Slops Tank/s (Capacity [m^3])						
Incinerator (indicate for oily sludge and/or garbage)						
Macerator/Grinder with Overboard Discharge						
Sewage Treatment Plant/Marine Sanitation Device/s/Holding Tank						
Other/Comments						

3. MARINE WASTE RECEPTION FACILITIES AND PROCEDURES

3.1 General Solid Garbage (Operational, Cargo and Maintenance Wastes)

Does this port have a requirement for separate collection and disposal of quarantine waste? Y/N _____

If no, do not address questions in 'Quarantine' column of audit table.

	Garbage					
	Garbage (mixed)	**Putrescible (non-Quarantine)**	**Quarantine** (foodstuffs and food-contaminated packaging)	**Fishing Gear/ Cargo Wastes** (Specify [eg. hold sweepings, wooden packing crates, etc.])	**Other** Type? _____	**Other** Type? _____
Assessment of Reception Facilities and Procedures						
Are reception facilities provided?						
Annual demand for facilities (tonnes)						
Annual demand for facilities (m^3)						
Seasonality of Demand?						
Recorded Peak Demand for Single Waste Transfer (tonnes and/or m^3)						
Limit on Max. Amount Accepted? (tonnes and m^3)						
Limit on Min. Amount Accepted? (tonnes and m^3)						
Are facilities (ie. no/size of bins, tank capacities, etc.) sufficient for demand, including seasonal factors?						
Are waste collection receptacles emptied on a regular basis commensurate with demand, including seasonal demand?						
Is direct access available from vessel to receptacle/collection point on wharf/pier?						
Is access along wharf/pier available to truck/smaller vehicle for direct loading of waste from vessel?						
Are barges/lighters used or available for waste transfer?						

	Garbage					
	Garbage (mixed)	**Putrescible (non-Quarantine)**	**Quarantine** (foodstuffs and food-contaminated packaging)	**Fishing Gear/ Cargo Wastes** (Specify [eg. hold sweepings, wooden packing crates, etc.])	**Other** Type? _____	**Other** Type? _____
Are waste reception facilities easily accessible (eg. not locked up, close to where ships/boats berth, etc?)						
Are waste facilities well signposted?						
Are waste facilities well lit?						
Are clear instructions/guidelines for use provided (eg signs)?						
Are waste facilities sufficient to prevent access by birds/vermin, and to prevent loss of contents due to wind?						
Are facilities able to contain spills/leaks (eg. bunding)?						
Can vessels offload waste from their berths while undertaking normal loading/unloading operations?						
Can vessels offload wastes without causing undue delay to their programmes?						
Who Operates Waste Reception Facilities?						
Port authority/operator						
Municipal authority						
Other gov't department.						
Shipping operator						
Contractor						
Other						
Fate of Wastes						
Landfill						
Mixed with other waste						
Incineration						
Sea dumping						
Export/transfer						

	Garbage					
	Garbage (mixed)	**Putrescible (non-Quarantine)**	**Quarantine** (foodstuffs and food-contaminated packaging)	**Fishing Gear/ Cargo Wastes** (Specify [eg. hold sweepings, wooden packing crates, etc.])	**Other** Type? _____	**Other** Type? _____
Reuse/recycling						
Other						
Assessment of environmental acceptability						
Do any plans/intentions exist to modify existing waste management procedures?						

3.2 Recyclable Wastes

Are recyclable waste materials from vessels collected separately from general waste? (Y/N) _____

If Yes, proceed with Recyclables table; if No, move direct to next table

	Recyclables					
	Paper/-Cardboard	**Plastic**	**Glass**	**Aluminium**	**Other Metals**	**Other** (eg. wood)
Assessment of Reception Facilities and Procedures						
Are reception facilities provided?						
Annual demand for facilities (tonnes)						
Annual demand for facilities (m^3)						
Seasonality of Demand?						
Recorded Peak Demand for Single Waste Transfer (tonnes and/or m^3)						
Limit on Max. Amount Accepted? (tonnes and m^3)						
Limit on Min. Amount Accepted? (tonnes and m^3)						
Are facilities (ie. no/size of bins, tank capacities, etc.) sufficient for demand, including seasonal factors?						
Are waste collection receptacles emptied on a regular basis commensurate with demand, including seasonal demand?						
Is direct access available from vessel to receptacle/collection point on wharf/pier?						
Is access along wharf/pier available to truck/smaller vehicle for direct loading of waste from vessel?						
Are barges/lighters used or available for waste transfer?						
Are waste reception facilities easily accessible (eg. not locked up, close to where ships/boats berth, etc?)						
Are waste facilities well signposted?						
Are waste facilities well lit?						
Are clear instructions/guidelines for use provided (eg						

	Recyclables					
	Paper/-Cardboard	**Plastic**	**Glass**	**Aluminium**	**Other Metals**	**Other** (eg. wood)
signs)?						
Are waste facilities sufficient to prevent access by birds/vermin, and to prevent loss of contents due to wind?						
Are facilities able to contain spills/leaks (eg. bunding)?						
Can vessels offload waste from their berths while undertaking normal loading/unloading operations?						
Can vessels offload waste without undue delay to their programmes?						
Who Operates Waste Reception Facilities?						
Port authority/operator						
Municipal authority						
Other gov't department.						
Shipping operator						
Contractor						
Other						
Fate of Wastes						
Landfill						
Mixed with other waste						
Incineration						
Sea dumping						
Export/transfer						
Reuse/recycling						
Other						
Assessment of environmental acceptability						
Do any plans/intentions exist to modify existing waste management procedures?						

3.3 Oily, Noxious and Miscellaneous Wastes

	Oily Wastes			Noxious Wastes			Other
	Bulk Oily Wastes/-Sullage (eg. bilge water, tank washings)	**Packaged Oily Waste**	**Oily Rags/ Filters**	**Liquid Noxious/-Hazardous Materials**	**Solid Noxious/-Hazardous Materials**	**Medical Wastes**	
Assessment of Reception Facilities and Procedures							
Type/s of waste							
Are reception facilities provided?							
Annual demand for facilities (tonnes)							
Annual demand for facilities (m^3)							
Seasonality of Demand?							
Recorded Peak Demand for Single Waste Transfer (tonnes and/or m^3)							
Limit on Max. Amount Accepted? (tonnes and m^3)							
Limit on Min. Amount Accepted? (tonnes and m^3)							
Are facilities (ie. no/size of bins, tank capacities, pumping rates, etc.) sufficient for demand, including seasonal factors?							
Are pumping/discharge connection points available on wharves/piers? If so, do they operate, are hoses, suitable couplings and adaptors provided?							
Are sullage trucks/trailers available for collection and removal of liquid wastes?							
Are waste collection receptacles emptied on a regular basis commensurate with demand, including seasonal demand?							
Is direct access available from vessel to receptacle/collection point on wharf/pier?							
Is access along wharf/pier available to truck/smaller vehicle for direct loading of waste from vessel?							
Are barges/lighters used or available for waste transfer?							

	Oily Wastes			Noxious Wastes			Other
	Bulk Oily Wastes/-Sullage (eg. bilge water, tank washings)	**Packaged Oily Waste**	**Oily Rags/ Filters**	**Liquid Noxious/-Hazardous Materials**	**Solid Noxious/-Hazardous Materials**	**Medical Wastes**	
Are waste reception facilities easily accessible (eg. not locked up, close to where ships/boats berth, etc?)							
Are waste facilities well signposted?							
Are waste facilities well lit?							
Are clear instructions/guidelines for use provided (eg signs)?							
Are waste facilities sufficient to prevent access by birds/vermin, and to prevent loss of contents due to wind?							
Are facilities able to contain spills/leaks (eg. bunding)?							
Can vessels offload waste from their berths while undertaking normal loading/unloading operations?							
Can vessels offload waste without undue delay to their programmes?							
Who Operates Waste Reception Facilities?							
Port authority/operator							
Municipal authority							
Other gov't department.							
Shipping operator							
Contractor							
Other							
Fate of Wastes							
Landfill							
Mixed with other waste							
Incineration							
Sea dumping							
Export/transfer							

	Oily Wastes			Noxious Wastes			Other
	Bulk Oily Wastes/- Sullage (eg. bilge water, tank washings)	**Packaged Oily Waste**	**Oily Rags/ Filters**	**Liquid Noxious/- Hazardous Materials**	**Solid Noxious/- Hazardous Materials**	**Medical Wastes**	
Reuse/recycling							
Other							
Assessment of environmental acceptability							
Do any plans/intentions exist to modify existing waste management procedures?							

3.4 Local Landfill Details (Where Port Wastes are Disposed Of)

Landfill Site	Distance from Port (km)	Operator/Licensee	Environmental Issues? (eg. vermin, windblown litter, polluted run-off, groundwater pollution)	Remarks/Other

4. FEES AND CHARGES

1. Are charges levied for vessel waste collection/disposal? (Y/N) _____

2a. Are these absorbed as a non-divisible component of port charges?; or (Y/N) _____

2b. Are these included as a discrete component of port charges? (Y/N) _____

Details of Charges (ie. complete table)?

	Flat Charge per Vessel	Duration of Visit	Size of Ship	Type of Ship	Amount/Type of Waste Landed						No. crew/-passengers onboard	Other
					Garbage	Quarantine	Bulk Oily/Waste Sullage	Packaged Oily/Waste Sullage	Sewage	Other		
Basis of Charge												
Rate (local currency)												
Rate ($US)												

Fate of Port Waste Management Revenue	Comments
Used to pay for waste disposal?	
Used to pay for port waste infrastructure?	
Used for general port revenue?	
Used for general gov't/departmental revenue?	
Other? (give details)	
Unknown use	
Do charges realistically reflect true costs for waste handling?	
Other issues/comments	

5. PORT WASTE MANAGEMENT ADMINISTRATIVE ARRANGEMENTS

Waste Management Planning	Comments/Details
What organisation is responsible for overall waste management (eg. gov't department, port operator, shipping operator, contractor, other, or responsibility not defined)?	
Have reports been made by ship operators alleging inadequacy of port waste reception facilities? Y/N? (Give details, dates, etc.)	
If yes, what actions have been taken to address any agreed inadequacies?	
Does the port monitor and record types and quantities of waste accepted?	
Does the port monitor and record marine waste management incidents (eg. spills, overflows, instances where demand has exceeded capacity, etc)?	
Does a waste management plan exist for the port?	**Y/N:**
If so, assess adequacy (try to obtain a copy).	
If not, does the port/marina intend to develop and implement a waste policy/plan?	
Does the plan address all forms of marine waste likely to be handled by the port?	
Is the waste management plan assessed/audited as to adequacy?	
Does the waste management plan articulate emergency response measures (eg. oil spillage, unforeseen demand for garbage reception facilities)?	
Are emergency response measures tested/exercised?	
If so, how often?	
Is the waste management plan considered adequate?	
Staff Training and Awareness.	
Are management and staff cognisant of marine waste management issues?	
Are they sufficiently trained/knowledgable regarding proper handling and disposal of marine waste?	
Berthing Contracts/Agreements	
Are marine pollution prevention commitments included in codes of practice or berthing contracts for port/marina users?	
Radio Pratique	
Are quarantine waste requirements addressed in radio *pratique*?	

6. LEGAL FRAMEWORK

6.1 Treaty Obligations of Nation (or Governing Country if a Pacific Territory)

	MARPOL 73/78					London Convention	UNCLOS III	SPREP Convention	SPREP Dumping Protocol	SPREP Pollution Protocol	Other	Other
	I	II	III	IV	V							
Signatory? Y/N												

6.1.1 Flag/Port State Controls

If a signatory to MARPOL 73/78, do local authorities exercise:

	Y/N	**Details/Remarks** (eg. frequency of inspections, agency conducting inspections, actions for non-compliance, etc)
Flag State Controls?		
Port State Controls?		
Check vessel compliance: pollution prevention equipment?		
Check vessel compliance: oil record book?		
Check vessel compliance: garbage record book?		
Check vessel compliance: waste management placards?		
Other?		

6.2 Local Legislative/Policy Requirements

Does the nation/territory have:

Local Legislative/Policy Issues	Y/N	Details (eg. name, general requirements)
Local MARPOL 73/78 enabling legislation?		
Other marine pollution law/s?		
Local waste management laws/policies?		
Local environment laws/policies?		
Quarantine laws/regulations?		
Any relevant laws/policies pending or planned?		
Other?		

7. GENERAL WASTE MANAGEMENT ARRANGEMENTS IN PORT AREA (NON-VESSEL SOURCED WASTES)

Fate of Wastes

	Municipal					Commercial					Industrial				
	Landfill	**Inciner-ation**	Sea Dump-**ing**	**Export/ transfer**	**Other** (eg. composting, recycling, etc.)	**Landfill**	**Inciner-ation**	**Sea Dump-ing**	**Export/ transfer**	**Other** (eg. composting, recycling, etc.)	**Landfill**	**Inciner-ation**	**Sea Dump-ing**	**Export/ transfer**	**Other** (eg. composting, recycling, etc.)
General Garbage															
Putrescible Waste (non-quarantine)															
Quarantine															
Recyclables (eg. plastic, glass, paper/cardboard)															
Aluminium															
Other Metals															
Oily Waste															
Noxious/ Hazardous Wastes															
Medical Waste															
Other															
Responsible Authority?															
Gov't/municipal authority															
Contractor															
Other															

8. MARINE WASTE MANAGEMENT IN THE FUTURE

Do alternative waste management systems/processes/methods, compared to those currently used for marine wastes, already exist in, or are planned for, the nation/territory (within reasonable access of the port)?	
Is recycling of any waste a realistic option for the port/nation/territory?	
If so, which types of recyclables?	
Is a zero acceptance of waste from ships policy viable for the port? (eg. for small islands which have trouble managing their own municipal waste)	
Is transfer of wastes to another island/territory/nation for environmentally acceptable disposal a realistic option?	
If so, what types of waste and to where?	
Likely acceptance of, or impediments to implementation, of eventual SPREP strategy (ie. the outcome of our project).	
Other issues or comments?	

9. SEWAGE

Name of Port/Boat Harbour/Marina	
Management Authority	
Harbour/marina Operator	
Is the port/harbour/marina poorly flushed?	**Y/N:**
Is water quality considered poor?	**Y/N:**
Is the port/harbour/marina used by ships, yachts and/or pleasure craft with people living onboard?	**Y/N:**
Do these vessels discharge untreated sewage direct into the harbour?	**Y/N:**
If answered 'Yes' to preceding four questions, proceed with questionnaire; if answered 'No' to any of the four questions, discontinue.	
Number of vessels, with people living onboard, using harbour/marina (peak and off-season)?	
No. of people living onboard boats (peak and off-season)?	
Period/s of peak use?	
Do port/marina rules prohibit or restrict the discharge of sewage from vessels?	
Do port/marina rules prohibit or restrict the discharge of greywater from vessels?	
Is stormwater and/or sewage from terrestrial sources discharged into the water body?	
If sewage is discharged, what is the level of treatment? (nil, primary, secondary, tertiary)	
Are facilities provided for the discharge of sewage from vessels? If so are they:	
Holding tank pump-out points?	
Permanent sewage line connections to each mooring/pen?	
Pump-out/disposal facilities for portable marine toilets?	
Are any planned? (give details)	
Are shore facilities provided in the port/marina for:	
Toilets?	
Showering/washing?	
Cooking?	
Laundry?	
Are any planned? (give details)	

Appendix C

Individual State Reports

Appendix C

Individual SPREP Member Reports (with exception of Tokelau)

AMERICAN SAMOA

1. PRELIMINARY

1.1 Introduction

The United States Territory of American Samoa is a chain of high-volcanic islands, with the exception of the Swains Island and Rose Island, each a series of low-lying coral atolls. Pago Pago, main settlement and administrative centre of the islands, provides what has been described as the best natural harbour within the Pacific islands region.

The territory exercises limited self-government. It has a local legislature and administration that effectively control and provide services similar to those that would be provided at the state and local level in the mainland US. The territory is represented in the US Congress, and all Federal US laws apply.

The economy of American Samoa is dominated by tuna fishing and processing, with the fishing mostly conducted by US registered purse-seiners. Pacific island nations/territories most closely neighbouring American Samoa are Samoa to the west, Niue and Tonga to the south, and the Cook Islands and French Polynesia to the east.

1.2 Geography

The total land area of American Samoa is 199 km2, with a declared EEZ covering 390,000 km2. The territory comprises five main islands, or island groups, plus two groups of low-lying coral atolls. Economic activity and the population of 61,000 are centred upon the island of Tutuila.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

As a territory, American Samoa shares the same coverage of IMO treaties as does the United States. The US is a member of the IMO and a party to Annexes I, II, III and V of MARPOL 73/78, as well as the London Convention. Although the US has not formally extended coverage of MARPOL 73/78 to the territory of American Samoa, federal US law has application within the territory. The provisions of MARPOL 73/78 are expressed in US law principally through the Code of Federal Regulations (CFR) Title 33 Navigation and Navigable Waters, and CFR Title 46 Shipping.

Port State Controls are exercised by the United States Coast Guard (USCG) detachment in Pago Pago. Neither the United States proper nor the territory of American Samoa is a Participant or Associate Member of the Tokyo MOU, although the US does have Observer status. Nevertheless, the inspection and compliance regime applied by the USCG is quite exacting and thorough. It should be noted that even though the US is not a party to Annex IV of MARPOL 73/78, stringent regulations exist in US law for the management and disposal of vessel-sourced sewage; these requirements are regarded to be more onerous than those contained in Annex IV.

1.3.2 Local Legislative Issues

By virtue of the application of Federal US laws to the territory, augmented by laws specific to the territory as passed by the local legislature, American Samoa may be considered to have a comprehensive suite of environmental management laws. The over-arching environmental law of American Samoa is the US Environment Protection Act. The territory is formally recognised within a District of the US EPA and all US national environmental laws apply in American Samoa. Other Federal US laws relevant to management of marine pollution are the Clean Water Act, Port and Water Waste Safety Act and the Oil Pollution Act. The territory also has its own Environmental Quality Act. Issues addressed by environmental laws and regulations include waste management, water quality, marine protection and environmental impact assessment.

The territory also has local laws in place regulating plant and animal quarantine. These are administered by the American Samoa Department of Agriculture. Quarantine laws appear to focus principally upon potential threats to agriculture. The laws themselves and their methods of application may not, therefore, be fully effective in protecting native flora and fauna from exotic pests and pathogens.

2. PORT REPORT : PAGO PAGO

2.1 Description of Port and Associated Shipping/Boating Activities

Pago Pago is American Samoa's principal port. All ships visiting from overseas call on the capital, and the port is also the base of operations for the small inter-island passenger and cargo service operating within the territory. This inter-island service visits the other inhabited islands within American Samoa, in roadstead and over-the-beach operations serviced by small boats. The main feature of activity of the port is support of the tuna fishing fleets, including the large, generally American-flagged, purse-seiners.

The Department of Port Administration operates the main port facilities in Pago Pago. These comprise: a combined Main Dock and Container Dock, capable of handling four large ships simultaneously; an oil dock; Water Transport Dock (for harbour craft); and the Inter-Island Dock, a ro-ro facility used in support of shipping between Apia and Pago Pago and outlying islands. In addition, a three point mooring is provided for the transfer of LPG cargoes via subsea pipeline. The main wharf is also used extensively by purse-seiners, berthing up to three abreast. The wharves are not fitted with cargo-handling gear, relying upon ships' gear for loading and unloading.

Opposite the main wharf area are situated Pago Pago's two tuna canneries. Wharves are provided at the canneries for the use of fishing boats. A small ship repair facility, with slipway, is situated adjacent to the canneries.

A small marina and a number of moorings are provided for yachts and small motor boats, including local fishing boats.

Pago Pago is arguably the most important tuna fishing port in the South Pacific. Over 450 visits are made annually by tuna boats from open-water fishing fleets. In addition to unloading their catch at the canneries, the tuna boats use Pago Pago as a maintenance base, remaining in port for up to 14 days per visit. Over 50 large purse-seiners may be in port simultaneously. Crew size ranges from 15 to 20.

Around 30 tankers and 190 cargo ships engaged in international trade, mainly container carriers, call on Pago Pago annually. Some of these container vessels are engaged on routes visiting nearby islands, such as Fiji, French Polynesia, Samoa and Tonga; others arrive from or depart for ports further afield, including Australia, New Zealand, Japan and the west coast of the United States. These ships range in size from around 5,000 tons to 15,000 tons. Port visits are typically of one to two days duration, with sailing times into and out of Pago Pago generally lasting three to four days. As opposed to most ports within the Pacific islands region, exports from Pago Pago are almost on a par with imports, in terms of container loads. The port handles about 19,000 TEUs inbound annually, compared to about 18,500 loaded TEUs outward.

A regular inter-island mixed passenger/cargo service operates on a weekly basis between Pago Pago and Apia. This is supplemented by special charters, as required. Further services are provided between Pago Pago and other islands within American Samoa, with the Manu'a Islands being the main destination.

About 10 visits per annum are undertaken by international cruise liners. Ships usually come alongside the main wharf and remain in port for less than a day. Pago Pago also receives about 15 visits annually by major warships and US Coast Guard cutters. Additionally, in the order of 100 itinerant yachts visit the port annually, with most extended stays concentrated around the cyclone season from November to March. Yachts usually anchor in the upper reaches of the harbour.

The Department of Port Administration has developed a plan for the incremental expansion of the port. Planned enhancements include a dedicated container facility co-located with the canneries, a new wharf for cruise ships, an

international ferry terminal and a marina for local and visiting recreational craft.

The US Coast Guard is installing an opto-electronic surveillance system in Pago Pago harbour. The purpose of the system is to detect oil discharges within the harbour and alert the Coast Guard of breaches of pollution prevention regulations.

2.2 Demand for Ship Waste Reception Facilities

The total demand for port waste reception facilities in Pago Pago has the potential to be considerable. A large and active tuna fishing fleet is centred upon Pago Pago, merchant ships visit regularly, and large cruise liners and warships are also frequent visitors. The most significant potential source of waste is the tuna fishing fleet, by dint of the number of vessels involved and wastes associated with their catch.

Fishing vessels operating from Pago Pago probably represent the biggest demand for waste disposal services. Assuming these ships have a crew of 18, spend an average of 30 days at sea each trip and accumulate 0.7 kg/pers.day of garbage other than food wastes, then each boat would have about 0.38 tonne of garbage to land on arrival in Pago Pago. To this must be added garbage generated during the period alongside (which would include maintenance wastes); if this is assumed to be 1.5 kg/pers.day, then another 0.38 tonne would be added in a typical two-week stay, for a total of approximately 0.75 tonne per boat per visit. Therefore, total garbage from the 450 fishing boats visiting Pago Pago each year would be around 340 tonnes, occupying somewhere in the order of 2,000 m^3 to 3,000 m^3.

Cruise liners visiting American Samoa regularly, although not always, discharge waste in Pago Pago, normally garbage. Cruise liners do not always discharge waste during port visits, so although Pago Pago is only be one to four day sailing from the previous port (eg. Suva, Papeete or Apia), the garbage discharged may have been accumulated over a longer period. A ship with 1,500 passengers and crew each generating 3 kg/day, on an eight-day transit from Auckland, with 50% of garbage (mainly food waste) disposed of to sea en route, could land somewhere in the order of 18 to 20 tonnes of garbage in Pago Pago; assuming an average density of 0.2 kg/L, this would equate to about 100 m^3 of solid waste (although volume is likely to be less owing to compaction of the garbage by the ship). Similarly, a warship with a crew of 200, generating 0.7 kg/pers.day of garbage other than food wastes could have up to 1.3 tonnes of solid waste after a similar transit to Pago Pago (Note: These estimates are more refined than those presented in Appendix D which employ more generic modelling data).

By contrast, if the 60,000 people of American Samoa each generate 1 kg/pers.day of waste (5 L/pers.day) then the annual amount produced will be about 22,000 tonnes annually (about 110,000 m^3). The visits of 10 cruise liners and 15 warships on an annual basis, landing up to 200 tonnes of garbage, could deliver garbage equivalent to about 1 % of the annual total of garbage generated in the territory.

No explicit waste management plan exists for the port of Pago Pago, although waste management planning is incorporated within the port management and contracting arrangements. The canneries also receive significant amounts of waste from the fishing vessels calling directly upon them. Similarly, the boatyard would also encounter waste oil and bilge water requiring disposal arising from maintenance and repair activities. As for the government operated port, contractors are engaged to collect and dispose of waste from the canneries and boatyard. No allegations of inadequate waste reception facilities were notified to the auditor.

Specific fees are charged to visiting vessels for waste collection and disposal. In the case of garbage, these are calculated on the basis of daily collection charges (ie. charged each time a collection is required); garbage charges are $US 50 per skip load (up to 3 m^3) for dry solid waste and $US 100 for putrescible matter. Oily waste is collected for $US 0.25 per US gallon (about $US 0.07 per litre or $US 70/ m^3) although actual price fluctuates according to world oil prices and quality of the waste oil.

2.2.1 Oily Wastes

American Samoa provides an effective service for the collection and disposal of ship-generated oily wastes. All waste oil collection and disposal services are operated by a contractor, on a period engagement with the Port Administration.

Customers for this service are usually tuna boats and domestic shipping; few requests have been received to date from international merchant vessels.

The contractor operates collection trucks which can pump direct from bilges, shore connections or waste oil tanks. Waste oil is filtered and separated to remove water and suspended solids. Extracted water is directed through the municipal waste water treatment system; solids are disposed to landfill except if they contain toxic contaminants such as polychlorinated biphenyls (PCBs), in which case they are exported for proper disposal. Recovered oil is transported to the tuna canneries where it is used as supplemental fuel for boilers.

Oily waste heavily contaminated with impurities is not suitable for treatment and needs to be treated as hazardous waste. In these circumstances, the material is exported to the US mainland for appropriate treatment.

A 6,500 L waste oil tank is located at the boatyard. Oily waste pumped to this tank is also collected for treatment by the contractor.

2.2.2 Garbage

Garbage skips of 3 m^3 capacity are provided in wharf areas for collection of non-quarantine solid waste. These skips are intended for use by port staff and boats remaining alongside the wharf for extended periods. International shipping requiring collection of solid waste is required to arrange for collection through its agent. In this instance, a contractor will collect the garbage by loading direct from the ship into trucks. Garbage collected from vessels is transported to Tutuila's sanitary landfill, located 12 km from the port.

Cargo-associated packaging waste is re-used to the greatest extent practicable to reduce garbage. Pallets are re-used and wooden shoring recovered from incoming cargo is used in outgoing loads.

Hazardous, special and liquid wastes are required to be segregated from general garbage. In accordance with US EPA regulations, any liquid waste within the garbage is required to be treated as hazardous. The port waste collection contractor reported no incidents of inappropriate disposal of liquid or hazardous wastes from vessels visiting Pago Pago.

2.2.3 Quarantine Wastes

The American Samoa Agriculture Department enforces barrier controls for the territory. It is understood that the focus of quarantine efforts is upon protection of agriculture. The usual routine is for Agriculture officials to inspect visiting shipping, including yachts, and determine if any of the materials onboard require handling as quarantine items. Advice from the Agriculture Department is that smaller vessels are encouraged to dispose of potential quarantine items at sea before reaching Pago Pago.

Should this be the case, dedicated bins or plastic bags are used to collect the waste for transfer to the sanitary landfill. Quarantine bins are also provided at the Apia – Pago Pago ferry terminal. Bulk collection of quarantine waste is available if requested by visiting cruise liners. Trucks can be used for direct loading of quarantine wastes if required. Quarantine waste is disposed via deep landfill.

Vessel masters or agents are charged by the Agriculture Department for the attendance of quarantine inspectors. Costs for the collection and disposal of quarantine waste are charged direct to the master or agent by the disposal contractor.

2.2.4 Special, Hazardous or Noxious Wastes

No specific procedures were in evidence for the separate collection and management of hazardous or noxious wastes, and it is understood that the demand for such services from marine sources is relatively minor. Nevertheless, quantities of these wastes would be generated, especially from maintenance and repair activities of the tuna boats. It is understood that wastes of this class can be collected on request by contractors.

2.2.5 Sewage

Degradation of water quality within Pago Pago harbour is a long-term problem. The harbour is very poorly flushed and water exchange is minimal. The degraded water quality is principally the result of the discharge of fish-processing effluent from the tuna canneries over

a period of many decades. Even though the discharges ceased some years ago Pago Pago harbour has not yet recovered.

The potential contribution to continuing water quality problems from vessel sourced sewage could be substantial: This is in recognition of the large number of tuna boats remaining in harbour for extended periods, while the crews remain onboard, augmented by organic material from tuna unloading activities. The US Coast Guard enforces a regime of zero-discharge of untreated sewage within Pago Pago harbour. Observing the length of stay in the harbour, holding tanks in fishing vessels are unlikely to be able to retain all sewage until a boat returns to sea. Shore ablution facilities are provided by the canneries and the boatyard for fishing boat crews; none are available at the main port. Alternatively, boats without approved marine sanitation devices are tending to rely upon incinerating toilets.

No shore ablution facilities are presently provided for itinerant yachts. Showers and toilets are planned to be included within the marina in the intended port upgrade.

There are no restrictions on the discharge of greywater within the harbour.

2.3 Discussion

With the exception of hazardous materials, and possibly quarantine wastes, ship waste reception services in Pago Pago are capable of dealing with all wastes in an environmentally sound manner. The waste oil collection and reclamation arrangement operating within American Samoa is a model scheme which may have wider application within the project area.

The discharge of sewage within the harbour is banned by US law, which is fortuitous considering the poor flushing and degraded water quality of Pago Pago harbour. Compliance with sewage discharge restrictions would be eased for tuna boat crews in extended stays at the Port Administration wharves if shore ablutions were provided.

The US Coast Guard is effective and aggressive in policing marine pollution discharge controls.

2.4 Current Terrestrial Waste Management Practices

The management of waste in American Samoa has improved markedly in recent years as standards applying in the US mainland are applied and new waste management procedures and facilities come into operation.

All garbage on the island of Tutuila is disposed of in a lined landfill. Scrap metal and aluminium are collected separately and exported (to Australia, New Zealand or the US) for recycling. The American Samoa Environmental Protection Agency (ASEPA) is promoting the separation and composting of domestic green wastes. The territory government is currently considering the option of applying a levy on beverage containers and batteries in order to fund the collection and recycling of these items.

Hospital waste currently treated and landfilled, as the hospital incinerator is inoperable. It is intended that the incinerator be relocated from the hospital to the American Samoa Power Authority (ASPA) Tafuna Power Plant. The hospital is also investigating use of an autoclave disposal system for the treatment of bio-hazardous wastes and sharps.

No facilities or procedures currently exist within the territory for the disposal of hazardous wastes, particularly liquids. The current policy is that the party generating the waste (i.e, the source) is responsible for its proper disposal, with assistance available from the ASEPA. If proper disposal is not achievable then the material must be stored at source. The ASEPA is investigating options for the identification, collection and export for disposal (to Australia, New Zealand or the US) of such wastes. Used batteries are currently separated from the general garbage stream and stored at the landfill site, with the intention of exporting battery cases for recycling.

A system has been established for the collection of waste oil within American Samoa. Small quantities are dropped off by the public at the ASPA or else collected at source in dedicated containers supplied to petrol station and vehicle repair workshops; larger quantities are collected in bulk road tankers. The waste oil is then collected by a contractor or ASPA and filtered prior to use as a fuel at the canneries; ASPA is

investigating the use of the recovered oil as a fuel in its own generating plant. Filtered material recovered from the oil and which is unsuitable for disposal within the territory is exported to the US for disposal.

Sewage within Pago Pago is collected in a municipal wastewater system and treated to primary standard. The effluent is chlorinated before discharge via ocean outfall. The outfall is located beyond the entrance to the harbour.

2.5 Summary and Conclusions

American Samoa has a relatively sophisticated administrative and technical infrastructure compared to other Pacific island states of comparative size. Annexes I, II, III and V of MARPOL 73/78 apply within the territory by virtue of its US parent's accession to the convention. Although Annex IV does not apply, US Federal regulations on sewage are quite stringent and rigidly enforced by the US Coast Guard. Port and Flag State Controls are exercised.

Waste management has been greatly improved in American Samoa in the last few years and this is reflected in the way in which ship-generated waste is handled. Nevertheless, some refinements can be made to quarantine and hazardous waste capture and the provision of shore ablution facilities improved.

The current demand for the reception of ship wastes is significant, mainly due to the intense concentration of tuna-fishing shore support activities within the harbour.

In conclusion:

- ship waste reception facilities and procedures at Pago Pago are generally comprehensive and with capacity commensurate to the present level of demand;
- current quarantine waste and ship-generated hazardous waste procedures may need review to ensure their ability to capture all items of quarantine interest;
- the current waste oil collection service is effective;
- Pago Pago harbour has severely degraded water quality. The discharge of sewage from ships would exacerbate this situation. Sewage discharges within the harbour are contrary to US law, as enforced by the USCG;
- Port State Controls, as applied by the USCG, are effective and applied in a rigorous manner; and
- terrestrial waste management services in American Samoa are well run and capable of dealing with all components of the waste stream in an environmentally sound manner, either by disposal or controlled stockpiling until long-term solutions are implemented.

3. RECOMMENDED IMPROVEMENTS

Overall, American Samoa has adequate procedures for the management of ship-generated waste, reinforced by effective legislation and compliance inspection measures.

3.1 Legislative Issues and Status of Relevant Conventions

The United States should formally advise the IMO of the extension to American Samoa of US accession to relevant IMO treaties.

3.2 Compliance Monitoring and Enforcement

Nil specific recommendations. Current measures effective, although regional cooperation in the application of Port State Controls should be improved.

3.3 Regional Waste Management Opportunities

American Samoa should evaluate options for export of recyclable materials (aluminium and other scrap metals) and hazardous wastes to other ports in the Pacific islands region or further, for appropriate treatment/disposal.

Potential exists for Pago Pago oil recovery services to play a wider regional role by accepting waste oil and oily mixtures from neighbouring Pacific island states. Any such activity will be constrained, however, by US EPA regulations.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Pago Pago

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Oily wastes (waste oil)	Provide waste oil collection drums at facilities used by small boats for refuelling.	Nil action required. Current practices adequate.
Oily wastes (oily water)	Nil action required. Current practices adequate.	Nil action required. Current practices adequate.
Garbage	Improve provisions of bins on wharves.	Improve provisions of bins on wharves, particularly for shipping on extended stays (e.g. fishing vessels undergoing periodic maintenance).
Recyclables	If recycling of aluminium cans found to be viable for Territory as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.	If recycling of aluminium cans found to be viable for Territory as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.
Quarantine wastes	n/a	Review quarantine procedures to ensure all wastes presenting quarantine risk are captured.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage.	Nil action required. Current practices adequate, assuming proper vigilance by waste collection contractors to ensure hazardous/special wastes excluded from general garbage.
Sewage	n/a	Improve shore facilities for visiting yachts and fishing vessels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Pago Pago
Nation/Territory: American Samoa

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	8000	4	1.5	190	1.5	108.0	20.5	102.6	0.18	0.72	137	n/a	n/a	70	1.9	359.1
Cruise Liners	1500	20000	2	1	10	3.0	9000.0	90.0	450.0	0.27	0.54	5	n/a	n/a	70	105.0	1050.0
Inter-island Traders	15	500	2	1	50	1.5	45.0	2.3	11.3	0.05	0.10	5	5	250	30	0.5	22.5
Inter-island Ferries	220	1000	1	n/a	60	1.5	330.0	19.8	99.0	0.05	0.05	3	2	120	n/a	n/a	n/a
Tourist Charter Boats	15	n/a	3	n/a	10	0.5	22.5	0.2	1.1	0.01	0.03	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	5	4	15	1.7	1700.0	25.5	127.5	0.18	0.90	14	n/a	n/a	50	40.0	600.0
Warships (small)	20	110				1.3	0.0	0.0	0.0	0.01	0.00	0	5	0	50	0.0	0.0
Fishing (oceanic)	18	250	30	14	450	1.8	1425.6	641.5	3207.6	0.02	0.60	270	10	4500	40	10.1	4536.0
Fishing (local)	2	n/a	1	n/a	6000	0.8	1.6	9.6	48.0	0.005	0.01	30	n/a	n/a	n/a	n/a	n/a
Local workboats	3	n/a	1	n/a	400	0.5	1.5	0.6	3.0	0.01	0.01	4	0.05	20	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	10	10	100	0.5	30.0	3.0	15.0	n/a	0.01	1	n/a	n/a	20	0.6	60.0
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**813**	**4065**			**469**		**4890**			**6628**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

1. PRELIMINARY

1.1 Introduction

The Cook Islands straddle the Tropic of Capricorn and are located approximately halfway between Hawaii and New Zealand. Nearest neighbours are Tonga to the west, American Samoa to the northwest, and French Polynesia (Tahiti) to the northeast.

1.2 Geography

The centre of the island group is located at 21 º S, 160 º W. There are 15 islands in the group with a combined coastline of 120 km and a total land area of 240 km^2. The topography of the southern group is steep and hilly, some islands such as Rarotonga having volcanic slopes with a narrow fringing alluvial plain and coral reef platform, others being of raised coral cliffs supporting internal lakes and swamps. The northern group is geologically older, and comprises low coral and sandy circular atolls with internal lagoons.

Agriculture and tourism provide the economic base with major exports being copra and citrus fruits. Rarotonga is the largest of the islands and the location of the nation's main, and only international, at Avarua (the capital of Rarotonga). A small boat / yacht anchorage is found at Avatiu. A very small harbour, supporting roadstead operations, is situated on the neighbouring island of Aitutaki.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

The Cook Islands are not a signatory to MARPOL 73/78, but have applied to become one and have already adopted its provisions. The Cook Islands are also a signatory of UNCLOS III and have claimed a 200 nm EEZ.

1.3.2 Local Legislative Issues

Rarotonga has a *Shipping Act* (1998) and *Prevention of Marine Pollution Act* (1998), and an *Environment Protection Act* (1994/5). Under the *Shipping Act* it has set up its own Register of Vessels, and produced waste management guidelines, oil record books and garbage record books for registered vessels (which number some 24, including 12 fishing boats, one patrol boat and seven small inter-island passenger/cargo vessels, three recreational charter boats and a fuel barge).

The *Prevention of Marine Pollution Act* bans the discharge of oil, pollution, garbage and sewage in Cook Island waters and exempts the government from providing reception facilities for materials it is not equipped to dispose of. The Act also adopts the following international maritime conventions into Cook Islands' law:

- MARPOL 73/78
- London Convention 1972
- SPREP Convention
- Various other IMO oil pollution conventions
- SOLAS 1974

The *Environment Protection Act* establishes an authority responsible for protection of the environment and prevention of pollution, requires development proposals to undergo environmental impact assessment and establishes a waste management authority.

2. PORT REPORT: AVARUA

2.1 Port Activities and Associated Shipping/Boating Activities

Avarua is the Islands' major port and provides protected wharfage (approximately 400 m) for all visiting vessels. The largest vessel to visit the port has been the occasional cruise liner, but the port is not regularly visited by such vessels. The port is regularly visited by 3,000 ton breakbulk cargo vessels and container ships, and oil and LPG tankers. Most vessels visiting the port are recreational yachts passing through the South Pacific. Some 150 such vessels visit per annum and are allowed to stay for 10 days at most.

Long-line fishing for tuna, swordfish, mahi-mahi and albacore is practiced from the port by some dozen small fishing boats. Processing is done at sea, with offal returned to the sea, and the catch is iced down on the vessel.

2.2 Demand for Ship Waste Reception Facilities

The demand for waste reception facilities at Avarua is small and mostly comes from visiting yachts and the fishing boats. The larger cargo ships and tankers are encouraged to retain their garbage and oily wastes. Wastes are only accepted from Cook Islands registered vessels.

2.2.1 Oily Wastes, Garbage and Quarantine Wastes

One small skip is provided at the port for all garbage and small containers of oily wastes. The skip is removed as necessary by a contractor and emptied at the waste dump.

Small containers of oily waste are usually taken by islanders for use as a fuel or treatment against termites and ants. Larger volumes of oily wastes are handed back to Mobil; the company collect it in 205 L barrels and return about 150 of these to New Zealand each year.

All combustibles are incinerated at the port in an open pit near the outer breakwater. Quarantine wastes are burned at the airport incinerator.

2.2.2 Special, Hazardous or Noxious Wastes

No specific procedures were in evidence for the separate collection and management of hazardous or noxious wastes, and it is understood that the demand for such services from marine sources is relatively minor. Nevertheless, quantities of these wastes would be generated, especially from maintenance and repair activities of local vessels, and it may be assumed that these wastes are probably dumped at sea or disposed with general garbage.

2.2.3 Sewage

Sewage cannot be discharged in port or island waters and toilet, laundry and cooking facilities are provided at the port for itinerant yachts. The harbour is well flushed and water quality is considered to be acceptable.

2.2.4 Current Terrestrial Waste Management Practices

The Cook Islands lack modern community infrastructure. Rarotonga has a drinkable water supply based on mountain surface catchment reservoirs and regular rainfall. Water is treated to primary standard and reticulated throughout the island. Sewage is disposed to septic tanks which are periodically pumped out and the septage is ploughed back into the agricultural fields. There are no modern wastewater treatment facilities for the island although a few of the larger hotels run package treatment plants. There is no modern sanitary landfill, but a private waste dump is in operation but receives minimal management and does not practice sorting of garbage. Garbage is regularly collected by private contractors. A proposal for a modern landfill has been formulated, but funding is yet to be obtained.

2.2.5 Summary and Conclusions

Whilst demand for waste reception is not high, facilities to cope with what demand there is, are rudimentary at best, but seem to cope. There is no proper signage for garbage area or bunded area for oily wastes reception. A small unmanaged waste tip has developed near the harbour breakwater where combustibles are incinerated. The island has limited capacity to receive and treat wastes. No sorting of garbage occurs, and only superficial attempts at recycling occur (aluminium cans and bottles by a local school). Domestic ablution and washing facilities are provided for visiting yachts.

Rarotonga has enacted laws which forbid the disposal of garbage, oil and sewage in Cook Island waters and restrict the disposal of such wastes at the port. The island needs a modern landfill site managed to international standards before it can contemplate accepting more waste than it does at present.

3. RECOMMENDED IMPROVEMENTS

The Cook Islands experiences limited demand for the acceptance of ship-generated waste, and current reception procedures for garbage are relatively effective, albeit final disposal of garbage requires improvement. Although the islands are not as pressed for space for landfill as are the smaller coral atoll nations, non-acceptance of most waste from international shipping is recommended owing to the limited waste disposal infrastructure.

3.1 Status Of Relevant Conventions

In consultation with New Zealand, the Cook Islands should ascertain the actual status of the application to the Cook Islands of IMO conventions to which New Zealand is a Party,

given that New Zealand has a role in the foreign affairs of the Cook Islands. The feasibility of extending these conventions to the Cook Islands should be investigated, and if practicable, the conventions should be formally extended.

If extension of New Zealand membership is not practicable, then the Cook Islands should accede to MARPOL 73/78 in its own right.

3.2 Compliance Monitoring and Enforcement

The current application of Port State Controls is minimal. These should be developed in parallel with the Cook Islands' formal accession to MARPOL 73/78 and within a cooperative framework with other Pacific island states.

3.3 Regional Waste Management Opportunities

There is a need to evaluate options for export of recyclable materials (aluminium and other scrap metals), and hazardous wastes to other ports in the Pacific islands region or further, possibly New Zealand.

The existing waste oil export and recovery scheme should be reviewed to ensure its effective capture of all waste oil derived from vessels in the Cook Islands.

3.4 Ship waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Avarua

Waste Category	WASTE MANAGEMENT RECOMMENDATIONS	
	Domestic Shipping	**International Shipping**
Garbage	Current provision of collection receptacles adequate. Need to cease incineration of combustibles at port.	Nil acceptance.
Recyclables	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.
Quarantine wastes	n/a	Review quarantine procedures to ensure storage and handling procedures adequately contain wastes.
Hazardous/special wastes	Review current procedures to ensure diversion from general garbage stream of hazardous/special wastes for separate collection.	Nil acceptance.
Oily wastes (waste oil)	Provide waste oil collection drums at facilities used by small boats. Ensure all oily wastes are collected (e.g. diverted from general garbage stream).	Nil acceptance.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic vessels.	Nil acceptance.
Sewage	N/a, although shore ablution facilities should be provided in wharf areas as a prudent management measure.	N/a, although shore ablution facilities should be provided in wharf areas as a prudent management measure.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Avarua
Nation/Territory: Cook Islands

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	10	3000	5	1.5	44	1.5	75.0	3.3	16.5	0.18	0.90	40	n/a	n/a	70	1.1	46.2
Cruise Liners	1500	20000				3.0	0.0	0.0	0.0	0.27	0.00	0	n/a	n/a	70	0.0	0.0
Inter-island Traders	8	250	3	3	35	1.5	36.0	1.3	6.3	0.05	0.15	5	5	175	30	0.7	25.2
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	150	2500	5	3	1.5	1.7	1275.0	1.9	9.6	0.18	0.90	1	n/a	n/a	50	22.5	33.8
Warships (small)	20	110	5	20	18	1.3	130.0	2.3	11.7	0.01	0.05	1	5	90	50	20.0	360.0
Fishing (oceanic)	18	250				1.8	0.0	0.0	0.0	0.02	0.00	0	10	0	40	0.0	0.0
Fishing (local)	3	n/a	1	n/a	500	0.8	2.4	1.2	6.0	0.005	0.01	3	n/a	n/a	n/a	n/a	n/a
Local workboats	3	n/a	1	n/a	600	0.5	1.5	0.9	4.5	0.01	0.01	6	0.05	30	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	10	5	150	0.5	22.5	3.4	16.9	n/a	0.01	2	n/a	n/a	20	0.3	45.0
Local craft (day trips)	3	n/a	1	n/a	300	0.5	1.5	0.5	2.3	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**15**	**74**			**57**		**295**			**510**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

THE REPUBLIC OF THE FIJI ISLANDS

1. PRELIMINARY

1.1 Introduction

Fiji has one of the most diversified economic bases of any of the Pacific island states. Forestry, gold and silver extraction and processing, fishing, sugar farming, clothing manufacture, copra and tourism are the main areas of economic activity. Principal exports are sugar, molasses, gold, fish, timber and garments.

Fiji's closest neighbours are Vanuatu to the West, Wallis and Futuna to the North, Tonga to the East and New Zealand to the South.

1.2 Geography

The Republic is made up of over 300 islands dotted across 710,000 km^2 of the Pacific, one third of which are inhabited and range in size from Viti Levu of 10,429 km^2 to small-uninhabited atolls. The population of Fiji is in the order of 830,000 with a growth rate of 1.41%. Almost 80 per cent of the population live on the two main islands of Viti Levu and Vanua Levu (5556 km^2).

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

Fiji is a member of IMO but is not yet a Party to MARPOL 73/78 nor OPRC 90 and the Tokyo MOU. It is not a signatory to the London Convention but this is under consideration in the draft *Environment Act*. The government is preparing national legislation giving effect to the five Annexes of MARPOL 73/78 and OPRC 90.

Fiji is a signatory to the SPREP Convention and its two associated Protocols.

1.3.2 Local Legislative Issues

Existing laws relating to the environment, quarantine and waste management are:

Continental Shelf Act 1970
Harbour Ordinance (Amendment) Act 1974

1.3.3 Marine and Ports Authority of Fiji Act 1975

Marine Spaces Act 1977
Plant and Animal Quarantine Act 1985
Animal Importation Act and Regulations
Quarantine Act 1985 CAP 112 (Revision)c
Marine Act 1986
Suva City Council By Laws

The Environment Department of the Ministry of Local Government, Housing and Environment has submitted a draft Environment Bill to the Cabinet for review and is optimistic that the relevant decree would be proclaimed by the end of 2000, giving effect to the legislation.

In early 2001 Fiji announced the intention to impose an environment protection levy on all vessels entering the nation's ports. The government identifies discharges from shipping as a major cause of pollution in Fiji's ports, and has stated an intention to direct funds generated by the levy for the purchase and maintenance of marine pollution control equipment.

2. PORT REPORTS

2.1 Suva

Suva is the principal port for import/export cargoes with a total of 751 vessels using the port in 1999 with a gross tonnage of 5,489,614. Kings Wharf is the terminal for container traffic, car carriers, dry bulk and passenger vessels and is 492m long with a least depth alongside of around 11m. Container vessels are the principal traders to the port with inbound voyages from Asia, Australia, New Zealand and the US ranging in duration from 3 to 30 days. Suva is a hub port for the Pacific Islands with transhipment in smaller vessels for the short duration voyages to other islands.

There is also significant tanker traffic with 80 tankers of 672,00 gross tons conducting discharge/loading operations in any year. Two tankers of an average capacity of 6,000 tones are operated from Suva. Kings Wharf has two cargo discharge/bunkering facilities. BP and Shell have joint use of an eight-inch pipeline for all white products and another eight-inch pipeline for bunker oil and diesel. Mobil have a six-inch pipeline for diesel and bunker fuel and a ten-inch pipeline for white products. There is a small tanker-loading jetty adjacent to the Shell terminal.

Princes Wharf is 183 m in length with a least depth alongside of 6.0 m. The wharf is heavily used by large foreign fishing vessels for repairs, provisioning, crew changes, etc with traffic of around 200 vessels/year

Walu Bay Wharf is 183 m in length with a least depth alongside of 9.0m and is principally used by the Government Shipping Services for passenger/cargo traffic to other islands. Eleven vessels of almost 50 m LOA are operated in these services, two harbour tugs of 2,000 and 8.000 hp and various support craft also use this wharf.

There is also a small wharf in the Walu Bay area used by the Fiji Defence Force (Navy) to berth its three patrol craft, one converted minesweeper and three inshore patrol craft. Fuel is supplied by tanker truck and a septic tank contractor pumps out the sewage holding tanks. Any residual oil from the slop tanks is discharged to a tanker truck.

A number of cruising yachts, an average of 16 per year, visit the Royal Suva Yacht Club and are normally anchor off the Club jetty or come alongside the docks.

2.2 Lautoka

Lautoka is principally a bulk port handling sugar, timber, fertilisers and chemicals with King's Wharf constructed in 1952. With the increasing traffic, Queen's Wharf was completed in 1981 and consists of a rectangular pier 140 by 80 metres connected to shore by an 11 metre concrete bridge with depth alongside of 11 metres. Dolphins are positioned off each end of the wharf. The Fiji Sugar Corporation has separate facilities for bulk export of sugar and molasses situated south of Queen's Wharf consisting of a conveyor system for the sugar and a pipeline for the molasses. Tropik Wood operate a conveyor system for export of wood chips which is co- located with the Sugar Corporation installation

The port of Lautoka is the principal port for import/export cargoes for the western side of Viti Levu. Queen's Wharf is the terminal for container traffic, car carriers, dry bulk and passenger vessels. This facility is smaller than King's Port in Suva and is also operated by the Maritime and Ports Authority of Fiji. It is commonly referred to as the second port of Fiji. This is the hub port for container vessels servicing the western part of Viti Levu which are coming from Australia, New Zealand and the United States and transhipping from Suva. Inbound voyage durations are on average 9 days and outbound voyages to the other islands from 1 to 4 days. In addition the wharf handles dry bulk imports of caustic and fertiliser.

Three international oil companies (BP, Mobil and Shell) have storage facilities for petroleum products and share a common pipeline for ship-to-shore product transfer with a permanent connection on the wharf. A storage facility for LPG is located adjacent to the wharf and with a fixed connection to a pipeline on the wharf. Petroleum product and LPG tankers from either international terminals or Vuda Point supply the tank farms on a monthly basis.

Private and government passenger and cargo vessels servicing the outer islands on the western side of Viti Levu use the port. International passenger liners pay visits to the port, usually one vessel each month. There are also many local tourist and passenger vessels which load and discharge passengers alongside the wharf, laying off to permanent moorings on completion of their voyages.

A limited number, up to 20 each year, of large cruising yachts and cabin cruisers ranging in size from 25 to 50 metres visit the port. Average time alongside is one day. The majority of yachts and power boats use the privately operated Vuda marina, located 40 km west of Lautoka.

Adjacent to Queen's Wharf are two smaller wharves one of which is a fisherman's wharf for domestic fishing vessels with minimal services; these are separated from each other and Queen's Wharf by fences. The principal purpose of the fisherman's wharf is to provide a secure anchorage for up to 80 craft ranging in size from 5 to 10 metres. Associated with this installation is a small boat yard operated by the Fisheries Department. Wooden boat construction, from locally available timber, repairs and outboard motor servicing takes place at this facility. The second wharf is privately operated used by the domestic inter-island ferries and cargo vessels that service the outer islands and tourist resorts. This facility is located next to the fisherman's wharf. Limited quantities of fuel and other basic requirements are available on request.

2.3 Vuda Point

Three port operations are located at Vuda point; the Vuda petroleum terminal, the Blue Gas LPG terminal and the Vuda marina.

2.3.1 Vuda Petroleum Terminal

The Vuda petroleum terminal is one of the largest fuel storage facilities in the Melanesian/Polynesian region. BP, Mobil and Shell all have tank farms at Vuda Point for petroleum products such as jet fuel, distillate and gasoline with a common user submarine pipeline and associated multiple buoy mooring located approximately 450 m offshore at a depth of around 12 m. Two types of tanker use this facility, the large supply tankers of up to 40,000 GRT which call monthly and originate in Australia and Singapore; the other category is the inter-island tankers of between 2,000 and 10,000 GRT which carry petroleum product from the Vuda Point terminal to tank farms on the other islands on a twice monthly schedule. A small jetty is available and provides a berth for the tug boat which services the offshore mooring

2.3.2 The Blue Gas Propane terminal

This company operates a propane gas facility consisting of a tank farm supplied through a submarine pipeline from an offshore multiple buoy mooring with tanker discharges on a monthly basis.

2.3.3 Vuda Marina

This is a privately owned and operated marina in a mooring basin providing a secure anchorage for domestic and international pleasure craft. Over 90% of the 300 vessels using the facility each year are internationally registered and are up to 45 m LOA The domestic users are yachts up to 12 m LOA and a limited number of large cabin cruisers. The marina operates a repair facility utilising a type of synchrolift and cradles to permit work on the shore

2.4 Denarau Marina

This is a privately owned and operated marina in a mooring basin which also supports delivery of supplies and fuel to the island resorts in Bligh Water and to the village co-operatives. There is significant passenger traffic, over 150,000 tourists per annum, in resort transfers and in fishing and other charter craft. The marina can accommodate up to 50 vessels on floating and fixed piers with a depth of 3.5 m alongside. There are also four mooring buoys capable of accommodating vessels up to 15 m LOA. International craft are by far the major users of this marina with 200 yachts and 10 large cabin cruisers each year from Australia, New Zealand, United Kingdom and the US. There are 10 large cabin cruisers and 20 yachts in the marina which are locally owned.

An annual international yacht race finishes at Denarau Marina.

2.5 Labasa / Malau

The Harbour Master for the Marine Department is based in Labasa where there is a government wharf for inter-island freight and passengers and a number of small inshore fishing vessels are dotted along the river bank. The only significant external traffic is a monthly delivery of approximately 400 tonnes of Heavy Fuel Oil to the sugar mill by a pusher tug/barge combination from Suva.

The deepwater major port is at Malau where there are wharves operated by Fiji Sugar Corporation and Fiji Forest Industries. The Sugar Corporation wharf with a depth of 12 metres is utilised for loading of sugar through a conveyor system or molasses through a fixed pipeline. Eight sugar ships of up to 22,000 GRT and four molasses tankers of up to 29,000 GRT load at the wharf each year.

Fiji Forest Industries have around 12 vessels/year loading timber and woodchip for export to India and Japan.

Bulk storage facilities for light petroleum products are maintained by Mobil and Shell with a fixed shore piping system connected to the delivery tanker by a floating hose with 10 to 12 deliveries/year by a small coastal tanker. There has been no demand for any reception facilities for garbage or waste oil.

2.6 Demand for Ship Waste Reception Facilities

The demand for waste reception facilities in the ports which were subject to review is relatively small. Most of the larger vessels retain wastes on board or are capable of on board treatment such as incineration, maceration, compaction and biodegradation in sewage treatment plants. The small inter-island vessels do generate garbage, sewage and oily bilge water, some of which is probably disposed at sea as most harbours have strict regulations regarding discharges from vessels using the port. The marinas and boat harbour do provide reception facilities and there are appropriate penalties for illegal discharges.

In the main ports waste is accepted from domestic vessels with the cost covered by the port dues which are normally based on the size of the vessel and length of stay. In the marinas and boat harbour similar systems operate where the costs of waste reception and disposal are incorporated in the port charges with a different scale of charges for domestic vessels at a permanent berth.

2.6.1 Oily Wastes

There have been a number of requests from vessels for reception of oily wastes ranging in volume from 2-3 m^3 to 20-25 m^3. In Suva in 1999, 52 vessels discharged oily wastes through their international shore connection into tanker trucks. Tanker trucks take the recovered oil to the Shell waste oil tank for subsequent use by the furnaces at Carpenter Steel Mills. There are two basic streams for waste oil with the smaller vessels accumulating oil in their slop tanks from the operation of the oily water separator. The larger vessels using intermediate or heavy fuel oils tend to create more residue from the operation of their purifiers.

Oily waste is not accepted from international vessels in Lautoka unless by special request, which must be cleared with the head office in Suva. Private contractors receive any waste oils in tank trucks with final disposal to the nearby Emperor gold mines.

The marinas and boat harbours do accept waste oils and oily bilges from visiting pleasure craft, mostly into 205 L drums with periodic collection and eventual disposal by contractors.

The petroleum terminal at Vuda Point accepts oily tank cleaning residues from the inter-island tankers and any oily ballast prior to loading the new cargo. The system can also accept any liquid oily wastes from the engine rooms of all visiting tankers. No facilities or procedures exist for the reception of oily wastes in Labasa/Malau.

2.6.2 Garbage

There is only a limited demand for garbage reception facilities from visiting ships in Suva and Lautoka. It was reported that only two merchant vessels requested disposal of quarantine waste in Suva for the whole of 1999. FFVs come into the port for repairs, maintenance, fuel and provisions and there have been several requests for acceptance and disposal of wastes from these vessels.

In the principal ports of Suva and Lautoka the disposal of waste into port waters is prohibited, but personal observations were that some plastics were in the water and on the shoreline. In the case of Suva this could be due to loss from the municipal dump located on the foreshore.

The ports of Suva and Lautoka are clean and have public notices prohibiting discharge of garbage within the port limits. Bins are provided in both ports for domestic garbage, albeit with no separation or recycling in the port. Collection is either by private contractors or the municipal authorities with disposal at the relevant municipal dump.

The marinas at Denarau and Vuda and the small privately owned dock adjacent to Queen's Wharf all provide garbage collection and disposal for users of their facilities.

The petroleum and gas terminals at Vuda Point only accept garbage from the inter-island tankers and this is removed and disposed of at the Lautoka landfill by the terminal operators.

The port of Labasa has some open top drums on the Government Wharf for disposal of garbage from local vessels, with collection and disposal by the municipal authorities. The port of Malau has no facilities for reception of garbage and has received no such request from any of the vessels using the port facilities.

2.6.3 Quarantine Wastes

Any waste from a foreign vessel is treated as quarantine material and disposal must be arranged through the shipping agent for contractor services to:

- Locate the closed top bin at the wharf @ $50.00
- Bin rental @ $55.00/day
- Transport to incinerator @ $60.00
- Incineration @ $25.00/hour
- Suva City Council dumping fee @ $80.00
- Suva City Council Bin Washing Fee @ $10.00

These charges are over and above any port dues or charges. The incinerator has a capacity of 1.5 m^3/hour and the residue is taken to the City

dump in a closed top bin and subsequently buried. Only two contractors are employed for quarantine waste collection.

If the incinerator is out of service no quarantine wastes are accepted. Similar regimes are in effect in both Lautoka and Suva. Quarantine materials cannot be accepted in Labasa.

International yachts arriving in Fiji must make first call at a port of entry (Lautoka, Levuka, Savusavu and Suva) and must declare the following on arrival:

- Foods (tinned or packaged) including meat, sausages, salami, ham, pork, poultry, eggs, fats, milk, butter, cheese.
- Plants (live or dead) including vegetables, fruits, nuts, seeds, bulbs, flowers (fresh or dry), mushroom, straw, bamboo.
- Animals, or animal products, reptiles, fish, birds (or parts thereof) alive or dead, stuffed or mounted. Biological specimens.

Many of these items may be kept provided they are consumed and/or kept aboard the yacht for the duration of the visit. What is allowed is at the discretion of the inspecting Quarantine Officer.

Quarantine inspectors are able to clear yachts arriving at Royal Suva Yacht Club and Denarau Marina at the conclusion of major international yacht races. On these occasions a portable incinerator is used at Denarau Island for destruction of seized materials.

2.6.4 Special, Hazardous or Noxious Wastes

There have been no formal requests for discharge of noxious substances which fall under the jurisdiction of the Occupational Health and Safety Branch of the Labour Department. In the event of a spillage of such substances on the wharf during transfer, the National Fire Authority are trained and equipped to respond.

2.6.5 Sewage

Whilst the city of Suva does have a sewerage system connected to most homes and businesses within the city proper, it conducts only primary treatment before discharging through an ocean outfall at the edge of the reef. There is reported to be considerable mortality of corals in the vicinity of the outfall. The small number of yachts at anchor do discharge untreated sewage but the harbour has relatively good flushing with an almost 2 m tide range. Most of the vessels have either holding tanks or sewage treatment systems. If collection is required a septic tank contractor is available to pump out the tanks, as in the case for the naval vessels or visiting yachts. The Royal Suva Yacht Club provides shore ablution and laundry facilities.

The port of Lautoka itself has no reception facilities for sewage but is well flushed by both tidal streams and terrestrial run-off. The water quality is not pristine due to the discharge of wastewater from the town of Lautoka and the sugar mill. No provision is made for the reception of sewage in the ports of Labasa/Malau.

No sewage reception facilities are provided at the marinas and boat harbours on the western side of Viti Levu nor are septic transfer trucks available for collection. Toilets, showers and laundry facilities are provided ashore at Denarau Marina and Vuda Point Marina.

2.7 Current Terrestrial Waste Management Practices

Suva City Council operates the waste collection system with increasing use of mobile garbage bins. Wastes are compacted following collection. The municipal tip is on the edge of the harbour approximately 3 km from the port. There has been dieback of mangroves in the vicinity of the dump, probably due to leachate. A consultant has recommended an alternative dump site on Government land approximately 7 km from the port. This recommendation has been approved by the relevant authorities and the new site will be operated as a sanitary landfill.

The use of deep burial to dispose of quarantine waste was considered by the Quarantine Department but it is not considered feasible until the new dump site is commissioned.

Lautoka municipal dump is operated as a landfill and is located approximately 3 km from the main port. All of the marine facilities in western Viti Levu use this facility for disposal of garbage with collection and transport by private contractors.

There is no segregation, separation or recycling at any of these municipal dumps. Some of the

island resorts separate glass bottles and cans for recycling.

2.8 Discussion

There appears to be little demand for reception of ship generated garbage from international vessels using Fiji's ports, probably due to the relatively high cost of collection and incineration due to the quarantine requirements. The ports have established systems and procedures for handling ship generated garbage but there are no recycling initiatives at present.

The procedures for reception and treatment of waste oils are well established where available and are undertaken at little or no cost to the ship owner, although access to this service is more difficult on the island of Vanua Levu.

In Suva, other than the odd yacht at anchor, there is little point in providing a pumpout facility for sewage as the volumes are insignificant, particularly as the main sewage discharge is adjacent to the harbour. Special procedures have been established for visiting yachts whereby the Quarantine Inspector boards the vessel, removes any garbage and perishables for incineration with commensurate charges based upon an inspection fee and the quantity of quarantine waste seized.

2.9 Summary and Conclusions

- Fijian ports, especially Suva and Vuda Point, act as major regional shipping centres.
- the port of Suva appears to have management of ship generated wastes under control with an equitable arrangement between ship's agents, port authorities, quarantine department contractors and Suva City.
- only a minimal quantity of waste is discharged from international shipping in Fijian ports, but procedures for the acceptance of waste from domestic shipping appear to be incapable of capturing all of the waste generated;
- the use of deep burial of quarantine wastes should be further addressed once the new dump site is operational as the high costs of incineration can be a disincentive.
- quarantine procedures in place appear to extend far beyond the scope of the Act, which deals with plants and animals, which would include food wastes.
- with better definition of quarantine the segregation of waste streams and the recycling of cans, bottles, plastics and paper products would significantly reduce the volumes of waste for disposal at the landfill; and
- until the nation accedes to MARPOL 73/78 and OPRC 90 new complementary enabling legislation is enacted, the penalties for illegal discharges remain minimal and do not act as a deterrent to vessel masters/owners.

3. RECOMMENDED IMPROVEMENTS

The Fijian ports of Suva, Lautoka and Vuda Point are major regional hubs for most of both Melanesia and Polynesia, and provide connections for smaller regional ports with nations external to the Pacific islands region.

Fiji has a substantial landmass and is generally in a more advanced state of development compared to many of its regional neighbours. Additionally, it is a point of focus for shipping operations for a substantial proportion of the Pacific islands region. Noting these attributes, great potential exists for Fiji to play a pre-eminent role in any coordinated ship waste management programme for the pacific islands region. This role could be realised in three discrete aspects, namely, as a reception centre for:

- waste from ships engaged in cross-Pacific routes (such as cruise ships, and container ships engaged in Pacific trunk services);
- waste from ships engaged in international feeder services within the region (such as small product tankers operating from Vuda Point and container ships servicing states such as Tuvalu, Wallis & Futuna, Tonga, Niue, etc.); and
- backloaded wastes collected from regional neighbours (e.g. waste oil; recyclable materials; and possibly certain hazardous wastes [assuming Fiji was properly equipped to deal with them]).

These reception services for international shipping and regional neighbours would be in addition to reception of waste from the large coastal and inter-island trading fleet operating domestically.

Current procedures are generally in Fijian ports, albeit with limited demand for the disposal of waste from international shipping.

3.1 Legislative Issues and Status of Relevant Conventions

Fiji should become a Party to Annexes I to V of MARPOL 73/78. No specific and comprehensive enabling legislation for these conventions is in place at present, although this should soon be rectified with the proclamation of a comprehensive marine pollution law with associated regulations.

In early 2001 Fiji announced the intention to impose an environment protection levy on all vessels entering the nation's ports. It is intended that funds generated by the levy will be used for the purchase and maintenance of marine pollution control equipment.

3.2 Compliance Monitoring and Enforcement

Fiji is a Party to the Tokyo MOU on Port State Controls. The current status of Fijian inspection efforts is not known to this project, although it may be assumed that this could be improved through enhancing regional cooperation.

3.3 Regional Waste Management Opportunities

Considerable opportunity exists for Fiji to become a regional ship-waste reception and treatment centre. It is recommended that Guam:

- accept garbage (expected to be mainly plastic wastes) and recyclable materials from international ships trading in the Melanesian and Polynesian regions;
- accept waste oil from international ships trading in the Melanesian and Polynesian region, but only when onboard storage facilities are nearing capacity;
- investigate the feasibility of acting as a regional collection centre for recyclable and hazardous wastes, before such material is forwarded to a suitably equipped location external to the Pacific islands region (such as Australia or New Zealand); and
- accept waste oil from neighbouring states, for treatment and recycling/reuse in Fiji.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to
Port Waste Reception: Lautoka, Suva, Labasa/Malau, Vuda Point

Waste Category	WASTE MANAGEMENT RECOMMENDATIONS	
	Domestic Shipping	**International Shipping**
Garbage	Minimal action required. Current practices generally adequate.	Accept garbage from international ships operating in region.
Recyclables	Provide aluminium collection bins in wharf areas.	Provide aluminium collection bins in wharf areas.
Quarantine wastes	n/a	Minimal action required. Current practices generally adequate, although actual effectiveness of disposal measures should be monitored.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Accept hazardous/special wastes from international ships operating in region.
Oily wastes (waste oil)	Review current procedures to assess adequacy of collection services for medium to large domestic vessels; improve services as necessary. Provide waste oil collection facilities (such as drums or pump and tank systems) for small boats.	**Labasa/Malau:** Review acceptability of current practice of non-acceptance. Implement collection service if deemed warranted. **Lautoka**: Review adequacy of current arrangements and improve as deemed necessary. **Other ports:** Nil action required. Current practices generally adequate.
Oily wastes (oily water)	Review current procedures to assess adequacy of collection and acceptability of fate of wastes.	**Labasa/Malau:** Review acceptability of current practice of non-acceptance. Implement collection service if deemed warranted. **Lautoka**: Review adequacy of current arrangements and improve as deemed necessary. **Other ports:** Nil action required. Current practices generally adequate.
Sewage	**Suva:** Current practices generally adequate, although should be continually monitored to ensure effectiveness. **Other ports:** N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.	**Suva:** Current practices generally adequate, although should be continually monitored to ensure effectiveness. **Other ports:** N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.

Recommended Improvements to Port Waste Reception: Fiji marinas and small boat harbours

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Nil action required. Current practices adequate.	Accept garbage from international itinerant yachts (consistent with Quarantine requirements).
Recyclables	Provide aluminium collection bins as a minimum, plus glass and recyclable plastic bins if national recycling schemes in place.	Provide aluminium collection bins as a minimum, plus glass and recyclable plastic bins if national recycling schemes in place.
Quarantine wastes	n/a	Nil action required. Current practices adequate.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.
Oily wastes (waste oil)	Review current procedures to assess adequacy of collection services for medium to large domestic vessels; improve services as necessary, particularly at Denarau Marina. Current practices for small boats considered acceptable.	Nil action required. Current practices adequate.
Oily wastes (oily water)	Review current procedures to assess adequacy of collection services for medium to large domestic vessels; improve services as necessary, particularly at Denarau Marina.	Nil action required. Current practices adequate.
Sewage	Nil action required. Current practices generally adequate.	Nil action required. Current practices generally adequate.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Port Denarau Marina
Nation/Territory: Fiji

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	3000				1.5	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	70	0.0	0.0
Cruise Liners	1500	20000				3.0	0.0	0.0	0.0	0.27	0.00	0	n/a	n/a	70	0.0	0.0
Inter-island Traders						1.5	0.0	0.0	0.0	0.05	0.00	0	5	0	30	0.0	0.0
Inter-island Ferries	100	100	1	n/a	1500	1.5	150.0	225.0	1125.0	0.05	0.05	75	2	3000	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500				1.7	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	50	0.0	0.0
Warships (small)	20	110				1.3	0.0	0.0	0.0	0.01	0.00	0	5	0	50	0.0	0.0
Fishing (oceanic)	18	250				1.8	0.0	0.0	0.0	0.02	0.00	0	10	0	40	0.0	0.0
Fishing (local)		n/a		n/a		0.8	0.0	0.0	0.0	0.005	0.00	0	n/a	n/a	n/a	n/a	n/a
Local workboats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	0.05	0	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	5	8	210	0.5	19.5	4.1	20.5	n/a	0.01	2	n/a	n/a	20	0.5	100.8
Local craft (day trips)	2	n/a	1	n/a	1200	0.5	1.0	1.2	6.0	n/a	0.001	1	n/a	n/a	n/a	n/a	n/a
					Total			**230**	**1151**			**78**		**3000**			**101**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: **Labasa / Malau**
Nation/Territory: **Fiji**

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	25000	9	2	36	1.5	243.0	8.7	43.7	0.18	1.62	58	n/a	n/a	70	2.5	90.7
Cruise Liners	1500	20000				3.0	0.0	0.0	0.0	0.27	0.00	0	n/a	n/a	70	0.0	0.0
Inter-island Traders						1.5	0.0	0.0	0.0	0.05	0.00	0	5	0	30	0.0	0.0
Inter-island Ferries	20	50	1	n/a	100	1.5	30.0	3.0	15.0	0.05	0.05	5	2	200	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500				1.7	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	50	0.0	0.0
Warships (small)	20	110				1.3	0.0	0.0	0.0	0.01	0.00	0	5	0	50	0.0	0.0
Fishing (oceanic)	18	250				1.8	0.0	0.0	0.0	0.02	0.00	0	10	0	40	0.0	0.0
Fishing (local)	3	n/a	1	n/a	8000	0.8	2.4	19.2	96.0	0.005	0.01	40	n/a	n/a	n/a	n/a	n/a
Local workboats	3	n/a	1	n/a	12	0.5	1.5	0.0	0.1	0.01	0.01	0	0.05	1	n/a	n/a	n/a
Yachts (itinerant)	3	n/a				0.5	0.0	0.0	0.0	n/a	0.01	0	n/a	n/a	20	0.0	0.0
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**31**	**155**			**103**		**201**			**91**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Lautoka
Nation/Territory: Fiji

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	12000	9	1	170	1.5	243.0	41.3	206.6	0.18	1.62	275	n/a	n/a	70	1.3	214.2
Cruise Liners	1500	20000	1	1	12	3.0	4500.0	54.0	270.0	0.27	0.27	3	n/a	n/a	70	105.0	1260.0
Inter-island Traders	10	350	3	3	40	1.5	45.0	1.8	9.0	0.05	0.15	6	10	400	30	0.9	36.0
Inter-island Ferries	50	50	1	n/a	1500	1.5	75.0	112.5	562.5	0.05	0.05	75	1	1500	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500				1.7	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	50	0.0	0.0
Warships (small)	20	110	5	5	25	1.3	130.0	3.3	16.3	0.01	0.05	1	5	125	50	5.0	125.0
Fishing (oceanic)	18	250				1.8	0.0	0.0	0.0	0.02	0.00	0	10	0	40	0.0	0.0
Fishing (local)		n/a		n/a		0.8	0.0	0.0	0.0	0.005	0.00	0	n/a	n/a	n/a	n/a	n/a
Local workboats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	0.05	0	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	3	3	15	0.5	9.0	0.1	0.7	n/a	0.01	0	n/a	n/a	20	0.2	2.7
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**213**	**1065**			**361**		**2025**			**1638**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: **Suva**
Nation/Territory: **Fiji**

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	7500	5	1	425	1.5	135.0	57.4	286.9	0.18	0.90	383	n/a	n/a	70	1.3	535.5
Cruise Liners	1500	20000	3	1.5	14	3.0	13500.0	189.0	945.0	0.27	0.81	11	n/a	n/a	70	157.5	2205.0
Inter-island Traders	100	350	2	2	700	1.5	300.0	210.0	1050.0	0.05	0.10	70	5	3500	30	6.0	4200.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	7	3	5	1.7	2380.0	11.9	59.5	0.18	1.26	6	n/a	n/a	50	30.0	150.0
Warships (small)	20	110	30	5	220	1.3	780.0	171.6	858.0	0.01	0.30	66	5	1100	50	5.0	1100.0
Fishing (oceanic)	18	250	30	5	220	1.8	1134.0	249.5	1247.4	0.02	0.60	132	10	2200	40	3.6	792.0
Fishing (local)		n/a		n/a		0.8	0.0	0.0	0.0	0.005	0.00	0	n/a	n/a	n/a	n/a	n/a
Local workboats	4	n/a	3	n/a	750	0.5	6.0	4.5	22.5	0.01	0.03	23	0.05	38	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	5	4	50	0.5	13.5	0.7	3.4	n/a	0.01	1	n/a	n/a	20	0.2	12.0
Local craft (day trips)	2	n/a	1	n/a	0	0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**895**	**4473**			**691**		**6838**			**8995**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Vuda Point
Nation/Territory: Fiji

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1] kg/pers.day (at sea)	Garbage [1] Amount per ship visit (kg)	Garbage [1] Annual mass (t)	Garbage [1] Annual volume (m^3)	Sludge and Waste Oil [1] m^3/day (at sea)	Sludge and Waste Oil [1] Amount per ship visit (m^3)	Sludge and Waste Oil [1] Annual amount (m^3)	Oily Bilge Water [2] Amount per ship visit (m^3)	Oily Bilge Water [2] Annual amount (m^3)	Sewage [3] L/pers.day (in port)	Sewage [3] Amount per ship visit (m^3)	Sewage [3] Annual amount (m^3)
Merchantmen	18	10000	4	2	85	1.5	108.0	9.2	45.9	0.18	0.72	61	n/a	n/a	70	2.5	214.2
Cruise Liners	1500	20000				3.0	0.0	0.0	0.0	0.27	0.00	0	n/a	n/a	70	0.0	0.0
Inter-island Traders						1.5	0.0	0.0	0.0	0.05	0.00	0	5	0	30	0.0	0.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500				1.7	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	50	0.0	0.0
Warships (small)	20	110				1.3	0.0	0.0	0.0	0.01	0.00	0	5	0	50	0.0	0.0
Fishing (oceanic)	18	250				1.8	0.0	0.0	0.0	0.02	0.00	0	10	0	40	0.0	0.0
Fishing (local)		n/a		n/a		0.8	0.0	0.0	0.0	0.005	0.00	0	n/a	n/a	n/a	n/a	n/a
Local workboats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	0.05	0	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	5	5	310	0.5	15.0	4.7	23.3	n/a	0.01	3	n/a	n/a	20	0.3	93.0
Local craft (day trips)	2	n/a	1	n/a	1000	0.5	1.0	1.0	5.0	n/a	0.001	1	n/a	n/a	n/a	n/a	n/a
					Total			**15**	**74**			**65**		**0**			**307**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

FRENCH POLYNESIA

1. PRELIMINARY

1.1 Introduction

French Polynesia is an archipelagic territory incorporating 118 islands and atolls in five separate island groups. The area is administered as a French overseas territory, although it is largely autonomous. The only closely neighbouring nations/territories are the Cook Islands to the west, and Pitcairn Island to the southeast.

Principal natural resources are timber, fish and cobalt, with export revenue derived from these products as well pearls, coconut products and agricultural products.

1.2 Geography

The total land area of the territory is 3,521 km2, with the largest declared EEZ of any of the Pacific islands, covering 5,030,000 km2. Most of French Polynesia is composed of high island groups of volcanic origin, plus a number of low-lying coral atolls. The Society Islands, site of the main settlements of Papeete on Tahiti, and Moorea, are high volcanic islands surrounded by fringing coral reefs.

Papeete is the main port for the territory. More than 60 roadstead port operations service the outlying islands, and passenger services, mainly catering to the tourist trade, operate to 11 other islands from Tahiti.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

France, French Polynesia's territorial administrator, is a signatory to Annexes I, II, III, IV and V of MARPOL 73/78, plus the London Convention. The provisions of the MARPOL Annexes have been given effect in French national law. Although France has not formally advised the IMO of an extension of the provisions of MARPOL 73/78 to French Polynesia, it is inferred that this is nevertheless the case. It is understood that Port State Controls are exercised in the territory by French national authorities. Neither France nor the territory is a Party to the Tokyo MOU.

1.3.2 Local Legislative Issues

French Polynesia has implemented a range of local marine pollution and waste management laws, and waste management contractors are regularly audited. Papeete port regulations prohibit the discharge into harbour waters of garbage, sewage and oily wastes. Environmental impact assessment in French Polynesia is undertaken and conducted to a level consistent with standards applying in metropolitan France.

The territory also has laws addressing plant and animal quarantine.

2. PORT REPORT: PAPEETE

2.1 Description of Port and Associated Shipping/Boating Activities

Papeete is the main port of the eastern Pacific islands region, particularly in terms of cruise liner and container traffic. It is a large, well operated and sophisticated port that supports a wide range of merchant, passenger, fishing, tourist, recreational and naval traffic, and is also a centre of maritime support services. The port has separate commercial wharf areas for international and inter-island merchant ships. The port of Papeete also has, or plans to construct, dedicated international and inter-island passenger terminals, a fishing boat harbour, naval base and yacht marina.

The main commercial wharves are capable of taking up to 20 ships simultaneously. Depth alongside is in the order of 10 to 14 m. Papeete is a major port of call for cruise liners plying Polynesian routes or transiting the Pacific region, with up to 30 calls each year. International merchant traffic into and out of the port mainly comprises container and ro-ro ships (225 per year), oil (24 per year) and LPG (12 per year) tankers, and vehicle ferries. A small container crane is available but most cargo ships needs to be geared. About 40 domestic, inter-island trading vessels are based in the port. Around 6,000 port calls were made by inter-island trading vessels in 1999, down from a peak of about 9,000 in 1997.

Three large inter-island ferries, carrying up to 600 passengers, and four smaller ones operate from Papeete, as do 30 local fishing boats. The local fishing fleet is currently being expanded with about 50 new hulls planned. The French Navy maintains a permanent presence, with four patrol vessels plus various auxiliaries and support boats. Police, Fisheries Customs and pilot boats are also based in the port. About 10 tourist vessels, providing fishing, diving and pleasure cruising services, also operate from the port (as well as several hundred in neighbouring islands).

International merchant traffic into and out of Papeete principally operates between Australia, New Zealand, the United States and France, with voyage duration ranging from as little as four days to as much as 40. Considerable trade is also conducted with neighbouring island states, especially Samoa, Fiji and American Samoa, as well as the French territory of New Caledonia.

Up to 10 major warships, generally carrying around 200 or more crew, visit the port on average every year and usually stay for two to five days. Visits are also made on occasion by US Carrier Battle Groups, with up to 8,000 personnel. Around 10 FFVs visit Papeete each year, usually for five to seven days.

A very large number of itinerant yachts (over 300 per annum) and motor cruisers (over 30) call on Tahiti each year. Activity is concentrated in the dray season between May and September.

A 10 year expansion plan has been developed for Papeete. This will see the expansion of existing facilities and construction of new berthing areas.

2.2 Demand for Ship Waste Reception Facilities

Papeete experiences considerable demand for port waste reception facilities, particularly observing the activities of cruise liners, inter-island traders and inter-island passenger services. The requirement for ship waste reception facilities may be expected to be exacerbated by the long transit times (up to 15 days) for ships proceeding directly between Tahiti and the United States or Australia. The regular visits of cruise liners also present the need to deal with considerable amounts of garbage, delivered in single, large loads.

All forms of waste oil are accepted at Papeete. The largest recorded transfer of oily waste in Papeete was 40 m3 of oily water.

No specific waste management plan exists for the port of Papeete, although effective waste management procedures are effected by the contracting out of these services by Port Autonome, Papeete. Charges are levied for the collection and disposal of vessel waste. These are PF 3,000/m3 (about $US 25) for garbage, PF 40,000/m3 (about $US 325) for oily wastes and PF 36,000/m3 (about $US 300) for sewage.

2.2.1 Garbage

All forms of ship-generated garbage are accepted at Papeete. Reception facilities are well provided and well maintained. Garbage is removed to a transfer station in the port area where it is sorted into categories. Aluminium, recyclable plastics and cardboard are separated from the waste stream and compacted and baled in preparation for export. Green waste is also removed and composted. All other garbage is disposed of in a modern landfill which is designed and operated to European standards.

2.2.2 Quarantine Wastes

French Polynesia enforces barrier controls. Quarantine wastes are kept separate from non-quarantine waste. It is understood that all quarantine waste is disposed in lined, deep landfill at present. It is intended to commission a waste incinerator in the near future, at which time quarantine wastes will be incinerated.

2.2.3 Oily Wastes

Modern, well-maintained reception facilities and services are provided for all types of waste oil and oily wastes. These include fixed wharf discharge points, sullage trucks and waste oil collection tanks, the latter usually within bunded enclosures.

Waste oil is collected and exported to New Zealand or Singapore for treatment and re-use. A small proportion is collected by local people and used for purposes such as dust control.

Oily rags and used oil filters are collected and disposed of separately.

2.2.4 Special, Hazardous or Noxious Wastes

Hazardous liquid and solid wastes are collected separately. These materials are sorted and exported for treatment or disposal.

2.2.5 Sewage

The port of Papeete is considered to be poorly flushed, although water quality is not apparently degraded. The discharge of sewage from vessels within the port precincts is banned.

No fixed holding tank pump-out facilities are provided in the harbour. Nevertheless, sullage trucks are available to provide such services, and toilets, ablutions and laundry facilities are provided ashore in Papeete's marinas.

2.3 Discussion

Ship waste reception in the Port of Papeete is effective and well managed. Both international and local shipping are well catered for, with all wastes being collected, handled and disposed of in an environmentally acceptable manner. This is creditable, especially considering the intensity of port activities.

2.4 Current Terrestrial Waste Management Practices

All terrestrial wastes in the municipality of Papeete are well managed, and have greatly benefited from the recent commissioning of a waste transfer station and sanitary landfill. Ship-sourced wastes are, in fact, incorporated within the municipal and commercial garbage and oily waste streams.

Hospital wastes are presently understood to be destroyed by incineration, and it is planned to commission an incinerator in 2001.

Sewage disposal measures in Papeete do not present are considered to be environmentally sustainable.

2.5 Summary and Conclusions

French Polynesia possesses a sophisticated and sound technical and economic base. Through France, its territorial administrator, Annexes I to V inclusive of MARPOL 73/78 apply within French Polynesia, and it is believed that there is an active regime of ship inspections.

Wastes are well managed in the territory, although it is intended to improve procedures for the destruction of quarantine materials. Tahiti is self-sufficient in waste management, with the exception of the need to export oily and hazardous wastes and recyclable materials for treatment. The current demand for the reception of ship wastes is considerable and well-catered for.

In conclusion:

- ship waste reception facilities and procedures at Papeete are effective and appear to be sufficient for the current level of demand, including both domestic and international shipping;
- current quarantine waste procedures are adequate;
- effective means for the separate collection, handling and disposal of hazardous wastes are in operation;
- waste oil and oily wastes are effectively collected and treated; and
- the current management of sewage from vessels in Papeete ensures that this waste stream does not present as either a waste management or water quality problem.

3. RECOMMENDED IMPROVEMENTS

French Polynesia experiences significant demand for the reception of ship-generated wastes, both domestic and international. Current procedures are considered adequate for the management of all components of the ship-generated waste stream.

3.1 Legislative Issues and Status of Relevant Conventions

France should formally advise the IMO of the extension to French Polynesia of French accession to relevant IMO treaties.

3.2 Compliance Monitoring and Enforcement

It is understood that effective Port State Controls are exercised in the territory by French national authorities. Nevertheless, regional cooperation in the application of Port State Controls should be enhanced.

3.3 Regional Waste Management Opportunities

Nil specific recommendations.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Papeete

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Nil action required. Current practices adequate.	Nil action required. Current practices adequate.
Recyclables	Nil action required. Current practices adequate.	Nil action required. Current practices adequate.
Quarantine wastes	n/a	Nil action required. Current practices adequate.
Hazardous/special wastes	Nil action required. Current practices adequate.	Nil action required. Current practices adequate.
Oily wastes (waste oil)	Nil action required. Current practices adequate.	Nil action required. Current practices adequate.
Oily wastes (oily water)	Nil action required. Current practices adequate.	Nil action required. Current practices adequate.
Sewage	Nil action required. Current practices adequate.	Assess requirement for provision of holding tank pump-out facilities (especially for itinerant yachts).

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: **Papeete**
Nation/Territory: **French Polynesia**

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	14	5000	10	1.5	320	1.5	210.0	67.2	336.0	0.18	1.80	576	n/a	n/a	70	1.5	470.4
Cruise Liners	1800	20000	8	1	25	3.0	43200.0	1080.0	5400.0	0.27	2.16	54	n/a	n/a	70	126.0	3150.0
Inter-island Traders	10	1000	6	2	4000	1.5	90.0	360.0	1800.0	0.05	0.30	1200	5	20000	30	0.6	2400.0
I/island Ferries (large)	600	1500	10	n/a	110	1.5	9000.0	990.0	4950.0	0.05	0.50	55	10	1100	n/a	n/a	n/a
I/island Ferries (small)	100	50	1	1	2000	1.5	150.0	300.0	1500.0	1.05	1.05	2100	2	4000	n/a	n/a	n/a
Tourist Charter Boats	10	n/a	1	n/a	2500	0.5	5.0	12.5	62.5	0.01	0.01	25	n/a	n/a	n/a	n/a	n/a
Warships (large)	14	2500	5	20	30	1.7	119.0	3.6	17.9	0.18	0.90	27	n/a	n/a	50	14.0	420.0
Warships (small)	30	150	20	20	90	1.3	780.0	70.2	351.0	0.05	1.00	90	5	450	50	30.0	2700.0
Fishing (oceanic)	18	350	30	6	10	1.8	1166.4	11.7	58.3	0.02	0.60	6	10	100	40	4.3	43.2
Fishing (local)	5	n/a	5	n/a	1500	0.8	20.0	30.0	150.0	0.005	0.03	38	n/a	n/a	n/a	n/a	n/a
Local workboats	4	n/a	1	n/a	1100	0.5	2.0	2.2	11.0	0.01	0.01	11	0.05	55	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	10	5	325	0.5	22.5	7.3	36.6	n/a	0.01	3	n/a	n/a	20	0.3	97.5
Local craft (day trips)	2	n/a	1	n/a	1400	0.5	1.0	1.4	7.0	n/a	0.001	1	n/a	n/a	n/a	n/a	n/a
				Total				**2936**	**14680**			**4186**		**25705**			**9281**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

FEDERATED STATES OF MICRONESIA

1. PRELIMINARY

1.1 Introduction

The Federated States of Micronesia (FSM) is the largest and most diverse group of the greater Micronesian region. The nation is a confederation of four sovereign States. In geographic sequence from west to east, these are Yap, Chuuk, Pohnpei and Kosrae. All but Kosrae state consist of more than one island. Each State has considerable autonomy within the federation.

Agriculture and tuna fisheries (international and domestic) are the main commercial activities.

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Agriculture and tuna fisheries (international and domestic) are the main commercial activities.

1.2 Geography

The FSM comprises 607 islands with a total landmass of 702 km^2, and a declared EEZ covering over 1.6 million km^2. The FSM's nearest neighbours are New Guinea, Solomon Islands and Nauru to the south, Palau to the west, Guam and the Northern Marianas to the north and the Marshall Islands in the east.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

The FSM is not a member of the IMO nor a signatory to any of that body's marine environment protection treaties. Although not a party to MARPOL 73/78, the provisions of Annexes I to V have been given effect in the FSM national *Environmental Act*. There are a series of codes within this Act addressing specific issues, including marine pollution.

Each state within the FSM is currently developing a Marine Resource Bill, which includes the national environmental regulations and additional specific state regulations. These regulations are currently undergoing review with the intention of clarifying any gaps or inconsistencies with MARPOL 73/78 requirements, plus those proposed in the generic SPREP marine pollution bill.

The nation is not a signatory to the London Convention, although advice from state EPA officials indicates that the provisions of the Convention are observed and are reflected in the national *Environmental Act.*

The government of the FSM is a signatory to UNCLOS III, and the SPREP Convention and its subordinate Protocols.

1.3.2 Local Legislative Issues

Laws and regulations to manage and protect the environment have been established at both the national and state levels. The functions of the Environmental Protection Authority (EPA) have been essentially transferred to the state governments since 1991. Therefore, the majority of environmental management, including marine pollution, is the responsibility of the states and rests with the government agencies of the EPA and Marine Resource Divisions. Individual state marine pollution regulations are in varying stages of maturation. In all cases these regulations require regular review as new issues arise. These regulations incorporate various offences related to the discharge of sewage, garbage and similar materials into the port waters.

2. PORT REPORTS: FSM

This report has been separated into the four sections, each representing one of the four individual states of the FSM.

2.1 Kosrae State

2.1.1 Description of Port and Associated Shipping/Boating Activities

Kosrae has one main commercial dock (Okat Port), which is located on the northern end of the island and used by all commercial vessels. A smaller dock located in Lelu Harbour (eastern side of the island), has minimal use and is only frequented by FSM inter-island cargo and passenger vessels, plus a small number of international yachts. There are also three small fisheries docks located in each harbour that are used by local fishing boats and private craft. These small floating docks are designed to allow access to small (less than 10 m) outboard powered boats. The two larger docks are owned and operated by the State government through the Department of Public Works. The three smaller fishing docks and associated complexes are owned by the State Government, but managed by private companies.

The commercial facility at Okat port is a single concrete pier, with total length of 100 m and a depth alongside of 10 m. The port can accommodate one ship at any one time, however several purse-seine fishing vessels can use the port simultaneously. Anchorages for up to three vessels with a total vessel length of less than 56 m are available within the reef. The anchorage site is less than half a kilometre from the dock. All larger vessels are required to stand-off outside the reef (where no anchorage is available) while awaiting access to the cargo berth. All vessels come alongside the wharf. The wharf does not possess any cargo-handling gear.

The smaller dock in Lelu is a 40 m concrete wharf. This dock is too small for all the international merchant traffic and is used primarily for FSM domestic passenger and cargo vessels. These vessels are based in Pohnpei and visit Kosrae less than six times a year. Anchorage sites for large vessels are not available in this harbour. The harbour is used by the majority of international yachts visiting Kosrae.

International traffic into and out of Kosrae, and the FSM in general, is predominantly containerised cargo, with some vehicle carriers and minor amounts of break-bulk items, principally construction materials. The usual cargo-run into and out of the nation originates from the US west coast, Guam or Australia. All these vessels call into other Pacific island ports. The typical route for trips originating in the US is the Marshall Islands, Kosrae, Pohnpei, Chuuk and then Guam returning directly to the US. Typical sailing time for container ships into and out of FSM ports is two days to/from the next/previous port. International container ships servicing the FSM are usually of the order of 7,000 tonnes, up to 15 years of age and carry crews in the order of 15 to 22. An average of 31 such ships call in Kosrae annually, with port stays typically of less than one day, although sometimes longer due to slow container-handling rates.

All bulk petroleum products arrive on a six week cycle from Brisbane in tankers of approximately 1,600 GRT. Tankers discharge whilst alongside the wharf. All LPG is brought into the island in small cylinders carried on the container vessels.

International cruise ships are not reported to have visited visit Kosrae during the past three years. Two to three visits a year are made by the FSM national patrol vessels based in Pohnpei.

Both longline and purse-seine fishing vessels and ‘motherships’ have used Kosrae port over the past decade. The long-line fleet which was based in Kosrae has recently moved and currently few, if any long-line vessels use this port. An average of 30 purse-seine vessels a year use the port with a maximum stay of about five days. The transfer of fish to the ‘mothership’ occurs either at the dock or whilst at anchor within the lagoon. The purse-seine vessels are on average 1,000 tons and have a crew of 24 to 28. The long-line vessels are considerably smaller and are usually about 70 tons with a crew of six to eight. The purse-seine ‘motherships’ are about 4,000 tons and have a crew of 18. FFVs in FSM waters are permitted to use any of the ports within the country. Use of the ports is dependent on the location of the fish stocks at any given time; therefore, patterns of use can vary considerably.

About 15 itinerant yachts call into Kosrae annually, with most activity during the winter months between April and October. The majority of yachts anchor within Lelu harbour

and use the small dock which is located in the centre of the main village.

A private slipway is located near the Okat commercial dock, capable of slipping vessels up to 1,000 tons. This is the only commercial slipway within the FSM and is used by the international and domestic fishing fleets as well as the national and state government vessels. The Kosrae state government has a marine management plan for this facility and environmental monitoring program is ongoing.

There are no planned increases to the capacity of the port. However, the tuna long-line fishing fleet may well resume use of the port. Local authorities have developed an EMP for Okat harbour.

2.1.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Kosrae is relatively small. Waste is not accepted from the large commercial vessels unless specifically requested (and this did not happen in 2000) and the periods spent at sea before these vessels arrive are minimal. The infrequent visits of domestic passenger and cargo vessels generate little waste demand, however all waste is removed from these vessels when in port. The biggest potential demand arises from the regular operations of the international and domestic tuna fishing fleets. Purse-seine vessels and motherships are fitted with oil separators and in some cases incinerators, so that their demand for waste reception facilities is minimal. Long-line vessels are unlikely to be so equipped, especially boats originating from Taiwan and China.

Visiting yachts and resident watercraft generate inconsequential quantities of garbage and oily wastes.

A waste management plan exists for the port and the island of Kosrae. This plan was undergoing review at the time of the PACPOL SW1 field survey. A new programme has just been developed that provides 205 L drums for storage of all waste oil which is then collected and exported off the island to Nauru for recycling and to be burnt in the furnaces of the mines. The waste oil is delivered to Nauru on tankers.

Distinct collection fees are charged to all vessels that require waste disposal at the commercial port.

2.1.2.1 Oily Wastes

Oily wastes are not accepted from international vessels unless requested and only under special circumstances. Domestic vessels can discharge waste oil to shore whilst at the dock. There are no installed facilities to accept oily waste from vessels, so all waste oil is hand carried from the vessels to be transferred to 205 L drums. As mentioned, waste oil on Kosrae is stored and periodically sent to Nauru for recycling and disposal.

It is reported that only a few hundred litres of waste oil are collected annually through the port. No facilities exist for the collection, treatment and disposal of oily water wastes, such as bilge water. Vessels are prohibited from pumping bilges, whilst at the port, and within the lagoon and harbours.

2.1.2.2 Garbage

Steel drums are currently used for waste receptacles at the commercial port of Okat. All international vessels must pass a FSM quarantine inspection and any quarantine items are incinerated at the dock. All other waste from international vessels is required to be retained, as they are not accepted by the port. Waste is only accepted from these vessels under certain circumstances and fees are charged.

Waste from domestic vessels, including the tuna fishing fleets, can be off loaded if requested. A fee is imposed and the majority of this waste is incinerated at the dock.

The three local fishing docks accept waste and bins are provided. The waste reception facilities and their maintenance and cleaning are the responsibility of private contractors. All waste is removed and taken to the local landfill.

Waste reception facilities are not provided at the smaller dock in Lelu, however it is believed that if the dock is used, 205 L drums are provided for the period vessels are alongside. The fate of waste at this dock is the same as the Okat harbour dock.

The port operators indicated that better waste reception bins (larger containers with lids) and dedicated vehicles to remove the waste are needed to prevent waste, especially garbage, from being inadvertently dumped into the marine environment.

There is no separation of wastes nor any recycling (except waste oil) from the vessels in Kosrae.

2.1.2.3 Quarantine Wastes

All vessels entering the ports of Kosrae are subject to quarantine inspections by FSM Quarantine officers. A fee is charged to inspect all vessels and additional fees are levied if goods are confiscated. All seized goods are incinerated at the dock. Quarantine goods may otherwise be sealed and left on board the vessel till the vessel departs.

2.1.2.4 Special, Hazardous or Noxious Wastes

No procedures were in evidence for the separate collection and management of hazardous or noxious wastes and it is understood that the demand for such services from marine sources is relatively minor.

2.1.2.5 Sewage

The discharge of sewage and greywater from all vessels whilst in port is prohibited. However, concerns have been raised in the past regarding the dumping of sewage into the ports at night by the tuna long-line fishing fleet when visiting Kosrae. The majority of these vessels do not have holding tanks.

Shore ablution facilities for vessels are not furnished at the commercial wharf nor are there any services available to remove sewage from vessels there. Toilet facilities are provided at the small fishing docks.

Water quality at the docks in Kosrae is acceptable and there is no concern at present for any problems associated with port activities. The slipway close to the Okat port may be adversely affecting water quality, however this is currently monitored and steps have been implemented to prevent water quality deterioration. The contribution of vessel-sourced sewage to any harbour water quality problems is considered relatively minor.

2.1.3 Discussion

Waste reception services at the commercial ports of Kosrae appear to be adequate for the current usage, although improved garbage reception receptacles should be provided. The port as a rule does not accept waste from international vessels and discourages the acceptance of waste from domestic vessels and the fishing fleet. However, the fate of wastes from the port, except oil, needs to be reviewed.

The new waste oil collection service is an effective means of ensuring proper management and disposal of this material. Its effectiveness and environmental acceptability would be enhanced by raising awareness of its availability.

The demand for reception of all categories of ship waste, as well as that specifically associated with fishing, can be expected to increase if and when the tuna long-line fishing fleet returns to Kosrae.

2.1.4 Current Terrestrial Waste Management Practices

Waste management in Kosrae is considered one of the most critical issues confronting the state. This issue is being addressed and new state regulations and management plans are being formulated. Waste oil collection and subsequent removal to Nauru is a positive development. All categories of waste, including solid waste, putrescibles and sewage are problematic in Kosrae. The majority of landfill areas are located in low-lying swamp areas, which provide little natural barrier to prevent or attenuate the leaching of pollutants into the sea and fresh groundwater lenses.

Individual households are responsible for waste removal and many households have garbage “pits” located close to their residences. Putrescible waste is usually fed to pigs and chickens or used for mulch on crops. Each village municipality has at least one community landfill site, usually poorly operated and habitually displaying persistent environmental problems.

The main village municipality in Kosrae has recently provided all households with one or more 205 L drums to be used for waste storage. The municipality collects this garbage and disposes the waste at the municipal landfill. The drums have only recently been provided to the households and it is unknown if the programme is meeting its expected outcomes.

Rubbish disposal is not generally recognised as a problem by the population, and inappropriate dumping of wastes and littering is endemic. This however, is changing.

Kosrae has had a successful recycling program for aluminum cans for over a decade. The cans are crushed into billets and exported for recycling; it is estimated that about two TEU's are exported annually.

A state initiative is to reduce the amount of waste generated, and to better manage that which is disposed to landfill. Such ambitions are hampered by technical, economic and cultural factors. The operation of a landfill employing modern techniques is constrained by the lack of suitable land, the close proximity of any site to groundwater and the ocean, plus the extremely limited supply of suitable material for daily covering. It is further complicated by the lack of government owned land.

Sea dumping is under active consideration by the state government as a disposal option for bulky, inert items. The lack of suitable local vessels to undertake this task is an obstacle.

Quarantine and hospital wastes are currently incinerated. However, some items from these sources may be burnt in open pits when incinerators are not operating or there is too much material to be burnt.

Sewerage in Kosrae is either septic tanks or village-based systems that collect household sewage and discharge it at sea without any treatment. Septic systems must now also be used for all household pigpens. This requirement has considerably reduced degradation of both fresh and marine waters.

There are no facilities in Kosrae to handle hazardous wastes. It is intended to develop a dedicated storage area for the collection and containment of such materials prior to development of a permanent disposal strategy; this may involve export.

2.2 Chuuk State

2.2.1 Description of Port and Associated Shipping/Boating Activities

Chuuk state has one commercial wharf located on the capital island of Weno. All international and domestic vessels use this dock. There are several small additional wharves located around this island that are only used by the local community to provide secure berths for their small private vessels. All shipping and boating facilities are owned and operated by the State government through the Department of Transport and Public Works.

The commercial port has one main berth for all merchant ships and two smaller wharves that accommodate domestic passenger and island ferries and the commercial tuna fleet. These smaller docks are extensions of the main berth and form a 'U' shape. The main berth has an approximate total length of 150 m and a depth alongside of 9 m. The port can accommodate two cargo ships at any one time, however several purse-seine fishing vessels can use the port simultaneously. Numerous anchorages are available within the lagoon immediately off from the wharf and all vessels are required to lay-off at anchor while awaiting access to the cargo berths. The wharf does not possess any cargo-handling gear, nor does the port have any pilot vessels or workboats. In addition, there are several live aboard dive boats that are based within the lagoon. These vessels have their own mooring sites within the lagoon and use the wharf for refuelling and re-provisioning.

International traffic into and out of Chuuk is predominantly containerised cargo, with some minor amounts of break-bulk items. Chuuk is on the same general routes and services as is Kosrae. An average of 24 container/dry cargo ships call into Chuuk annually, with port stays typically of less than one day, although sometimes longer due to slow container-handling rates.

All bulk petroleum products are sourced from Guam on a monthly cycle and are carried in tankers of approximately 4,000 GRT. Product is

transferred whilst alongside the wharf. All LPG is brought into the island in small cylinders on the container vessels.

International cruise ships have not been reported to visit Chuuk in the past two years. FSM national patrol vessels visit two to three times annually. These are routine patrols and the vessels stay at port no more than three days. Once or twice a year a US Coast Guard cutter arrives in port, usually for a three day stay.

International research vessels visit the port on an average of once a year. The average size of these vessels is 5,000 tons and the duration of the stay is up to five days.

Both long-line and purse-seine fishing vessels use Chuuk's port and lagoon for their operations. Some purse-seine vessels unload catches to their larger "motherships" while alongside, but most transfer occurs whilst at anchor within the lagoon. An average of 20 purse-seiners use the port each month, with a maximum stay of five days.

The larger 'motherships' rarely come alongside. They anchor within the lagoon and remain until they have obtained their quota of fish. These vessels can remain in the lagoon for extended periods of time, but normally between six to eight weeks. The size of Chuuk's lagoon and its central location within the EEZ of the FSM provides a most suitable location for these activities.

Long-line tuna fishing vessels use the fishing section of the port to off load catches, crew changes, bunkering and provisioning. An average of 15 vessels per month use the port and have a maximum stay of five days.

About 10 itinerant yachts call into Chuuk each year mostly during the summer months. The majority of yachts anchor within the lagoon and rarely use the port facilities except for refuelling.

Chuuk Lagoon has small boat repair yard adjacent to the wharf. Only small vessels can be accommodated. All larger vessels use slipways further a field.

The Port Authority indicated that they have requested an expansion of the main berth. The expansion would increase the total length by an additional 100 m but is yet to be confirmed.

2.2.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Chuuk is relatively small. Waste is not accepted from the large merchant vessels unless specifically requested, which did not occur in 2000. The domestic inter-island passenger and cargo vessels are the main regular source of ship waste, albeit in small quantities. All waste is removed from these vessels when in port.

The largest potential demand arises from the regular operations of the international and domestic purse-seine and long-line, including 'motherships' tuna fishing fleet. The majority of the purse-seine vessels and motherships are fitted with oil water separators, holding tanks and in some cases incinerators and their demand for waste reception facilities is therefore minimal. However, cases have been reported to the Chuuk EPA over several years of these vessels discharging waste directly into the lagoon. The material reported to have been discharged has ranged from domestic garbage to oil and sewage.

Visiting yachts and resident watercraft generate inconsequential quantities of garbage and oily wastes. There are over 500 small watercraft within Chuuk with the majority using small (less than 70 HP) outboard engines.

There is no waste management plan specifically for the port of Chuuk. A management plan for the environment, which includes all marine resources and port activities, is currently under development. All government agencies consulted indicated that assistance with the development of this management plan is required, especially recommendations on how to handle and deal with waste oil.

Fees are charged to all vessels requiring waste disposal at the commercial port, in addition to standard fees for wharfage and other port activities.

2.2.2.1 Oily Wastes

Oily wastes are not accepted from international vessels unless requested and then only under extenuating circumstances. Domestic vessels can remove waste oil whilst at the port. There are no facilities to accept waste oil from vessels and all waste oil is therefore carried by hand

from vessels in packaged form. The fate of the oil once it is removed from the vessels is unclear. A percentage of waste oil is stored into 205 L drums at the local power company and recycled. However anecdotal information indicates that oil has in the past been dumped into a pit and periodically burnt. There is also a percentage of oil that is suspected to be dumped directly onto the ground.

There is no island-wide programme at present to capture waste oil irrespective of its origin and is recycled. A small amount, several 205 L drums a year, is recycled by the power company or burnt by a local dive charter vessel powered by a steam engine. The supply of waste oil, hoever, greatly exceeds the demand from this vessel. It is estimated that only a few hundred litres of waste oil are collected annually through the port.

No facilities exist for the collection, treatment and disposal of oily water wastes, such as bilge water. All vessels are prohibited from pumping bilges whilst at the port and within the lagoon.

2.2.2.2 Garbage

The commercial port uses 205 L steel drums at the smaller domestic passenger and fisheries docks. The regular removal of waste from these drums appears to be lacking as at the time of the inspection there was considerable garbage strewn around the wharf and the majority of the drums were full with additional garbage piled up around the bases of the bins. There is an obvious need for better bins (larger containers with lids) and a programme to remove empty them and so prevent waste, especially garbage, from entering the marine environment.

Waste is not accepted as general garbage from international vessels. Waste from domestic vessels and the tuna fishing fleet, is accepted. The private fishing companies tend to remove all waste material from their own vessels. A fee is charged by the Port Authority to remove waste and all material is taken to the local landfill site.

There is neither separation of wastes nor any recycling from the vessels in Chuuk.

2.2.2.3 Quarantine Wastes

All international vessels entering the port of Chuuk are subject to quarantine inspections from FSM Quarantine officers. A fee is charged to inspect all vessels and additional fees are charged if goods are seized. All confiscated goods are incinerated at the airport (about 1 km from the port). Alternatively, quarantine goods may be sealed and left on board the vessel till the vessel departs.

2.2.2.4 Special, Hazardous or Noxious Wastes

No procedures were in evidence for the separate collection and management of hazardous or noxious wastes from shipping.

2.2.2.5 Sewage

The discharge of sewage and greywater from all vessels whilst in port is prohibited. However, concerns have been raised in the past regarding the dumping of sewage into the lagoon at night by vessels in the tuna fishing fleet.

Shore ablution facilities are not provided at the commercial wharf nor are there any services available to remove sewage from vessels at the commercial wharf. Toilet facilities are provided at the small fishing docks.

Water quality in the vicinity of the docks in Chuuk is deemed acceptable. Water in the port is flushed daily and any contaminants would be rapidly removed. Any contribution from vessel sourced sewage is considered relatively minor. However, it is clear that activities around the shoreline of this island have contributed to the deterioration of water quality. There are no present management plans specifically addressing water quality issues around the port.

2.2.3 Discussion

Waste reception services at the commercial ports of Chuuk are all but non-existent, however the demand for waste reception is small. Better garbage receptacles and collection services need to be provided. Oil reception facilities and procedures also need to be commissioned, as well as an oil waste management plan for the port. It may be possible to transfer waste oil in drums to Kosrae to be trans-shipped to Nauru.

2.2.4 Current Terrestrial Waste Management Practices

Terrestrial waste management procedures are inadequate in the FSM generally and particularly so in Chuuk. The island is confronted by all of the same waste management problems as described for Kosrae, but is less well-equipped to deal with them.

There is no public collection of household garbage neither on the main island of Weno nor on the various other islands within the state. Individual households are responsible for their waste removal and many households have garbage "pits" located close to their residences. Each village municipality has at least one community landfill site. These are habitually poorly operated. Current management procedures for sewage and hazardous wastes is as described for Kosrae.

A state initiative is to reduce the amount of waste generated, and to better manage that which is disposed to landfill. Such ambitions are hampered by technical, economic and cultural factors. The operation of a landfill employing modern techniques is constrained by the usual factors prevailing in low-lying coral atolls.

2.3 Pohnpei State

2.3.1 Description of Port and Associated Shipping/Boating Activities

Pohnpei state has one commercial wharf located at the northern end of the main island adjacent to the state capital of Kolonia. All international and domestic merchant vessels use this dock. There are several other mooring sites and private docks located on this island. The commercial dock is owned by the State government and managed by the Ports Authority, however the operations of the port are contracted out to a private company, Federated Shipping Company (FSC).

The commercial port comprises a single 'L' shaped concrete dock, with the main cargo berth accommodating all merchant ships, domestic passenger and inter-island ferries and the commercial tuna (long-line and purse-seine) fishing fleet. The three FSM national patrol boats berth alongside an arm of the wharf. The length of the main berth is approximately 130 m with a water depth of 9 m, while the small berth the patrol vessels use is approximately 30 m long and 7 m deep. Berthing spots are at a premium when the major part of the tuna fishing fleet is in port.

The port can accommodate two cargo ships simultaneously or several purse-seine fishing vessels. The wharf does not possess any cargo-handling gear, nor does the port have any tugs or workboats. Vessels are required to lay-off at anchor within the lagoon while awaiting access to the berths. The anchorage site, approximately 2 km from the wharf, can accommodate five vessels at any one time. It is at this site that the tuna 'motherships' anchor.

Island trading/passenger vessels use the dock and spend considerable periods alongside. These vessels are owned by Pohnpei state and the national governments. A 7 m outboard driven pilot vessel is available as required. A marine emergency response unit has just been commissioned and is located adjacent to the water close to the main dock. There are no live aboard tourist vessels based in Pohnpei.

International traffic into and out of Pohnpei is predominantly containerised cargo, with some minor amounts of break-bulk. An average of 36 such ships called into Pohnpei annually, with port stays typically of less than one day, although sometimes longer due.

All bulk petroleum products arrive from Guam on a twice-monthly cycle. Tankers discharge their cargoes while alongside. LPG is brought onto the island on container ships in 5 ton cylinders.

International cruise ships visit Pohnpei approximately once a year, with the majority of the vessel arriving from other Pacific countries. These vessels vary in size, crew and passenger numbers.

The FSM national patrol boat fleet is based at Pohnpei. There are three vessels of 110 ton displacement with crews of 18. These vessels patrol the EEZ of the FSM and visit the other ports of the FSM during these cruises. US Coast Guard cutters also visit several times annually. Additional courtesy calls are infrequently made by small Australian warships, and one visit per

year is typically made by a Japanese research vessel.

Both long-line and purse-seine fishing vessels use the port and lagoon of Pohnpei. Purse-seine vessels transfer their catches to 'motherships' either when alongside or in some instances while at anchor within the lagoon. An average of 30 purse-seine vessels use the port each year, with a normal stay of five days. The 'motherships' usually remain in the lagoon for six to eight weeks, but sometimes longer. An average of 25 long-line vessels per month use Pohnpei, also for about five days each time. There are four local long-line tuna fishing companies that are based in the port, operating a total of about 30 boats.

About 10 itinerant yachts call into Pohnpei each year mostly during the summer months. The majority of yachts anchor within the lagoon and rarely use the wharf.

There are no plans to expand or change the commercial port. However, a new fisheries dock, to be used solely for the tuna long-line fishing industry, is currently under development. Stage one of a three-stage development project has commenced. Once completed, the dock will be approximately 100 m long and provide all shore services required by the tuna fishing fleet. Financial aid for this project is being provided by the Japanese government.

2.3.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Pohnpei is relatively small, however the demand is the highest of any the FSM ports and will most likely increase once the new fisheries facility is complete. Waste is not accepted from overseas merchant vessels unless specifically requested and this rarely happens. Domestic inter-island passenger and cargo vessels generate some demand, but the largest potential demand arises from the regular operations of the international and domestic tuna fishing fleet and their 'motherships'.

As is believed to occur in Chuuk, cases have been reported over the past several years of fishing vessels (especially long-liners) discharging garbage, sewage and oily wastes directly into the lagoon. The new fisheries wharf will increase basic amenities for these vessels, which should reduce the incidence of direct discharge of garbage and sewage.

Visiting yachts and resident watercraft generate inconsequential quantities of garbage and oily wastes. There are 250 small watercraft within Pohnpei, the majority using small outboard engines.

A waste management plan exists for the port and the island of Pohnpei. The state is finalising a marine resource management plan that incorporates marine pollution and all other water related activities. The Ports Authority and the EPA are the authorities responsible for management and regulation of ship waste.

Specific fees for collection and disposal are charged to all vessels requiring waste disposal at the commercial port.

2.3.2.1 Oily Wastes

Oily wastes are not accepted from international vessels unless requested and usually only in abnormal circumstances. Domestic vessels can remove waste oil whilst at the dock. Waste oil is transferred to shore in packaged form. It is taken to the local landfill and stored in 205 L drums. Vessels can remove the waste oil themselves or contract a private company to undertake these tasks.

There is an island-wide programme for the collection and storage of waste oil irrespective of origin. The waste oil is stockpiled in drums at the landfill. However there is currently no treatment or recycling of these oily wastes. It is estimated that at least eight 205 L drums of waste oil are collected annually through the docks.

No facilities exist for the collection, treatment and disposal of oily water wastes, such as bilge water. Vessels are prohibited from pumping bilges, while at the port and within the lagoon.

2.3.2.2 Garbage

The provision of garbage receptacles and responsibility for emptying them is contracted by the state government to a private company. Steel drums and larger industrial size bins are currently used for garbage reception at the commercial port. The regular removal of waste

from these drums appears to be satisfactory and the port area presents as clean. A fee is charged by the private company to remove waste and all material is taken to the local landfill, located adjacent to the port. Waste oil, batteries and a percentage of aluminium cans are separated and stored awaiting their ultimate fate, which may be recycling.

Waste from domestic vessels, including the tuna fishing fleet, is accepted by the port. The private fishing companies tend to remove all waste from their vessels.

2.3.2.3 Quarantine Wastes

All vessels entering Pohnpei are subject to quarantine inspections. A fee is charged for inspection with additional fees levied if goods are removed. All confiscated goods are incinerated either at the airport or at the Customs and Quarantine office in Kolonia. Quarantine goods may otherwise be sealed and left on board the vessel till the vessel departs.

2.3.2.4 Special, Hazardous or Noxious Wastes

No procedures were in evidence for the separate collection and management of hazardous or noxious wastes. The private company that operates the landfill is currently investigating possible reception and disposal options.

2.3.2.5 Sewage

The discharge of sewage and greywater from all vessels whilst in port is prohibited. However, concerns have been raised in the past regarding the dumping of sewage into the lagoon at night by the tuna boats.

Shore ablution facilities are provided for vessels at the commercial docks and for a fee, vessels can have sewage waste removed by pumping into a sullage truck. Shore ablutions will be provided at the new fisheries wharf.

Water quality in the wharf area in Pohnpei is marginal and a management plan is needed to safeguard water quality. Improved enforcement of current regulations should help improve the current water pollution situation.

2.3.3 Discussion

Garbage reception services at the commercial port of Pohnpei appear to be adequate for current use. It should be noted that the port as a rule dose not accept waste from international vessels and discourages the acceptance of waste from domestic vessels and the fishing fleet. The fate of the waste from the port needs to be reviewed, in concert with any improved terrestrial waste management practices. A waste oil-recycling plan is required, possibly involving the transfer of this material to Nauru.

The demands for reception of all categories of ship waste, as well as that specifically associated with fishing, can be expected to increase when the new fisheries facility is completed.

2.3.4 Current Terrestrial Waste Management Practices

There is no public collection service for household garbage in Pohnpei. Individual households are responsible for their own waste removal, and many households have garbage “pits” located close to their residences. Each village municipality has at least one community landfill site, almost invariably poorly operated.

The operations of the Pohnpei landfill has recently been privatised. This has occasioned the introduction of new and better services, such as collection and storage of waste oil, batteries and aluminium cans, and has demonstrated environmental benefits for the people of Pohnpei.

Most quarantine and hospital wastes generated in Pohnpei are currently incinerated depending upon the serviceability of the nation’s incinerators. If the incinerator is not operating, then these wastes are disposed to landfill, possibly accompanied by burning in open pits.

Sewage in Pohnpei is disposed either to septic tanks or through village-based systems discharging directly to sea without any treatment. Concerns have been raised regarding the affect this raw sewage is having on the marine environment. Furthermore, septic systems must be used for all household pigpens. This requirement has considerably reduced the degradation of both fresh and marine waters.

There are no facilities in Pohnpei to handle hazardous wastes. It is intended to address this issue as a component of the comprehensive waste management plan currently being developed for the state.

2.4 Yap State

2.4.1 Description of Port and Associated Shipping/Boating Activities

Yap state has two commercial docks; one is used for all cargo and passenger vessels while the tuna fishing fleet uses the second. There are several additional small docks located around this island, mainly used by the local community. All port facilities are owned and operated by the State government through the Department of Transport and Public Works.

The commercial port in Colonia has one main berth which is used by all international merchant ships and domestic passenger and inter-island ferries. The main berth has an approximate length of 100 m and a depth alongside of 10 m. The wharf does not possess any cargo-handling gear. The port can accommodate one cargo vessel at any one time, and ships are required to lay-off at anchor within the lagoon while awaiting access to the cargo berths. The anchorage is approximately 0.5 km from the port and can accommodate up to five vessels at any one time. Tuna 'motherships' use the anchorage to receive fish from purse-seine fishing boats. Three island trading/passenger vessels use the dock, spending considerable periods berthed alongside. These vessels are owned by Yap state. There are no live aboard tourist vessels in Yap.

This dock used by the commercial tuna fishing fleet has an approximate total length of 60 m and a depth alongside of 7 m. The wharf can accommodate one purse-seine fishing vessel or several long-line vessels simultaneously. A small slipway (boats up to 50 tons) is located at the site.

International traffic into and out of Yap is predominantly containerised cargo, with some minor amounts of break-bulk. The typical cargo-run into and out of Yap originates from either Guam (which receives all goods from the US) or Asia. Typical sailing time for container ships into and out of Yap is two days to/from the next/previous port. An average of 24 such ships call into Yap annually, with port stays typically of less than one day, but sometimes longer due to slow container-handling rates.

All bulk petroleum products arrive from Guam on a monthly cycle in small product tankers. The tankers come alongside the main wharf to discharge their liquid cargo to shore. LPG is brought into the island in small cylinders on the container vessels.

International cruise ships visit Yap rarely, with an average of one visit every 18 months. Periodic visits are also made by the FSM national patrol vessels. Yap state has a 30 year old patrol vessel that berths alongside the commercial port. This vessel is 30 m in length and has 13 permanent crew. One or two visits each year are made by US Coast Guard cutters, as well as large ocean research vessels every second year.

All commercial fishing vessels use the fishing dock, rather than the commercial port. An average of six purse - seine vessels visit each month. 'Motherships' also visit Yap but rarely come alongside the wharf. Yap state has experienced a significant decrease in use of the port by long-liners. Anecdotal information suggests that about 20 extra vessels may be using the port in the near future.

A small number of itinerant yachts (10 annually) call into Yap, with most activity during the summer months. Yachts typically anchor in the lagoon and rarely use the wharf, except for refueling and the acquisition of supplies. Over 200 small boats are also present in Yap.

A small commercial slipway is located at the fishing dock. The slipway is used to service the domestic long-line fleet.

Projects for the expansion of both the commercial and fisheries docks have recently been commissioned. The dock expansions will allow greater access to both wharves for merchant ships and fishing vessels. The expansion is expected to increase traffic into Yap, with a resultant increase in waste reception needs.

2.4.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Yap is relatively small. The largest potential demand arises from the regular operations of the international and domestic tuna fishing fleets and their larger 'motherships'. The number of these vessels currently using the port is small, however it is expected to increase in the near future, especially once the port expansion is completed.

The majority of the purse-seine vessels and 'motherships' are fitted with requisite waste treatment devices and the demand for waste reception from these vessels is subsequently minimal. Long-line fishing vessels are generally not so well equipped and hence have a greater requirement for shore waste reception facilities.

A waste management plan exists for the port and the island of Yap. Fees are charged to all vessels requesting waste disposal at the commercial port. These are in addition to standard fees charged for wharfage and other port dues.

2.4.2.1 Oily Wastes

Oily wastes are not accepted from international vessels. Domestic vessels can remove waste oil but only in packaged form. The oil is taken to the local landfill site and stored in 205 L drums to await disposal. It is estimated that several hundred litres of waste oil are collected annually through the docks. This should greatly increase once long-line fleet activity increases.

The state government is considering options for recycling waste oil, including export. Waste oil was previously burnt at intervals in an open pit at the dump site.

No facilities exist for the collection, treatment and disposal of oily water wastes, such as bilge water. Vessels are prohibited from pumping bilges, whilst at the port and within the lagoon.

2.4.2.2 Garbage

Garbage is collected in 205 L drums at both the commercial and fisheries docks. The regular removal of waste from these drums appears to be satisfactory and the port areas are clean. No fee is charged for the removal of garbage from domestic vessels (state owned) at the commercial wharf. Similarly, no fees are charged at the fisheries dock as the private fishing companies collect and remove wastes themselves. All waste is taken to the local landfill about 5 km from the port. There is neither segregation nor any recycling of wastes from vessels in Yap. Waste oil and batteries are separated and stored at the landfill.

2.4.2.3 Quarantine Wastes

All vessels entering the port of Yap are subject to quarantine inspections. A fee is charged to inspect vessels with additional fees for seized goods. All quarantine materials are incinerated at the airport, about 5 km from the port. Quarantine goods may also be sealed and left on board until the vessel departs.

2.4.2.4 Special, Hazardous or Noxious Wastes

No procedures were in evidence for the separate collection and management of hazardous or noxious wastes.

2.4.2.5 Sewage

The discharge of sewage and greywater from all vessels is prohibited in port waters. Concerns have been raised in the past regarding the dumping of sewage into the lagoon at night by the tuna fishing fleet.

No shore ablution facilities are provided at the commercial wharf, nor are there any services available to remove sewage from vessels at this wharf. Toilet facilities are provided ashore at the fisheries dock.

Water quality in the port of Yap is considered acceptable and shipping is not seen as a major concern in this regard. The water in the port is flushed daily and any contaminants would be rapidly removed from the vicinity of the wharves.

2.4.3 Discussion

Waste reception services at the port of Yap appear to be adequate for the current usage for garbage, however better garbage reception devices are required. The port does not as a rule accept waste from international merchant vessels and discourages the transfer to shore of

waste from domestic trading and fishing vessels. The ultimate fate of waste collected from the port needs to be reviewed. A waste oil plan is also required, possibly involving the transfer of waste oil to Kosrae to be on-forwarded to Nauru.

2.4.4 Current Terrestrial Waste Management Practices

Waste management in Yap, in common with the remainder of the FSM, is a critical issue. A waste management program for both marine and terrestrial waste needs to be implemented as a matter of priority for Yap state.

There is no public collection of household garbage either on the main island of Yap nor on the various other islands within the lagoon. Individual households are responsible for their waste removal and many households have garbage "pits" located close to their residences. Each village municipality has at least one community landfill. These are poorly operated and display a suite of environmental problems. There is no recycling of any wastes in Yap and no procedures for proper handling of hazardous wastes, sewage or oily wastes.

2.5 Summary and Conclusions

The FSM is a small nation spread over a vast ocean with limited natural resources and an economy and infrastructure heavily reliant upon overseas technical and financial assistance. The FSM is not a signatory to MARPOL 73/78. Notwithstanding this, the provisions of Annexes I to V of MARPOL 73/78 have been given effect in the FSM national *Environmental Act*. Each state within the FSM is currently developing a marine resource act, which will include the national environmental regulations and additional state specific regulations. The nation is not a signatory to the London Convention, but is a signatory of the SPREP Convention, Dumping Protocol and Pollution Protocol.

Waste management is a major environmental and public health issue for the individual states of the FSM. These issues are particularly important for the state capital islands. The disposal of wastes is hampered by economic and technical constraints, not least of which is the lack of land suitable for landfill sites.

The current demand for the reception of ship wastes is relatively minor, and generally restricted to vessels operating domestically. International shipping into and out of the FSM is almost exclusively involved in inter-Pacific island trading; these ships are capable of retaining wastes for onboard treatment and/or disposal at alternative ports. Domestic vessels, however, have no alternative other than to discharge wastes at the ports or directly at sea.

In conclusion:

- ship waste reception facilities and procedures within the FSM need to be further improved, especially in Chuuk State. Reception facilities for international shipping are acceptable, although minimum facilities for the collection of garbage and oily wastes are required for vessels engaged in domestic trading;
- current quarantine waste procedures are adequate;
- the current waste oil collection service is partially effective in some states and management plans for this waste need to be further developed, especially oily bilge water;
- the prohibition on the discharge of waste from vessels whilst in port needs to be better policed;
- waste management facilities within the FSM are severely taxed by wastes of terrestrial origin, with ship waste contributing only a small proportion; and
- any increase in the number of foreign fishing vessels visiting the FSM ports will generate increased demand for reception of ship waste.

3. RECOMMENDED IMPROVEMENTS

The Federated States of Micronesia (FSM) has marginally adequate national procedures for the management of waste from terrestrial sources. This situation is mainly attributable to the lack of land as well as technical and economic constraints. There is little capacity to accept waste from international shipping; ideally, no waste should normally be accepted from international shipping. Nevertheless, foreign fishing vessels maintain a substantial presence around the islands of the FSM, including significant numbers of 'motherships'. Considering the number of vessels operating

within its waters, there is little alternative other than for the FSM to provide adequate waste reception facilities for these vessels.

3.1 Legislative Issues and Status of Relevant Conventions

The FSM is neither a member of the IMO nor a signatory to any of that body's marine environment protection treaties. Nevertheless, elements of Annexes I to V of MARPOL 73/78 have been given effect in the FSM national law. Additionally, each state within the Federation is currently developing a Marine Resource Bill, which includes the national environmental regulations and additional specific state regulations. It is intended that these regulations will be consistent with MARPOL 73/78 and the SPREP generic marine pollution bill.

3.2 Compliance Monitoring and Enforcement

It is understood that no Port State Controls are currently exercised by the FSM. These should be commenced following accession to MARPOL 73/78, and regional cooperation in the application of Port State Controls should be sought. It is particularly important for the activities of tuna fishing 'motherships' to be checked to ensure compliance with marine discharge requirements while inside FSM littoral waters.

3.3 Regional Waste Management Opportunities

Noting the limited national capability for waste treatment or disposal, the FSM should use all opportunities to link with regional ship-waste management programmes. The FSM should:

- evaluate and improve options for export of recyclable materials accepted from domestic shipping (aluminium and other scrap metals) to other ports in the Pacific islands region or further (possibly the US);
- identify and evaluate options for the export to a suitably equipped nation of hazardous wastes accepted from domestic shipping; and
- transfer waste oil excess to local disposal capacity to Nauru, Guam or the US, if possible, for appropriate treatment.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Weno, Chuuk

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Improve coverage of waste collection receptacles (i.e. to all wharves and jetties, especially those used by small boats) and quality of garbage receptacles (i.e. replace 205 L drums currently used). Improve garbage collection services. Review adequacy of current disposal arrangements.	Nil acceptance, except from itinerant yachts and FFVs. Review adequacy of current reception arrangements for FFVs and support ships.
Recyclables	Provide suitable collection bins for aluminium cans in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from vessels with expanded national recycling scheme.	Provide suitable collection bins for aluminium cans in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from vessels with expanded national recycling scheme.
Quarantine wastes	n/a	Review quarantine waste disposal procedures to ensure all wastes presenting quarantine risk are properly destroyed.
Hazardous/special wastes	Review current procedures to ensure	Nil acceptance from merchant ships.

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
	effective diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Review adequacy of current reception arrangements for FFVs and support ships.
Oily wastes (waste oil)	Improve coverage of waste oil collection drums/tanks at facilities used by domestic shipping. Link ship-generated waste oil procedures to improvements in national measures (e.g. expand the existing schemes for re-use of waste oil. Investigate opportunities to link with scheme for export of waste oil from Kosrae to Nauru).	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic vessels.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs less than 400 GRT.
Sewage	Ensure provision of adequate shore ablution facilities for fishing boat crews.	Ensure provision of adequate shore ablution facilities for fishing boat crews.

Recommended Improvements to Port Waste Reception: Okat, Kosrae

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Improve coverage of waste collection receptacles (i.e. to all wharves and jetties, especially those used by small boats) and quality of garbage receptacles (i.e. replace 205 L drums currently used). Improve garbage collection services. Review adequacy of current disposal arrangements.	Nil acceptance, except from itinerant yachts and FFVs. Review adequacy of current reception arrangements for FFVs and support ships.
Recyclables	Provide suitable collection bins for aluminium cans in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from vessels with expanded national recycling scheme.	Provide suitable collection bins for aluminium cans in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from vessels with expanded national recycling scheme.
Quarantine wastes	n/a	Review quarantine waste disposal procedures to ensure all wastes presenting quarantine risk are properly destroyed.
Hazardous/special wastes	Review current procedures to ensure effective diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Oily wastes (waste oil)	Improve coverage of waste oil collection drums/tanks at facilities used by domestic shipping. Link ship-generated waste oil procedures to improvements in national measures (i.e. ensure proper linkage with current scheme for export of waste oil from Kosrae to Nauru).	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic vessels.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs less than 400 GRT.
Sewage	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.	N/a, though should ensure provision of adequate shore ablution facilities for fishing boat crews, with sufficient capacity to accommodate any likely increase in the intensity of activities above current levels.

Recommended Improvements to Port Waste Reception: Kolonia, Pohnpei

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Nil recommendations. Current measures considered generally adequate.	Nil acceptance, except from itinerant yachts and FFVs. Review adequacy of current reception arrangements for FFVs and support ships.
Recyclables	Provide suitable collection bins for aluminium cans in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from vessels with expanded national recycling scheme.	Provide suitable collection bins for aluminium cans in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from vessels with expanded national recycling scheme.
Quarantine wastes	n/a	Review quarantine waste disposal procedures to ensure all wastes presenting quarantine risk are properly destroyed.
Hazardous/special wastes	Review current procedures to ensure effective diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.
Oily wastes (waste oil)	Improve coverage of waste oil collection drums/tanks at facilities used by domestic shipping. Link ship-generated waste oil procedures to improvements in national measures (e.g. investigate opportunities to link with scheme for export of waste oil from	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.

Waste Category	Waste Management Recommendations	
	Domestic Shipping	International Shipping
	Kosrae to Nauru).	
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic vessels.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs less than 400 GRT.
Sewage	Ensure adequate provision of shore ablution facilities for fishing boat crews.	Ensure adequate provision of shore ablution facilities for fishing boat crews.

Recommended Improvements to Port Waste Reception: Colonia, Yap

Waste Category	Waste Management Recommendations	
	Domestic Shipping	International Shipping
Garbage	Improve coverage of waste collection receptacles (i.e. to all wharves and jetties, especially those used by small boats) and quality of garbage receptacles (i.e. replace 205 L drums currently used). Improve garbage collection services. Review adequacy of current disposal arrangements.	Nil acceptance, except from itinerant yachts and FFVs. Review adequacy of current reception arrangements for FFVs and support ships.
Recyclables	Provide suitable collection bins for aluminium cans in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from vessels with expanded national recycling scheme.	Provide suitable collection bins for aluminium cans in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from vessels with expanded national recycling scheme.
Quarantine wastes	n/a	Review quarantine waste disposal procedures to ensure all wastes presenting quarantine risk are properly destroyed.
Hazardous/special wastes	Review current procedures to ensure effective diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.
Oily wastes (waste oil)	Improve coverage of waste oil collection drums/tanks at facilities used by domestic shipping. Link ship-generated waste oil procedures to improvements in national measures (e.g. investigate opportunities to link with scheme for export of waste oil from Kosrae to Nauru).	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic vessels.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs less than 400 GRT.

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Sewage	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.	N/a, though should ensure provision of adequate shore ablution facilities for fishing boat crews, with sufficient capacity to accommodate any likely increase in the intensity of activities above current levels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Colonia, Yap
Nation/Territory: FSM

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	12	6000	3	1	40	1.5	54.0	2.2	10.8	0.18	0.54	22	n/a	n/a	70	0.8	33.6
Cruise Liners	1200	15000	5	1	0.5	3.0	18000.0	9.0	45.0	0.27	1.35	1	n/a	n/a	70	84.0	42.0
Inter-island Traders	130	800	2	2	150	1.5	390.0	58.5	292.5	0.05	0.10	15	5	750	30	7.8	1170.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats	30	n/a	2	n/a	10	0.5	30.0	0.3	1.5	0.01	0.02	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	3	3	2	1.7	1020.0	2.0	10.2	0.18	0.54	1	n/a	n/a	50	30.0	60.0
Warships (small)	20	110	5	2	5	1.3	130.0	0.7	3.3	0.01	0.05	0	5	25	50	2.0	10.0
Fishing (oceanic)	25	250	30	5	72	1.8	1575.0	113.4	567.0	0.02	0.60	43	10	720	40	5.0	360.0
Fishing ('mothership')	18	4000	10	35	5	2.8	2268.0	11.3	56.7	0.05	0.50	3	10	50	40	25.2	126.0
Fishing (local)	6	n/a	2	n/a	500	0.8	9.6	4.8	24.0	0.005	0.01	5	n/a	n/a	n/a	n/a	n/a
Local workboats	13	n/a	5	n/a	30	0.5	32.5	1.0	4.9	0.01	0.05	2	0.05	2	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	5	3	20	0.5	12.0	0.2	1.2	n/a	0.01	0	n/a	n/a	20	0.2	3.6
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**203**	**1017**			**91**		**1547**			**1805**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: **Kolonia, Pohnpei**
Nation/Territory: **FSM**

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	20	7000	2	1	60	1.5	60.0	3.6	18.0	0.18	0.36	22	n/a	n/a	70	1.4	84.0
Cruise Liners	700	10000	5	1	1	3.0	10500.0	10.5	52.5	0.27	1.35	1	n/a	n/a	70	49.0	49.0
Inter-island Traders	150	700	2	4	150	1.5	450.0	67.5	337.5	0.05	0.10	15	5	750	30	18.0	2700.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	5	3	2	1.7	1700.0	3.4	17.0	0.18	0.90	2	n/a	n/a	50	30.0	60.0
Warships (small)	20	110	5	15	30	1.3	130.0	3.9	19.5	0.01	0.05	2	5	150	50	15.0	450.0
Fishing (oceanic)	25	250	30	4	330	1.8	1530.0	504.9	2524.5	0.02	0.60	198	10	3300	40	4.0	1320.0
Fishing ('mothership')	18	4000	10	50	30	2.8	3024.0	90.7	453.6	0.05	0.50	15	10	300	40	36.0	1080.0
Fishing (local)	10	n/a	5	n/a	1500	0.8	40.0	60.0	300.0	0.005	0.03	38	n/a	n/a	n/a	n/a	n/a
Local workboats	2	n/a	1	n/a	200	0.5	1.0	0.2	1.0	0.01	0.01	2	0.05	10	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	10	3	10	0.5	19.5	0.2	1.0	n/a	0.01	0	n/a	n/a	20	0.2	1.8
Local craft (day trips)	2	n/a	1	n/a	12500	0.5	1.0	12.5	62.5	n/a	0.001	13	n/a	n/a	n/a	n/a	n/a
					Total			**757**	**3787**			**306**		**4510**			**5745**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: **Okat, Kosrae**
Nation/Territory: **FSM**

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	20	7000	3	3	42	1.5	90.0	3.8	18.9	0.18	0.54	23	n/a	n/a	70	4.2	176.4
Cruise Liners						3.0	0.0	0.0	0.0	0.27	0.00	0	n/a	n/a	70	0.0	0.0
Inter-island Traders						1.5	0.0	0.0	0.0	0.05	0.00	0	5	0	30	0.0	0.0
Inter-island Ferries	120	800	3	n/a	6	1.5	540.0	3.2	16.2	0.05	0.15	1	2	12	n/a	n/a	n/a
Tourist Charter Boats	10	n/a	1	n/a	600	0.5	5.0	3.0	15.0	0.01	0.01	6	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500				1.7	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	50	0.0	0.0
Warships (small)	20	110	3	2	3	1.3	78.0	0.2	1.2	0.01	0.03	0	5	15	50	2.0	6.0
Fishing (oceanic)	20	250	30	5	30	1.8	1260.0	37.8	189.0	0.02	0.60	18	10	300	40	4.0	120.0
Fishing ('mothership')	18	4000	10	30	3	2.8	2016.0	6.0	30.2	0.05	0.50	2	10	30	40	21.6	64.8
Fishing (local)	9	n/a	5	n/a	2000	0.8	36.0	72.0	360.0	0.005	0.03	50	n/a	n/a	n/a	n/a	n/a
Local workboats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	0.05	0	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	10	3	15	0.5	19.5	0.3	1.5	n/a	0.01	0	n/a	n/a	20	0.2	2.7
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**126**	**632**			**99**		**357**			**370**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: **Weno, Chuuk**
Nation/Territory: **FSM**

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	12	6000	2	1	36	1.5	36.0	1.3	6.5	0.18	0.36	13	n/a	n/a	70	0.8	30.2
Cruise Liners	1200	15000	3	1	0.3	3.0	10800.0	3.2	16.2	0.27	0.81	0	n/a	n/a	70	84.0	25.2
Inter-island Traders	100	250	2	1	100	1.5	300.0	30.0	150.0	0.05	0.10	10	5	500	30	3.0	300.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats	30	n/a	4	n/a	120	0.5	60.0	7.2	36.0	0.01	0.04	5	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	3	2	3	1.7	1020.0	3.1	15.3	0.18	0.54	2	n/a	n/a	50	20.0	60.0
Warships (small)	20	110	3	2	3	1.3	78.0	0.2	1.2	0.01	0.03	0	5	15	50	2.0	6.0
Fishing (oceanic)	20	250	30	5	420	1.8	1260.0	529.2	2646.0	0.02	0.60	252	10	4200	40	4.0	1680.0
Fishing ('mothership')	18	4000	10	50	40	2.8	3024.0	121.0	604.8	0.05	0.50	20	10	400	40	36.0	1440.0
Fishing (local)	9	n/a	5	n/a	200	0.8	36.0	7.2	36.0	0.005	0.03	5	n/a	n/a	n/a	n/a	n/a
Local workboats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	0.05	0	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	10	3	10	0.5	19.5	0.2	1.0	n/a	0.01	0	n/a	n/a	20	0.2	1.8
Local craft (day trips)	2	n/a	1	n/a	25000	0.5	1.0	25.0	125.0	n/a	0.001	25	n/a	n/a	n/a	n/a	n/a
					Total			**728**	**3638**			**332**		**5115**			**3543**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

GUAM

1. PRELIMINARY

1.1 Introduction

Guam is an unincorporated territory of the US with policy relationships between Guam and the US. It dominates Micronesia economically and is also the largest island within Micronesia. The economic stability of the Guam is mainly dependent on the significant US military presence and tourist revenue.

1.2 Geography

The total landmass of Guam is 541 km^2, with a declared EEZ covering 218,000 km^2. The highest point is 406 metres. Guam's nearest neighbours are the Commonwealth of the Northern Mariana Islands to the north, the Republic of Palau and the Federated States of Micronesia to the south, and the Philippines to the west.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

US Federal laws and regulations have application in the territory. Guam is, therefore, effectively a signatory to MARPOL 73/78 Annexes I, II, III, and V, but not Annexes IV nor VI. The provisions of MARPOL 73/78 are expressed in US law principally through the Code of Federal Regulations (CFR) Title 33 *Navigation* and Navigable Waters, and *CFR Title 46* Shipping. The United States Coast Guard (USCG) exercise flag and port control.

The provisions of these annexes have been given effect in the Coastal Zone Management Act (1972) administered by the various US Federal agencies under the Department of Lands and Resources. These include the Divisions of Environmental Quality (DEQ), Fish and Wildlife and the Resource Management Division. The US Coast Guard is responsible for all maritime enforcement and is the agency responsible for coordinating all marine pollution responses contingency plans and vessel inspections.

The US is a signatory to the London Convention, SPREP Convention, SPREP Dumping Protocol and the SPREP Pollution Protocol. The US is not a signatory to the 1996 Protocol to the London Convention.

1.3.2 Local Legislative Issues

Guam has adopted US Federal environmental laws and regulations. Therefore, all regulations and activities undertaken in all ports are the same as all US ports. In addition to the Coastal Zone Management Act (1972) each US Federal division has adopted all US federal laws addressing port and marine issues. Within the act and the subsequent division regulations, provisions have been made that directly relate to offences pertaining to the discharge of sewage, garbage, oil and similar materials into port waters. The enforcement of these regulations is the responsibility of the Coast Guard with the assistance from the other US Federal agencies. Fines for offences are severe and enforced.

2. PORT REPORT: APRA

2.1 Description of Port and Associated Shipping/Boating Activities

All commercial shipping activities within Guam are located in Apra harbour. Within the harbour there are six commercial wharves. Guam has one commercial port (Port of Guam), which accommodates all international merchant vessels. Several smaller wharves are located towards the mouth of the harbour; these are used by the domestic and international commercial fishing fleet (purse-seine and longline vessels). Directly across from the main commercial port on the opposite side of the harbour is the US Naval base. This base has several wharves, each optimised for particular purposes. The main wharf is large enough to permit USN aircraft carriers (up to 100,000 tons) to berth alongside. A separate wharf towards the mouth of the harbour is used solely for ammunition loading and unloading. A commercial marina is located between these ports towards the western end of the harbour, which is used by all large commercial tourist passenger vessels.

The Ports Authority of Guam owns and is responsible for the commercial port and the associated civil docks. The fishing wharves and

the commercial tourist/passenger wharves are operated and managed by commercial companies. The US Department of Defense owns the wharves and manages all activities associated with them. The USCG detachment is also located within the base. The two marinas located outside Apra harbour are privately owned and operated.

The commercial port of Guam has one continuous concrete dock that is separated into 10 individual berths. The total length of the wharf is approximately 1000 metres. This wharf has one straight dock that has an approximately length of 600 metres and through additional arms each with a length of 200 metres. In addition, the port is responsible for three additional single concrete docks located along the shore towards the mouth of the harbour that have a combined length of 200 metres, this includes the commercial fishing fleet docks. The depth alongside the docks varies between 10 and 20 metres with the majority of the commercial dock possessing a minimum water depth of 14 metres.

All merchant ships use the main wharf area. The port can accommodate up to 15 cargo vessels at any one time. Numerous anchorage sites are also located within the harbour. All vessels are required to lay-off at anchor while awaiting access to the cargo berths. Additional anchorages are available outside the harbour if required. All vessels come alongside the wharf. The wharf possesses a wide range of cargo-handling gear and is thus able to service non-geared ships. This dock is used by the Port Authority's pilot and tug boats.

The three smaller docks located towards the mouth of the harbour have the capacity to allow two vessels (less than 30 metres) to be alongside at any one time. Additional anchorage sites within the harbour are used when required.

The commercial marina located within the harbour has several wharves that are used by the commercial passenger vessels as permanent mooring sites. The average depth of water alongside is 8 metres and all vessels come alongside. The 800 ton passenger vessels that link Guam with the island of Saipan on a weekly basis uses this port as their main terminal location.

The naval base has several concrete docks, all of which are only used by naval and USCG vessels. Information pertaining to the logistics and frequency of port use by military vessel was restricted and therefore only limited data are reported.

Two boat marinas are located approximately 4 kilometres from the commercial port. Both marinas offer permanent berths located either directly alongside the concrete wharves or floating docks. The facilities can accommodate a combined total of 100 boats (less than 20 metres) at any one time. Both power boats (inboard and outboard) and yachts use these docks. The water depth averages six metres. Dock facilities are present at both marinas to allow vessels to come alongside and purchase fuel. Shore ablution facilities are available and waste reception facilities and services are provided for garbage, oily wastes and sewage.

There are no permanent mooring sites for commercial or private vessels within the lagoon of Guam. Space is limited and regular seasonal typhoons prevent this activity.

The port of Guam is the largest and busiest in Micronesia. The majority of vessels servicing the region use this port and the majority of goods received are transhipped to other destinations within the region.

International traffic into and out of Guam is predominantly containerised cargo and some vehicle ferries. Bulk items are principally the importation of bulk cement, fertilizer and caustic soda. The latter three are pumped directly from vessels into storage tanks located within the port. Cargo-runs into and out of Guam are variable and vessels typically originate from Asian countries (Japan, Taiwan, Korea, Indonesia, Singapore, Philippines, Thailand), Australia, the Pacific islands and the US west coast. Container cargo traffic between the ports of Guam and Saipan arrive either loaded onto container ships or on large sea going barges towed by tugs, which are based in Guam. The barge service is twice weekly and the distance between the two ports is less than 200 kilometres.

Typical sailing time for container and break bulk ships into and out of Guam is two days to/from the next/previous port. International container ships servicing Guam are usually of the order of

9,000 tons, up to 15 years of age and carry crews in the order of 15 to 22. An average of 600 such ships arrive annually, with port stays typically of less than 12 hours.

The majority of bulk petroleum products originate directly from Singapore. An average of 12 vessels per month arrive in port and the tankers have a GRT of approximately 4000 tons. The main commercial dock has petroleum storage tanks located within the port area. Tankers are pump directly into these tanks whilst alongside. All LPG is brought into the island in tankers and transferred to holding tanks in the wharf precinct. Gas tankers come alongside to transfer their cargoes.

The government of Guam has one police boat (12 metres) and four pilot boats (25 metres). These moor alongside the commercial dock.

The USCG is responsible for the application of all Federal laws within Apra harbour as well as patrolling Guam's EEZ. The main office is located within the military base and has one permanent vessels based within the facility. As part of the US relationship with neighbouring islands, the USCG vessel based in Guam undertakes regular patrols outside Guam waters. Port visits are made to the Northern Marianas, Federated States of Micronesia, and the Republic of Palau occur at least once each year.

All naval vessels calling on Apra use the facilities located within the Guam naval base. It was estimated that 60 naval vessels visit annually. The majority of these vessels are frigates, destroyers, cruisers and submarines. Aircraft carriers and amphibious groups visit the port at least once a year, although more detailed information on the visit profiles of these ships was withheld for security reasons.

US military supply vessels call into the naval base on an average of once a month. These include bulk petroleum products, LPG carriers and ro-ro ships. The main dock at the naval base has petroleum and LPG storage tanks. Delivery tankers pump directly into the storage tanks whilst alongside from supply lines located on the dock.

Regular courtesy visits are made by ships of the navies of Australia and New Zealand, as well as ships from a variety of Asian navies. Visits typically last about three days.

International research vessels visit the commercial port on average twice a year. These vessels generally originate from Japan and are undertake oceanographic studies on the nearby deep-sea trench. These vessels use the port for crew changes, recreation and resupply. The average size of these vessels is 5,000 GRT and the vessels stay in port for up to five days.

International cruise ships visit Guam's commercial port monthly with the majority of the vessel arriving from Japan. These vessels vary in size, crew and passenger numbers. The commercial marina located within the harbour is the terminal for all large tourist vessels and passenger travel between Guam and the Northern Marianas. There is a large passenger usage of this port for daily tourist activities and the weekly commuter operations to the island of Saipan. The inter island passenger vessels displace approximately 700 tons, can accommodate 300 passengers, have a crew of 10 and are less than six years old.

International and domestic commercial longline and purse-seine fishing vessels use the fisheries wharves and other harbour facilities for their operations. Purse-seine fishing vessels conduct crew changes. Bunkering and re-supply and supplies (includes ice) and unload catches to their larger "motherships" whilst alongside or at anchor within the harbour. An average of seven purse-seine vessels per month use the port, with a maximum stay of five days. The purse-seine vessels are on average 1,000 GRT and have a crew of 24 –28. The 'motherships' have an average displacement of about 4,000 tons and a crew of 18. These larger motherships remain within the port for extended periods, but normally between four to six weeks. Long-line tuna fishing vessels use the fisheries wharves to off-load catches and conduct re-supply. An average of 15 vessels per month use the port, also with a maximum stay of five days. The average size of the tuna long-line vessels is 70 tons, and they carry six to eight crew.

Somewhere in the order of 25 itinerant yachts and motorboats call into Guam each year, with most activity during the summer months between April and October. These vessels almost exclusively berth at the two commercial marinas located to the south and north of the commercial port.

All commercial tourist vessels operate from the commercial marina. These vessels rarely use the commercial dock. It is estimated there are approximately 40 such vessels ranging in size from 8 - 30 metres.

A commercial slipway is located within the harbour and services Guam and the region. The operation is capable of slipping vessels up to 1000 tons and is primarily used by the domestic commercial fleet, including fishing vessels.

There are no plans for any immediate changes or expansions to the existing ports facilities within the country. It is not known if any plans exist to expand wharf facilities at the naval base. It is worthy of note that the Guam government is currently making representations to have a USN Carrier Battle Group (one aircraft carrier with about 10 escort and support ships, totaling around 10,000 personnel) permanently based in Apra.

2.2 Demand for Ship Waste Reception Facilities

The overall demand for port waste reception facilities in Guam is the largest of all ports within Micronesia. Waste is not usually accepted from the large merchant vessels unless specifically requested (and only in extenuating circumstances) and the periods at sea before these vessels call on Guam are minimal, indicating any waste onboard should only be in small quantities. Waste is accepted from the domestic vessels with the majority of waste removal functions contracted out to private waste management companies.

The largest potential demand arises from domestic inter-island passenger and cargo vessels, tourist boats and the commercial fishing fleet. Waste generated by these vessels is accepted. A significant proportion of the waste generated by these vessels is assumed to be disposed at sea.

The naval base accepts waste from their own vessels and are responsible for all waste reception and disposal. All items are disposed of in accordance with US Federal laws. The naval facility has its own landfill for all garbage. Oil, metals, plastics, batteries and paper wastes are recycled. Toxic wastes are stored while awaiting removal from the island.

Visiting yachts and resident small watercraft generate inconsequential quantities of garbage and oily wastes. The private marinas offer waste reception services for all vessels utilising their facilities. There are over 250 small watercraft (8- 13 metres) in Guam; these are propelled by two-stroke outboard motors. These boats are used on a daily basis and the majority are removed from the water and stored on land when not in use.

A waste management plan exists for all port activities within Guam. This plan is based on US Federal environmental regulations and directly relates to offences pertaining to the discharge of sewage, garbage and similar materials into port waters. The enforcement of these regulations is the responsibility of the Coast Guard with assistance from the other US Federal agencies. Fines for offences are severe.

Fees are charged to all vessels that require waste disposal at the commercial port, in addition to fees for wharfage and other port dues. Fees are not directly charged to vessels at the two marinas, as waste disposal services are included in the mooring charges. However, fees are charged by the private contracting companies if specific waste removal is required (eg: slop tank discharge). Waste reception facilities are provided at the privately operated commercial fisheries wharves and the fishing companies are responsible for proper waste disposal. A similar relationship is in operation at the commercial marina located with Apra harbour.

2.2.1 Oily Wastes

Oily wastes are not accepted from international vessels unless requested and are only accepted in extenuating circumstances. Domestic vessels can remove waste oil whilst at the docks. Private waste companies collect and remove all waste oil with fees paid directly to the contractors. Oily wastes are also accepted at the three marinas and fisheries docks. The removal of waste oil is the responsibility of the commercial operators.

The contractors pump the liquid waste to steel drums fitted to their trucks. Once removed, the oil is understood to be delivered to the oil storage and reception site at the local landfill site where it is recycled. The majority of the recycled oil is burnt at the local power station. It

is understood that several industrial companies also use the recycled oil.

The naval base accepts oily wastes from vessels based there and visiting ships. Oil is pumped from the vessels into road tankers to be recycled and burnt on the base in the power house.

Road tankers are also used at the commercial port for the collection of oily water wastes, such as bilge water. Vessels are prohibited from discharging bilge water whilst at the port and within the lagoon and harbours of Guam.

The naval base is capable of accepting bilge water direct from vessels alongside through shore connections. These wastes are pumped directly into the base's sewage system and treated to a standard in accordance with Federal EPA requirements.

2.2.2 Garbage

Waste is accepted from all domestic vessels utilising the ports of the Guam. Commercial garbage skips (1.2 x 2 x 1.5 metres) are currently used for reception receptacles at the commercial port, commercial marinas and the fisheries wharves. Private waste collection companies are responsible for the collection and removal of all waste at these facilities. The Ports Authority and other government divisions set the regulatory framework and environmental policies. The regular removal of waste from each port visited is considered satisfactory and all wharf areas inspected were clean.

Separation of garbage does not occur at either the commercial or fisheries ports. Separation of garbage does occur at the commercial marinas and individual drums for glass, plastic and metal are provided. Anecdotal information indicated that commercial waste collection companies recycle items removed from the ports.

The military port accepts garbage from all vessels. Commercial garbage skips are used for waste reception. The US Navy is responsible for the collection and removal of all wastes. Recycling of garbage occurs at the ports and all recycled products are stored separately at the military landfill site (located on the base) and, in general are shipped off island on military vessels.

The Guam landfill site is located less than 4 km from the commercial port and is owned and operated by the Guam government. Waste oil, batteries, metal, glass and some plastics are separated and stored at the landfill.

All international vessels must pass US customs, quarantine and Coast Guard inspections before the removal to shore, if allowed, of any material, including waste. Waste is only accepted from international vessels under certain circumstances and fees are charged.

2.2.3 Quarantine Wastes

All vessels entering the ports of Guam are subjected to quarantine inspections. A fee is charged to inspect all vessels and additional fees are charged if goods are seized or collected as quarantine waste. All seized and waste goods are incinerated. Quarantine goods may alternatively be sealed and left on board the vessel till the vessel departs.

2.2.4 Special, Hazardous or Noxious Wastes

No procedures were in evidence for the separate collection and management of hazardous or noxious wastes and it is understood that the demand for such services from marine sources is relatively minor. These products are not accepted at the commercial port and are left on board the vessels to be disposed of at other ports. Under the unusual circumstance that a request is submitted to remove hazardous waste from the commercial ports the USCG is contacted and waste is disposed at the military base.

The military base does accept hazardous wastes and all waste is stored on the base and shipped off island. US Federal hazardous waste management laws are observed.

2.2.5 Sewage

The discharge of sewage from all vessels whilst in port and within the lagoon is prohibited.

Sewage is not accepted from the international merchant ships at the commercial port. Sewage is accepted from all domestic vessels utilising the ports of the Guam. The private waste collection companies are response for the

collection and removal of all waste at the ports. Fees are charged. Similarly, sewerage wastes are accepted at the two marinas. All sewage is pumped from the vessels into steel tanks located on the back of trucks. The fate of this waste is unsure. Sewage is believed to be transported and pumped into the town's sewer lines.

The naval base accepts sewage from vessels alongside via shore connection. This is pumped directly into the bases treatment plant.

No shore ablution facilities are located on the commercial dock, nor were any observed at the fisheries dock. Shore ablution facilities including showers and washing facilities were provided at the marinas.

Water quality in Apra is considered to be acceptable and there is no major concern associated with the vessels using the port. The port activities' contribution to water quality is minimal when compared to the terrestrial inputs. It should be noted that the commercial harbour is used by several diving operators for training and the harbour is rated as one of the more favourable dive sites within Guam. The high water quality within this harbour is carefully monitored by several agencies and prohibiting fines exist for any environmental infringement.

The contribution of vessel-sourced sewage into the port is almost non-existent.

2.3 Discussion

Waste reception services at the commercial and naval ports of Guam are adequate for the current level of usage. As a rule, the port does not accept waste from international vessels and discourages the transfer to shore of waste from domestic vessels.

Guam has a waste oil management plan and it appears to be efficient and capable of coping with current demand. Scope exists for Guam to be more active in receiving waste oil for recycling and re-use from neighbouring islands, noting that Guam has accepted waste oil from the Commonwealth of the Northern Mariana Islands in the past. The waste oil management scheme at the naval base is effective and could be used as an example for the Micronesian region.

The government of Guam should develop waste recycling opportunities, especially for oily wastes, to receive waste from neighbouring island countries. The opportunity for these small island nations to store and periodically transfer waste to Guam will contribute considerably to resolution of current waste problems in the Micronesian region. Such movements would need to be rigorously managed in order to comply with USCG requirements.

Environmental monitoring of the ports and waters of the Guam is ongoing and severe fines are imposed for detected breaches of regulations. Oil spills have occurred in the past within this harbour and the new environmental regulations and monitoring programme have combined to greatly reduce the frequency of these incidents.

The demand for reception of all categories of ship waste can be expected to increase as shipping activities in Apra intensify.

2.4 Current Terrestrial Waste Management Practices

Waste management in Guam is considered one of the most critical issues confronting the territory. These issues are being addressed, however and the responsible agencies are developing improved methods for the correct collection, handling and disposal of all wastes generate both from the ports and land based activities. All US Federal environmental laws and regulations are enforced, including a waste management program for all marine sources.

All types of waste, including solid waste, putrescibles and sewage are problematic in Guam. Limited land is available for landfill sites and the natural environment of Guam offers only limited management opportunities to prevent or at least decrease leaching of pollutants into the sea and fresh groundwater lenses. These problems are continually addressed.

Household garbage is collected in Guam and the majority of households also remove waste themselves. All garbage is placed at the local landfill site. The community landfill site has environmental concerns.

Cultural issues also augur against comprehensive solid waste management. The

population does not generally recognize rubbish disposal as a problem, and inappropriate dumping of waste and littering is a concern. This situation is improving. There has been an intensive awareness campaign to enlighten the population of correct waste disposal practices. This is especially important for the nation as it derives a considerable amount of revenue from tourism, the majority of which is marine based.

Recycling is limited in Guam but is becoming more common.

Putrescible waste is usually fed to pigs and chicken or used for fertiliser on crops for the majority of the rural community.

Sea dumping is under active consideration by the government as a disposal option. It is intended that larger, inert items, such as car bodies and defunct shipping containers, would be dumped into the deep waters surrounding the island.

Quarantine and hospital wastes are currently incinerated.

Sewage in Guam is disposed via either septic tanks or community-based systems that collect household sewage and discharge to sea. All sewage is treated before discharge. Concerns have been raised regarding the affect of sewage discharges on the marine environment.

Currently, the majority of hazardous wastes existing in Guam are stored at the military bases, which have US federal certified containment areas. All hazardous materials are shipped off island for final disposal.

2.5 Summary and Conclusions

Guam is a small nation containing one single island with limited natural resources and an economy and infrastructure reliant upon US military spending and tourism.

Guam has adopted US federal laws and regulations, and is consequently a signatory to the MARPOL 73/78 Annexes I, II, III, and V. It is not a signatory of Annexes IV nor MARPOL Protocol 97 (Annex VI). Local authorities exercise Flag State and Port State controls. The provisions of these annexes have been given effect in the Coastal Zone Management Act (1983) administered by the various US federal agencies under the Department of Lands and Resources. These include the Divisions of Environmental Quality (DEQ), Fish and Wildlife and the Resource Management. The US Federal Coast Guard is responsible for all maritime enforcement and is the agency responsible for coordinating all marine pollution responses and contingencies plans.

Guam is a signatory to the London Convention, SPREP Convention, SPREP Dumping Protocol and the SPREP Pollution Protocol.

Waste management is a major environmental and public health issue for the territory.

Although potentially extensive, the current demand for the reception of ship wastes is relatively minor and generally restricted to vessels operating domestically. International shipping into and out of Guam is almost exclusively involved in inter-Pacific island trading; these ships are capable of retaining wastes for onboard treatment and/or disposal at alternative ports. Domestic vessels, however, have no alternative other than to discharge wastes, mainly garbage, at the ports or directly at sea.

In conclusion:

- current ship waste reception facilities and procedures within the Guam for oily wastes are largely adequate, although could be improved for international shipping;
- current ship waste reception facilities and procedures within the Guam for garbage and sewage are effective;
- current quarantine waste procedures are adequate;
- waste management plans, including cooperative disposal options for neighbouring islands need to be further developed;
- the discharge of waste from vessels whilst in port needs to be continually policed; and
- waste management facilities within Guam are severely taxed by wastes of terrestrial origin, with ship waste contributing only a small proportion.

3. RECOMMENDED IMPROVEMENTS

Guam's port of Apra is a major regional shipping centre and a point of focus of naval activity. The port consequently experiences

significant demand for the reception of ship-generated wastes, mainly from international shipping. Current procedures are considered adequate for the management of all components of the ship-generated waste stream. It can be anticipated that Apra's role as a regional shipping hub will be accentuated with the international trend toward trunk and feeder services for container cargoes.

3.1 Legislative Issues and Status of Relevant Conventions

The United States should formally advise the IMO of the extension to Guam of US accession to relevant IMO treaties.

3.2 Compliance Monitoring and Enforcement

Nil specific recommendations. Current measures effective, although regional cooperation in the application of Port State Controls should be improved.

3.3 Regional Waste Management Opportunities

Considerable opportunity exists for Guam to become a regional ship-waste reception and treatment centre, noting the port of Apra's distinction as a regional shipping hub and the excellent waste reception and management facilities and procedures currently in place. It is recommended that Guam:

- accept garbage (expected to mainly be plastic wastes) and recyclable materials from international ships trading in the Micronesian region;
- accept waste oil from international ships trading in the Micronesian region, but only when onboard storage facilities are nearing capacity;
- investigate the feasibility of acting as a regional collection centre for recyclable and hazardous wastes, before such material is onforwarded to a suitably equipped location external to the Pacific islands region (such as the US or Japan); and
- accept waste oil from neighbouring Micronesian states, for treatment and recycling/reuse in Guam.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Apra

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Nil action required. Current practices adequate.	Accept garbage from international ships operating in Micronesian region.
Recyclables	Nil action required. Current practices adequate.	Accept recyclable waste from international ships operating in Micronesian region.
Quarantine wastes	n/a	Nil action required. Current practices adequate.
Hazardous/special wastes	Nil action required. Current practices adequate.	Nil action required. Current practices adequate.
Oily wastes (waste oil)	Nil action required. Current practices adequate.	Nil action required. Current practices adequate.
Oily wastes (oily water)	Nil action required. Current practices adequate.	Review adequacy. Improve as necessary.
Sewage	Current practices adequate, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.	Assess requirement for provision of shore ablution facilities at fisheries wharves.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Apra
Nation/Territory: Guam

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	22	9000	5	1	560	1.5	165.0	92.4	462.0	0.18	0.90	504	n/a	n/a	70	1.5	862.4
Cruise Liners	700	15000	5	1	12	3.0	10500.0	126.0	630.0	0.27	1.35	16	n/a	n/a	70	49.0	588.0
Inter-island Traders						1.5	0.0	0.0	0.0	0.05	0.00	0	5	0	30	0.0	0.0
Inter-island Ferries	250	800	1	n/a	55	1.5	375.0	20.6	103.1	0.05	0.05	3	2	110	n/a	n/a	n/a
Tourist Charter Boats	15	n/a	1	n/a	6000	0.5	7.5	45.0	225.0	0.01	0.01	60	n/a	n/a	n/a	n/a	n/a
Warships (extra large)	6000	100000	20	4	1	0.7	84000.0	84.0	420.0	0.20	4.00	4	n/a	n/a	49	1176.0	1176.0
Warships (large)	200	2500	10	4	60	1.7	3400.0	204.0	1020.0	0.18	1.80	108	n/a	n/a	50	40.0	2400.0
Warships (small)	20	110	3	3	50	1.3	78.0	3.9	19.5	0.01	0.03	2	5	250	50	3.0	150.0
Fishing (oceanic)	25	250	30	4	260	1.8	1530.0	397.8	1989.0	0.02	0.60	156	10	2600	40	4.0	1040.0
Fishing ('mothership')	18	4000	10	35	15	2.8	2268.0	34.0	170.1	0.05	0.50	8	10	150	40	25.2	378.0
Fishing (local)		n/a		n/a		0.8	0.0	0.0	0.0	0.005	0.00	0	n/a	n/a	n/a	n/a	n/a
Local workboats	3	n/a	1	n/a	600	0.5	1.5	0.9	4.5	0.01	0.01	6	0.05	30	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	10	5	25	0.5	22.5	0.6	2.8	n/a	0.01	0	n/a	n/a	20	0.3	7.5
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**1009**	**5046**			**866**		**3140**			**6602**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

THE REPUBLIC OF KIRIBATI

1. PRELIMINARY

1.1 Introduction

The Republic of Kiribati has 33 islands in three archipelagos, the Gilbert, Phoenix and Line Islands. Tarawa, the capital island, is in the Gilbert chain. Kiribati's closest neighbours are Nauru to the west, Marshall Islands to the north, Tuvalu and Samoa to the south and French Polynesia to the east.

1.2 Geography

Tarawa is the most heavily populated island and the seat of government. Betio is the principal town and the main port for imports/exports. The EEZ is 3,550,000 km^2 and inter-island vessels take about seven days to transit the 2000 nm between Tarawa and Christmas Island (Kritimati).

The land area is 717 km^2, with the largest island being Kritimati with an area of about 321 km^2. All of the islands are low lying coral atolls surrounded by extensive reefs. The EEZ is vast and supports a major tuna fishery of around 350 large fishing vessels which are licensed by the government, with an annual fee levied for use of Kiribati's waters.

1.3 Legislative Issues

1.3.1 Status of Conventions

The Republic of Kiribati is a newly joined member of the IMO and is a Party to the 1972 London Convention. Kiribati is not yet a signatory to the SPREP Convention and its associated Protocols, nor is it a signatory to MARPOL 73/78. Port State Controls are not exercised but Flag State Controls are imposed upon locally registered vessels

1.3.2 Local Legislative Issues

The *Shipping Act 1990* and regulations made thereunder and the *Merchant Shipping Act 1992* do not make any provisions for prevention of marine pollution or penalties for illegal discharges. With the completion of the new marine terminal the Kiribati Ports Authority was established in 1999 and has been charged with administering the *Kiribati Port Authority Act 1990* which, *inter alia*, in Part VIII para 42 (I) established penalties for deliberate pollution of the harbour waters of up to A$2,000. The Act also prohibits discharge of oil into the harbour. The harbour ordinance defines the port limits. The Minister of Information and Communications may declare the sea and land port limits and must post notice of any changes. No regulations have been made under the *Port Authority Act*, however, the Act does seem to cover most aspects of port operations and procedures.

The *Environment and Conservation Act* came into force in March 2000. Regulations are currently under preparation dealing with sanitation, public health and environmental management. This Act, inter alia, also regulates "the carrying out of work in, on, over and under land or sea" where 'land' is also defined as "including any land covered by water". A vessel is defined as "anything that floats" and failure to comply with discharge standards attracts a penalty of A$20,000 for the first offence and A$15,000 for the second offence. A court can direct persons to undertake certain remedial measures; failure to do so attracts a penalty of A$20,000. Any prescribed developments such as dredging, ports and harbours and boat channels must submit an Environmental Impact Assessment for approval and subsequent granting of development consent.

2. PORT REPORT: BETIO

2.1 Description of Port and Associated Shipping/Boating Activities

The port of Betio is the principal marine terminal for Kiribati and an entire new port complex has recently been commissioned to provide better container handling facilities and the support infrastructure such as warehouses, cold storage etc. Most visiting ships from overseas call at the port , although cruise ships do visit Kritimati Island on a regular basis. The port is also the main base for the inter-island cargo and passenger services.

Port facilities have been recently significantly upgraded with an alongside berth 170 metres in length which can now accommodate alongside the main wharf vessels and barges up to 6 metres draft, within a tide range of 0.8 to 2.7 m. There are also berths alongside the old finger pier which are principally used by local vessels. Anchorages are available outside the main port with depths of around 12 metres and most of the container traffic is discharged at these anchorages using a crane barge and transferred to shore by lighter. Handling rates are good with the capability to discharge 250 containers in 30 hours when up to three container vessels may be at the anchorage. In 1999, 44 vessels principally containers, discharged cargo onto barges at anchor off the main wharf. The recent cessation of transshipment of containers from the Marshall Islands could reduce this by 2 vessel visits. The container ships range in size from 1,300 to 2,400 GT. These vessels come from Japan and other Pacific islands' ports including Lae, Suva and Majuro with voyage inbound of 3-8 days with 1-2 days in port.

Kiribati also takes delivery of refined petroleum products by a small, 1,150 ton tanker which operates out of Vuda Point, Fiji, and supply terminals on the other Pacific islands on a round trip basis. There is a mooring buoy and underwater pipeline for discharge of petroleum product with 14 tanker visits each year.

Liquefied petroleum gas is imported in containers with a monthly special TEU of 20 t capacity from Fiji and two to three LPG containers per month from Australia

There are six inter-island traders ranging in size from 100 to 450 GRT, two of these are cargo only whilst the others carry some cargo and a maximum 64 passengers. These small vessels are the principal mode of inter-island transport within each group of islands. These vessels sometimes call at 12 or 14 island atolls every two weeks. The ferry/cargo service operates to Kritimati with an outbound voyage of 8 days and 6 days inbound to Tarawa.

Approximately 12 yachts/annum visit Tarawa but as many of the other islands are uninhabited these could be some transient yachts which are not reported.

A large offshore fishing fleet operates in the Kiribati EEZ with around 350 vessels ranging in size from 350 to 1,500 GRT. Most of their catch is transferred to a 'mothership' at anchor off Betio. The fishing vessels are bunkered and provisioned at sea by two 2,874 GRT support vessels operating out of Guam.

Christmas (Kristimati) Island has around 15 cruise ship visits each year out of Papeete, Tahiti. They anchor well offshore and use the ship's boats for passenger transport to the shore. No facilities are required or utilised from the island.

There are currently no plans to increase the capacity or operating procedures of the port as the port authorities are still in the process of developing the new port facilities.

2.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Kiribati is relatively small as most local vessels only generate minor quantities of waste and the cargo vessels dispose of wastes other than oil at sea prior to entry into the territorial seas of Kiribati The largest potential demand arises from the operation of the cargo/passenger vessels *Nei Mataburo*, *Nei Morri* and *Teo Taope* which can generate garbage and sewage whilst in port and at anchor or alongside in the minor ports. On arrival in Betio there could also be cargo associated wastes for disposal.

Whilst the cruise liners which visit Kritimati do generate enormous amounts of domestic wastes, the owners are well aware of their obligations under the IMO Conventions and their public image. They have installed on board waste handling equipment such as compactors, grinders, macerators, incinerators and holding tanks for food wastes, oily water separators and sludge tanks for waste oil from purifiers and oily bilges and sewage treatment systems. Discharges permitted at sea only take place well at sea with the processed cans, bottles and packing wastes discharged to shore facilities at their home port.

No waste management plans are in effect for the port of Betio and no waste reception facilities for oily wastes are available, however open top 205 L drums were evident at the cargo/passenger vessel terminal. Other than an occasional request for accepting quarantine waste from visiting warships (l-2 per year) the

port has not been asked to receive any garbage or oily wastes. The ship pays only for hire of tug/barge for at sea dumping of the quarantine materials.

2.2.1 Oily Wastes

Other than the police patrol boat there has been no demand for these reception facilities. The patrol boat slop tank is periodically emptied and the oil blended in with used lubricants. This accumulated waste oil is currently shipped back to Fiji as a back load deck for cargo the tanker in 205 L drums.

2.2.2 Garbage

Although no reception facilities are provided for the visiting cargo/container vessels this is not considered significant as they can retain plastics on board and dispose of the remainder at sea as permitted by Annex V of MARPOL 73/78.

None of the other large vessels using the port have requested garbage disposal. The inter-island vessels have open top drums close to their berths which are probably used in port but once *en route* the garbage is thrown over the side.

2.2.3 Quarantine Wastes

The two collections of quarantine waste were sealed in plastic bags, fumigated and then dumped at sea offshore. There was no attempt to segregate or recycle the wastes. The Agriculture and Fishery Department of the Ministry of National Resources Development has issued Quarantine Regulations which deal with documentation, fumigation and disposal of quarantine material. In practice, until recently, the quarantine material was taken offshore by a barge/tug combination and dumped at sea. With the commissioning of an incinerator by the quarantine section the previous practice should terminate in favour of incineration.

2.2.4 Special, Hazardous or Noxious Wastes

As there have been no such wastes reported from marine sources, this is considered by local authorities as strictly a terrestrial problem. It may be assumed that hazardous wastes generated by domestic vessels are probably dumped at sea, albeit only in limited quantities.

2.2.5 Sewage

Most of the large vessels and cruise liners have either treatment plants or holding tanks for sewage. The inter-island ferries and work boats do discharge untreated sewage in harbour or at sea. The harbour is well flushed and residence times for discharged sewage is minimal.

2.3 Discussion

With the exception of collection of some waste oil and quarantine wastes no specific ship waste reception facilities are available in the port of Betio although the garbage drums at the passenger terminal are emptied on a regular basis. The inter-island vessels would probably be the most significant generators of waste in the port. Other than this, the current demand for ship waste reception facilities is minimal and any improvements are contingent upon upgrading the terrestrial sewage and garbage collection and treatment systems.

It must be considered that most of the oil wastes generated by the domestic trading fleet are disposed in an uncontrolled manner.

2.4 Current Terrestrial Waste Management Practices

A number of initiatives have been undertaken or are established whereby very little import of glass bottles is permitted. Beer can only be purchased in cans for subsequent crushing into 7 kg cubes for export to a reprocessing plant. As the payment to collectors is only A$0.35/kg there is little incentive to collect the cans which currently litter the beaches and the roadside.

The municipal sewerage system has direct discharge to the sea at the edge of the reef and only services Betio. Garbage collection is by the three district councils with no sorting or segregation. Some of the garbage is used to fill in seawalls or disposed of at a dump area and is alleged to be 80% organic waste. There are little or no food wastes involved as these are consumed by pigs and chickens.

A project involving Sanitation, Public Health and Environment is currently underway with the following objectives:

- upgrade the water supply (many wells are contaminated);
- extend the sewage collection system to Bikenibeli;
- extend the sewage system ocean outfall;
- prepare regulations under the *Environment and Conservation Act*;
- examine the provision of landfill sites recognising that most available government land is close to the lagoon and would require extensive site preparation
- provide of incinerators at the hospital, Betio medical centre and the port; and
- implement a public education programme.

2.5 Summary and Conclusions

From discussions with the relevant authorities it appears that the Republic of Kiribati has little demand for ship waste reception facilities. The only areas that could be improved are waste reception facilities for garbage and better capture of oily wastes generated by the inter-island ferries, work and patrol boats.

In support of the intent of the SPREP Convention and its Protocols, Kiribati should accede to the Convention and Protocols to promote regional co-operation and should also consider OPRC 90 as a means of obtaining assistance in oil pollution incidents

- improvement of ship waste management is wholly dependent on the upgrading of terrestrial systems;
- provision of closed top bins at the ferry terminals, with periodic collection and disposal, would reduce garbage pollution in the harbour;
- the disposal by dumping at sea of quarantine wastes needs to be properly controlled to ensure that only putrescible materials and non-plastic solid items are disposed in this manner;
- the planned extension of the municipal sewage system could include erection and connection of public toilets at the wharf;
- whilst not directly within the remit of this project a modest refundable levy on beverage cans would promote the collection of discarded aluminium cans;
- with the segregation of wastes followed by compaction, incineration as appropriate, of garbage and the maceration or at sea disposal of food wastes there is little demand for a small island state to provide garbage reception facilities other than the occasional quarantine waste; and
- procedures for the reception of oily wastes exist in Betio but these appear to be poorly patronised by domestic vessels other than Kiibati's patrol boat.

3. RECOMMENDED IMPROVEMENTS

Kiribati currently experiences relatively minimal demand for the reception and treatment of ship-generated wastes. Demand principally arises from foreign fishing vessels and the domestic trading and passenger vessels. These latter vessels centre their operations around Betio on Tarawa, and Kiritimati on Christmas Island. Zero acceptance of waste from international shipping is a justifiable position for Kiribati owing to severe land constraints.

Noting the activities of tuna fishing fleet 'motherships' within its territorial waters, it is recommended that Kiribati is vigilant to ensure these vessels abide by relevant marine pollution prevention laws.

3.1 Legislative Issues and Status of Relevant Conventions

As a minimum, Kiribati should accede to MARPOL 73/78. Having done so, Kiribati should ensure that existing marine pollution legislation is adequate for the effective implementation of the convention, or amend this as necessary.

Kiribati should also accede to the SPREP Convention and Protocols.

3.2 Compliance Monitoring and Enforcement

Current Flag State Control procedures should be used as the basis to develop appropriate Port State Control measures, once Kiribati has acceded to the relevant international conventions. Opportunities for regional cooperation in the application of Port State Controls should be developed, including information exchange and building of indigenous technical capacity.

3.3 Regional Waste Management Opportunities

Kiribati should:

- evaluate and improve options for export of recyclable materials accepted from domestic shipping (aluminium and other scrap metals) to other ports in the Pacific islands region or further;
- identify and evaluate options for the export to a suitably equipped nation of hazardous wastes accepted from domestic shipping; and
- expand the existing scheme for transfer of waste oil to Fiji for recycling to capture more of the waste oil generated by Kiribati shipping.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Betio and Kritimati

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Improve quality of bins in wharf area. Include port area in municipal collection rounds.	Nil acceptance, except from itinerant yachts.
Recyclables	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas.
Quarantine wastes	n/a	Improve quarantine disposal procedures to ensure no plastic or noxious wastes contained within quarantine waste stream are disposed to sea.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance.
Oily wastes (waste oil)	Provide waste oil collection drums at facilities used by domestic trading vessels and small boats.	Nil acceptance.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic inter-island trading vessels.	Nil acceptance.
Sewage	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: **Betio**
Nation/Territory: **Kiribati**

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	2000	5	1.5	60	1.5	135.0	8.1	40.5	0.18	0.90	54	n/a	n/a	70	1.9	113.4
Cruise Liners	1500	20000				3.0	0.0	0.0	0.0	0.27	0.00	0	n/a	n/a	70	0.0	0.0
Inter-island Traders	30	250	10	2	150	1.5	450.0	67.5	337.5	0.05	0.50	75	5	750	30	1.8	270.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	5	3	2	1.7	1700.0	3.4	17.0	0.18	0.90	2	n/a	n/a	50	30.0	60.0
Warships (small)	20	110	10	15	16	1.3	260.0	4.2	20.8	0.01	0.10	2	5	80	50	15.0	240.0
Fishing (oceanic)	18	250	30	3	350	1.8	1069.2	374.2	1871.1	0.02	0.60	210	10	3500	40	2.2	756.0
Fishing (local)		n/a		n/a		0.8	0.0	0.0	0.0	0.005	0.00	0	n/a	n/a	n/a	n/a	n/a
Local workboats	3	n/a	1	2	400	0.5	1.5	0.6	3.0	0.01	0.01	4	0.05	20	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	10	4	12	0.5	21.0	0.3	1.3	n/a	0.01	0	n/a	n/a	20	0.2	2.9
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**458**	**2291**			**347**		**4350**			**1442**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

REPUBLIC OF THE MARSHALL ISLANDS

1. PRELIMINARY

1.1 Introduction

The Republic of the Marshal Islands (RMI) comprises 29 atolls and five low elevated coral islands located in the north central Pacific Ocean. The majority of the islands are inhabited. Nearest neighbours are Kiribati to the south, the Federated States of Micronesia to the west and Hawaii in the east.

Agricultural production and tuna fisheries (international and domestic) are the main commercial activities within the islands.

1.2 Geography

The total landmass of the RMI is 181 km^2, with a declared EEZ covering 2,131,000 km^2. The low lying coral islands typically have an elevation less than 3 metres.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

The Republic of the Marshall Islands is a member of the IMO and a signatory to Annexes I, II, III, IV and V of MARPOL 73/78. The provisions of these annexes have been given effect in national law via the RMI *Environmental Act*. The Act is currently undergoing review with the intention of clarifying any gaps or inconsistencies with MARPOL 73/78 requirements, plus those proposed in the generic SPREP marine pollution bill. The generic SPREP draft legislation is also under consideration to be used as the basis for the revision. The Environmental Protection Agency (EPA) is chiefly responsible for the implementation and policing of this act. RMI authorities exercise Port State Controls.

The nation is not a signatory to the London Convention, although advice from the EPA indicated that the provisions of the Convention are observed and are reflected in the *National Environmental Protection Act 1984*. As for MARPOL 73/78, the pending review of the national law is intended to ensure consistency with the latest requirements of the London Convention, as amended.

The government of the RMI is also a signatory of the SPREP Convention and the associated Dumping Protocol and Pollution Protocol.

1.3.2 Local Legislative Issues

Environmental regulations include those by the national congress, state legislatures and traditional authorities. The Marshall Islands *National Environmental Protection Act 1984* addresses a wide range of facets of environmental management, and gives powers to the EPA to regulate and enforce. Included in this act are marine pollution regulations. The marine pollution regulations are continually developed as new issues arise. This Act provides for various offences related to the discharge of sewage, garbage and similar materials into the port waters.

2. PORT REPORT: MAJURO

2.1 Description of Port and Associated Shipping/Boating Activities

Majuro Atoll is the capital of the RMI and is the only atoll within the country that was evaluated during the survey. All information included in this report refers to this island. Kwajalein Atoll, to the north of Majuro, is the only other island to have a large port facility capable of receiving large international cargo vessels. This port is controlled by the US military and all US federal environmental laws and regulations are followed and enforced for the port. The majority of outer atolls within the RMI have small concrete docks that allow domestic cargo and passenger vessels to come alongside and discharge their wares. Waste reception facilities at these ports are rudimentary or non-existent, nor is the demand for ship waste reception high.

Majuro atoll has three commercial docks. All international commercial vessels use the main commercial dock Delap Dock. All domestic passenger and cargo vessels use a smaller dock Uliga Dock for all their activities. In addition, larger personal watercraft and some of the local tuna long-line long vessels use this dock, mainly as a mooring site. This dock is located approximately 5 kilometres from the large

commercial dock. The international and domestic tuna fishing fleet uses the third dock Fisheries dock. This dock is located at the eastern end of the main commercial dock. There are several other small docks located on this island that are used by the local community for secure anchorages for their private vessels (small outboard powered runabouts) and access to the land. The three commercial docks are owned and operated by the RMI government and are managed by the Port Authority. The fisheries dock is sub-managed by the Marshall Islands Marine Resource Authority (MIMRA).

The commercial port has one main berth for all merchant ships. The dock is constructed of concrete and the main berth has an approximate total length of 140 m and a depth alongside of 15 m. The port can accommodate two cargo vessels at any one time. Numerous anchorage sites are available within the lagoon immediately off from the wharf and all vessels are required to lay-off at anchor while awaiting access to the cargo berths. All vessels come alongside the wharf. The wharf does not possess any cargo-handling gear. The Port authority has a small (10 metre) outboard power pilot vessels. This vessel is used from the Uliga dock and generally is stored on a trailer on land.

The domestic commercial port has one main berth that accommodates the government and private domestic passenger and island ferries and some of the domestic tuna long-line fishing fleet. The wharf is constructed of concrete and the main berth (lagoon side) has an approximate total length of 60 m and a depth alongside of 9 m. All vessels come alongside. The inside section of the wharf is used for smaller domestic vessels as permanent mooring sites. The depth alongside is approximately 6 metres.

All international and the majority of the domestic tuna fishing fleet (purse-seine and long-line vessels) use the third dock. This dock is located at the eastern end of the main commercial dock and is made out of concrete. The dock has one main berth with a length of 40 metres and a smaller berth of 20 metres. These berths are connected and follow the shoreline. The depth at these docks is 15 metres and all vessels come alongside.

International traffic into and out of Majuro is predominantly containerised cargo, with some minor amounts of break-bulk items, principally vehicles and road construction materials when required. The typical cargo-run into and out of Majuro originate from the US west coast, Guam or Australia. All these vessels call into other Pacific island ports. The typical route for the US vessels is Majuro Atoll, Kwajalein Atoll, Kosrae, Pohnpei, Chuuk and then Guam returning directly to the US. In addition, vessels do sail directly to the Marshal Islands from the west coast as well as from Australia. Typical sailing time for container ships into and out of Majuro is two days to/from the next/previous port. International container ships servicing Majuro are usually of the order of 7,000 tons, up to 15 years of age and carry crews in the order of 15 to 22. An average of 72 such ships called in Majuro annually, with port stays typically of less than one day, although sometimes longer due to slow container-handling rates.

All bulk petroleum products originate from the US west coast and/or Guam on a monthly cycle and are delivered in tankers of about 4,000 tons. The main commercial dock has petroleum storage tanks that are located in close proximity to the port and these vessels pump directly into these storage containers whilst alongside from supply lines located on the dock. In addition, there is another fuel bunker facility (smaller) that receives bulk fuel from vessels from an underwater pipeline attached to permanent mooring site within the lagoon. Several of the outer atoll islands have small bunker fuel facilities (e.g. Jaluit atoll). These facilities receive fuel from domestic fuel vessels. All other atolls received fuel in 205 L drums. All LPG is brought into the island in small cylinders on the container vessels.

The RMI has one national patrol boat. This is based at the large commercial dock. The vessel is 110 tons and has a crew of 18; it patrols the EEZ of the RMI and periodically visits the other ports within the country. US Coast Guard cutters arrive in port typically once each year, usually from Hawaii. The duration of the visits are less than 3 days and they usually undertake maritime training programs in the region. Irregular calls are also made by ships of the Royal Australian Navy, with these ships usually coming alongside in the commercial port.

International research vessels and cruise ships are not reported to have visited the port of Majuro during the three years preceding the PACPOL SW1 field survey.

Majuro is the only atoll within the RMI that has the support facilities required by the tuna fishing fleets. Both long-line and purse-seine fishing vessels use Majuro's ports and lagoon for their operations. Purse-seine vessels use the port for crew changes, to obtain fuel and supplies (including ice) and in some cases unload catches to their larger 'motherships' whilst alongside. The transfer of fish, however usually occurs whilst at anchor within the lagoon. An average of 15 purse-seine vessels per month used the port and have a maximum stay of five days. The larger 'motherships' rarely come alongside the port. They anchor within the lagoon and remain until their vessels have obtained their quotes of fish from the purse-seine fishing vessels. These vessels can remain in the lagoon for extended periods of time, but normally between 6-8 weeks. Long-line tuna fishing vessels use the fisheries dock section of the port to off load catches, crew changes, refueling and for supplies. An average of 15 vessels per month used the port and have a maximum stay of five days. The purse-seine vessels are on average 1,000 tons and have a crew of 24 –28. The long-line vessels are considerably smaller and are on average about 70 tons and have a crew of six to eight. The purse-seine 'motherships' have an average displacement of about 4,000 tons and a crew of 18. Opposite the main commercial dock is a tuna loining plant. This operation receives product directly from the tuna fish fleet whilst alongside. Fish are transferred in steel containers.

About 20 itinerant yachts call into Majuro annually, with most activity during the summer period. The majority of yachts anchor within the lagoon and rarely use the ports. The port facilities are used for short periods of time (less than 24 hours) for refueling and re-provisioning.

A privately managed government owned slipway is located near the commercial dock. This operation has been in existence for the five years and is capable of slipping vessels up to 800 tons. This is the only commercial slipway within the RMI and is used by the international and domestic fishing fleet as well as the government and private passenger and cargo vessels. The local EPA includes the port facilities and the slipway in the marine monitoring program. All larger vessels use slipways further a field (Hawaii, Guam, Philippines, Australia etc).

There are no plans for any immediate changes or expansions to the ports within this atoll.

2.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Majuro is small. Waste is not accepted from the large commercial merchant vessels unless specifically requested and the periods at sea before these vessels arrive are minimal. The frequent activities of the domestic inter-island passenger and cargo vessels do create demand, however these vessels generate comparatively minimal waste. All waste is removed from these vessels when in port.

The largest potential demand arises from the regular operations of the international and domestic tuna fishing fleet, including the larger motherships. The majority of the purse-seine vessels and motherships are fitted with oil separators, holding tanks and in some cases incinerators and their demand for waste reception facilities are, therefore, minimal. The long-line fishing vessels do not normally have holding tanks or oil water separators and hence require shore reception. Concern has been expressed by the government regarding the improper discharge from fishing vessels of waste material directly into the lagoon. Material that is reported to be discharged includes domestic garbage, oil and slop tank contents, and drainage from deck washings (containing fish residues). Waste discharged directly into the lagoon is a major concern to the government and regulatory steps are currently under development, including significant fines. Improved capacity to enforce any new regulations is also required.

Visiting yachts and resident watercraft generate inconsequential quantities of garbage and oily wastes. There are over 300 small watercraft within this atoll, with the majority using small (less than 70 HP) outboard engines.

There is no waste management plan specifically for the ports of Majuro. A management plan for environment, which includes all marine resources and port activities, is currently under development. There is an urgent need to have this management plan completed and regulations in place.

Fees are charged to all vessels that require waste disposal at the commercial port. In addition, fees are charged for wharfage and other port activities at the two commercial ports. Only non-local registered fishing vessels are charged at the fisheries dock.

2.2.1 Oily Wastes

Oily wastes are not accepted from international vessels unless requested and only under unusual circumstances. Domestic vessels can remove waste oil whilst at the dock. There are no facilities to accept waste oil from vessels and therefore all waste oil is hand carried from the vessels. The fate of the oil once it is removed from the vessels is unclear. A percentage of waste oil is stored in 205 litre drums at the dock and periodically transferred to the local landfill site. However, anecdotal information indicates that oil in the past has been dumped into pits and periodically burnt. There is also a percentage of oil that is suspected to be dumped directly into the ground. The smaller commercial dock and the fisheries dock provide used 205 litre petroleum drums to store waste oil from the vessels. These drums were not bunded and the ground was heavily stained with spilt oil. There is a pressing need to improve waste oil reception facilities at these docks. Managers are aware of these problems and suggested a large storage tank that can be periodically emptied would address the problems.

No facilities exist for the collection, treatment and disposal of oily water wastes, such as bilge water. All vessels are prohibited from disposing bilge, greywater and sewage whilst at the port and within the lagoon.

2.2.2 Garbage

Used 205 L steel drums are currently used for reception devices at the three ports in Majuro. The government agencies are responsible for the collection and removal of all waste at the ports. The regular removal of waste from these drums could be improved at all ports. Garbage drums were full with garbage piled up around the drums at all ports. The fisheries dock was the worst. There is an obvious need for better waste reception bins (larger containers with lids) and a program to remove waste material from the port and prevent waste, especially garbage from being inadvertently dumped into the marine environment. All garbage removed from the port is taken to the local landfill site, which is approximately 9 kilometres from, the commercial port. A proportion of waste oil, batteries and aluminium cans are separated and stored at the landfill site.

Waste from domestic vessels, which includes the tuna fishing fleets, can be off loaded. The private fishing companies and passenger and cargo boats tend to remove all waste material themselves from their vessels. A fee is charged by the port authority to remove waste and all waste is taken to the local landfill site.

There is neither separation of wastes nor any recycling from the vessels in the RMI.

2.2.3 Quarantine Wastes

All international vessels entering the port of the RMI are subjected to inspections from Quarantine officers. A fee is charged to inspect all vessels and additional fees are charged if goods are seized. All confiscated goods are incinerated at the landfill site. Quarantine goods may otherwise be sealed and left onboard the vessel until departure.

2.2.4 Special, Hazardous or Noxious Wastes

No procedures were in evidence for the separate collection and management of hazardous or noxious wastes and it is understood that the demand for such services from marine sources is relatively minor. These products are presumably retained on board international vessels to be disposed of at other ports. The anticipated fate of noxious and hazardous wastes generated on board local shipping ids that the waste either ends up in the sea or else enters the general waste stream.

2.2.5 Sewage

The discharge of sewage from all vessels whilst in port and within the lagoon is prohibited. However, concerns have been raised in the past regarding the dumping of sewage into the lagoon at night by the tuna fishing fleet and local craft.

Shore ablution facilities for vessels at the commercial docks are not provided nor are there

any service to remove sewage waste from the vessels. Toilet facilities are provided at the fishing dock.

Water quality at the docks and the lagoon itself in Majuro is poor. Water exchange rates within this area of the lagoon have been greatly reduced due to the closure of several lagoon channels in the past. This section of the lagoon houses the bulk of the population of Majuro atoll (30,000) and the majority of all waste directly enters the lagoon. The port activities' contribution to the poor water quality is minimal when compared to these terrestrial inputs. Environmental management plans are currently under development to improve water quality. There is no management plan specifically addressing water quality issues around the port. Furthermore, increased policing of current regulations, especially after daylight hours should reduce any current visual water pollution problems.

2.2.6 Discussion

Garbage reception services at the three commercial ports of Majuro appear to be marginally adequate for the current usage. Improved garbage reception devices should be sourced and the timely removal of garbage included as part of the ports operations. The port as a rule dose not accept waste from international vessels and discourages the acceptance of waste from domestic vessels and the fishing fleet. However, the fate of the all waste from the ports needs to be reviewed and improved terrestrial management of waste should be developed.

There is an urgent need for a waste oil management plan for the ports and atolls of Majuro. These programmes should be incorporated and include the correct storage, recycling and disposal of all waste oil. As a priority the RMI government needs to review possible opportunities to remove waste oil from the island. A new waste oil collection service is an effective means of ensuring proper management and disposal of this material. Its effectiveness and environmental acceptability would be enhanced by raising awareness of its availability, and by providing a bunded area for the storage of the waste oil drums.

2.2.7 Current Terrestrial Waste Management Practices

Waste management in Majuro, and the RMI, is considered one of the most critical issues confronting the nation. These issues are currently being addressed for each island within the country, with special emphasis on the two major population centres of Majuro and Ebye. A waste management program for both marine and terrestrial sources must be completed and implemented as soon as possible. Waste oil must be contained and recycled and/or removed from the island.

A comprehensive suite of waste management measures addressing all elements of the waste stream needs to be developed and implemented for the RMI as a matter of priority. Virtually all waste is currently disposed of to landfill. The presents further problems as most landfill sites are located in low-lying areas, which provides little natural barrier to prevent or attenuate the leaching of pollutants into the sea and fresh groundwater lenses. These problems need to be addressed.

The main waste management problems for Majuro have been identified as:

- public health;
- visual amenity;
- water lens quality (brackish to fresh, but not potable);
- lagoon water quality;
- soil condition; and
- health of ecosystems.

Household garbage is collected on Majuro. The government provides large steel skips (10 m x 3 m x 1.5 m) at certain locations throughout the atoll. Residents are encouraged to place all household garbage into these containers, which are collected emptied and replaced on a regular basis. The containers and the vehicles were part of an aid program. These activities have been ongoing for the past four years and have made a large impact on household disposal. All garbage is placed at the local landfill site. The community landfill site has environmental concerns.

Cultural issues also augur against comprehensive solid waste management. The population does not generally recognize rubbish disposal as a problem, and inappropriate dumping of waste and littering is endemic. This

however is changing, albeit at a slow pace and much public debate and discussion is under way. The introduction of the large garbage collection units has assisted in achieving better management of wastes within the atoll. However, it appears the convenience of the bins is the driving force for their use, not concern for the environment.

There is limited recycling in Majuro. Aluminum cans are recycled, used batteries are stored and limited quantities of waste oil are stored and recycled at the local landfill site.

A nation wide initiative is to reduce the amount of waste generated, and to better manage that which is disposed to landfill. Such ambitions are hampered by technical, economic and cultural factors. The operation of a landfill employing modern techniques is constrained by the lack of suitable land, the close proximity of any site to groundwater and the ocean, as well as the extremely limited supply of suitable material for daily covering. This is further complicated by the lack of government owned land.

Putrescible waste is usually fed to pigs and chicken or used for fertiliser on crops.

The RMI government has in the past employed sea dumping to dispose of large, inert items, such as car bodies. Debate is currently ongoing to decide if this option remains a viable option.

Quarantine and hospital wastes are currently incinerated. However, some items from these sources may be burnt in open pits when incinerators are not operating or there is too much material to be burnt.

There is no definitive programme in the RMI for the capture and recycling of waste oil irrespective of its origin. Only a small quantity, amounting to a few 205 L drums per year, is recycled by the local coconut company and burnt in their generators. The local power company has in the past used oil in the same fashion and it was indicated that this practice might resume. Unfortunately, the supply of waste oil greatly exceeds the demand from these operations. It is estimated that only a few hundred litres of waste oil are collected annually through the port.

Sewerage in Majuro is either septic tanks or village-based systems that collect household sewage and discharge to at sea without any treatment. In addition, reef flats are used by a percentage of the population for ablution purposes. This is an environmental concern in areas of high population densities. Concerns have been raised regarding the effect that raw sewage is having on the marine environment.

There are no facilities in Majuro to handle hazardous wastes. It is intended to develop a dedicated storage area for the collection and containment of such materials prior to development of a permanent disposal strategy; this may involve export. This will be a component of the waste management plan for the atoll that is currently being developed.

2.2.8 Summary and Conclusions

The Republic of the Marshall Islands is a small nation widely spread over a vast ocean with limited natural resources and an economy and infrastructure reliant upon overseas technical and financial assistance.

The RMI is a signatory to Annexes I, II, III, IV and V of MARPOL 73/78 and exercises Flag and Port State controls. The provisions of these annexes have been given effect in national law via the RMI Environmental Act. The Act is currently being reviewed, using the generic SPREP marine pollution bill as a frame of reference. The nation is not a signatory to the London Convention, but is a party to the SPREP Convention and the associated Dumping and Pollution Protocols.

Waste management is a major environmental and public health issue for the individual atolls of the RMI. These issues are particularly important for the atolls of Majuro and Ebye, which together house over 80 percent of the nations population. The disposal of wastes is hampered by economic and technical constraints, not least of which is the lack of land suitable for landfill sites.

The current demand for the reception of ship wastes is relatively minor, and generally restricted to vessels operating domestically. International shipping into and out of the state of the RMI is almost exclusively involved in Inter-Pacific island trading; these ships are capable of retaining wastes for onboard treatment and/or disposal at alternative ports. Domestic vessels,

however, have no alternative other than to discharge wastes, mainly garbage, at the ports or directly at sea.

In conclusion:

- ship waste reception facilities and procedures within the RMI need to be further improved, especially storage of waste oil. Reception facilities for international shipping are acceptable. Minimum facilities for the collection of garbage and oily wastes are required for vessels engaged in domestic activities;
- current quarantine waste procedures are adequate;
- the current waste oil collection service is ineffective and there is an urgent need to improve reception facilities. Furthermore, terrestrial waste reception facilities must be greatly improved;
- waste management plans, including disposal options need to be further developed;
- the prohibition on discharge of waste from vessels whilst in port needs to be better enforced;
- waste management facilities within the RMI are severely taxed by wastes of terrestrial origin, with ship wastes contributing only a small proportion; and
- any increase in the number of foreign fishing vessels visiting the RMI ports will generate increased demand for reception of ship wastes.

3. RECOMMENDED IMPROVEMENTS

The procedures in place in the RMI for the management of ship-generated waste are of varying quality. Land area available for waste disposal is minimal, and the nation is also confronted by technical and economic constraints. No waste should be accepted from international shipping, except in extenuating circumstances. Majuro has also been identified as a port with water quality problems, and hence one where sewage discharge restrictions need to be more stringent than other ports, with commensurate provision of sewage reception facilities and/or alternative toilet facilities for vessels in port.

Significant potential demand for ship waste reception is presented by the extensive activities of tuna fishing fleets operating from Majuro, including extended stays in the neighbouring lagoon by 'motherships', suggesting that these vessels either have significant onboard waste holding capacity and/or treatment facilities, or they are in breach of MARPOL 73/78 requirements. Verification of whether these vessels comply with MARPOL 73/78, and the RMI's national enabling legislation, can only be achieved via an effective regime of Port State inspections.

It is unlikely that full compliance with MARPOL 73/78 can be achieved by these tuna 'motherships', so if the RMI is to permit extended stays in its waters, then it is incumbent upon the government to provide 'adequate' port waste reception facilities. This may involve the use of barges or lighters to collect wastes (garbage and waste oil) from these vessels while they remain at anchor.

3.1 Legislative Issues and Status of Relevant Conventions

The RMI is a Party to MARPOL 73/78 Annexes I to V inclusive, and national enabling legislation is currently under review to ensure its adequacy.

3.2 Compliance Monitoring and Enforcement

Opportunities for regional cooperation in the application of Port State Controls should be improved, including information exchange and enhancement of indigenous technical capacity. Port State Controls directed at tuna fishing vessels and associated support ships should be reviewed and enhanced as necessary to ensure their effectiveness.

3.3 Regional Waste Management OpportunitiesThe RMI should:

- evaluate and improve options for export of recyclable materials accepted from domestic shipping (aluminium and other scrap metals) to other ports in the Pacific islands region or further (possibly the US);
- identify and evaluate options for the export to a suitably equipped nation of hazardous wastes accepted from domestic shipping; and
- transfer waste oil excess to local recycling capacity to Guam or the US for appropriate treatment.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Majuro

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Improve quality of garbage receptacles (i.e. replace 205 L drums currently used). Improve garbage collection service.	Nil acceptance, except from itinerant yachts and FFVs. Review adequacy of current reception arrangements for FFVs and support ships.
Recyclables	Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from boats with national recycling scheme.	Provide suitable collection bins for aluminium cans in wharf areas.
Quarantine wastes	n/a	Review quarantine waste disposal procedures to ensure all wastes presenting quarantine risk are properly destroyed.
Hazardous/special wastes	Review current procedures to ensure effective diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.
Oily wastes (waste oil)	Provide waste oil collection drums/tanks at facilities used by domestic shipping. Link ship-generated waste oil procedures to improvements in national measures (i.e. expand the existing scheme for re-use of waste oil by local coconut company and reinvigorate the scheme where the local electricity utility blended waste oil with fuel for use in generators).	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic vessels.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs less than 400 GRT.
Sewage	Ban the use of heads in vessels in Majuro, except for those fitted with adequate sewage treatment plants. Provide shore ablution facilities at all docks and wharves in Majuro.	Ensure international ships alongside in Majuro or in the lagoon do not discharge untreated sewage (e.g. ban use of heads if necessary). Provide shore ablution facilities.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Majuro
Nation/Territory: RMI

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	6500	2	1	84	1.5	54.0	4.5	22.7	0.18	0.36	30	n/a	n/a	70	1.3	105.8
Cruise Liners	1000	15000				3.0	0.0	0.0	0.0	0.27	0.00	0	n/a	n/a	70	0.0	0.0
Inter-island Traders	120	150	5	3	300	1.5	900.0	270.0	1350.0	0.05	0.25	75	5	1500	30	10.8	3240.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats	10	n/a	1	n/a	400	0.5	5.0	2.0	10.0	0.01	0.01	4	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	5	2	1	1.7	1700.0	1.7	8.5	0.18	0.90	1	n/a	n/a	50	20.0	20.0
Warships (small)	20	110	5	15	18	1.3	130.0	2.3	11.7	0.01	0.05	1	5	90	50	15.0	270.0
Fishing (oceanic)	25	250	30	5	360	1.8	1575.0	567.0	2835.0	0.02	0.60	216	10	3600	40	5.0	1800.0
Fishing ('mothership')	18	4000	10	50	40	2.8	3024.0	121.0	604.8	0.05	0.50	20	10	400	40	36.0	1440.0
Fishing (local)	18	n/a	5	n/a	200	0.8	72.0	14.4	72.0	0.005	0.03	5	n/a	n/a	n/a	n/a	n/a
Local workboats	2	n/a	1	n/a	250	0.5	1.0	0.3	1.3	0.01	0.01	3	0.05	13	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	10	5	20	0.5	22.5	0.5	2.3	n/a	0.01	0	n/a	n/a	20	0.3	6.0
Local craft (day trips)	2	n/a	1	n/a	15000	0.5	1.0	15.0	75.0	n/a	0.001	15	n/a	n/a	n/a	n/a	n/a
					Total			**999**	**4993**			**370**		**5603**			**6882**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

THE REPUBLIC OF NAURU

1. PRELIMINARY

1.1 Introduction

The Republic of Nauru is an isolated island lying just South of the Equator. Closest Pacific island neighbours are Kosrae, FSM to the North, Papua New Guinea to the Southwest, the Solomon Islands to the South and Kiribati to the East.

1.2 Geography

Nauru has a land area of 21 km^2 and 30 km of coastline with an EEZ of 200 nm from the baseline. The offshore reef encircles the island with sandy beaches giving way to a fertile ring around raised coral reefs with a phosphate plateau in the centre; the maximum elevation is 61m above sea level.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

The Republic of Nauru is a member of IMO, and a signatory to the 1972 London Convention but is not a signatory to MARPOL 73/78 or to the1993 Tokyo MOU on Port State Controls. Nauru is a signatory to UNCLOS III, and the SPREP Convention and its two associated Protocols. The nation is not a Party to OPRC 90.

1.3.2 Local Legislative Issues

The draft Marine Environment Act, in Section 17, prohibits illegal discharges into the waters of Nauru and establishes penalties of up to $A 50,000 for contravention of the Act. However, it is not clear under the draft legislation whether this is only within the territorial sea or extends to the EEZ. There are no formal arrangements for surveillance or enforcement of any illegal discharges.

2. PORT REPORT: NAURU PHOSPHATE CORPORATION PORT (AIWO)

2.1 Description of Port and Associated Shipping Related Activities

There is a multiple buoy mooring system used by bulk carriers (of phosphate), oil tankers and container vessels. The inner moorings are in approximately 40 m of water and the outer mooring buoys in around 400 m of water at the edge of the fringing reef, which has a slope of 40 degrees to the sea floor from the edge of the reef. The loading of phosphate is through two cantilevered arms with the northernmost arm also utilised for discharge of petroleum/oils/lubricants (POL) products through a flexible hose from the ship's manifold to the shore connection on the cantilever. Container vessels discharge containers onto a barge/raft combination which can carry two containers to the small boat harbour for handling by a gantry crane and forklift to the container processing area. A total of 60 containers can be handled in each 23-hour day shift. The tanker uses the same buoys to position under the northern cantilever. The port has easy approach with no navigational hazards. No tugs are available.

There is a small boat harbour north of the phosphate loading facility that is used for container discharge. The pilot boat and workboat also use this harbour. The tide range is 1.8 m and the multiple buoy mooring area is considered well flushed. There are no prescribed port limits. In view of the extreme water depths, vessels awaiting a berth must drift well offshore, maintaining position by judicious use of their propulsion systems.

Marine traffic is predominantly bulk carriers ranging in size from 14,000 to 23,000 tons and trading between New Zealand, Australia, India, Korea and the Philippines with transit times of six to eight days and loading within one to two days. An annual average of 40 vessels load phosphate at the cantilevers. There is an average of 24 container vessels discharging at the mooring ranging in size from 3,000 to

8,000 tons inbound from Brisbane and Melbourne with transit times of up to eight days.

Nauru is supplied with refined petroleum products from Australia and Vuda Point, Fiji and does import small quantities of heavy fuel oil (1,400 tonnes/annum) for use in the phosphate drying facility. With an average of 12 vessels/annum ranging in size from 2,000 to 10,000 tons, subject to availability of the berth the cargo discharge is normally completed in one day.

No cruise vessels visit Nauru, as there are no bunkering, logistic or repair facilities readily available, foreign fishing vessels do not use the port. There have been several courtesy visits of around five days' duration by patrol craft from The Peoples Republic of China, which use the inshore moorings.

Another small boat harbour at Anibane has been constructed recently by Japan, under their technical assistance programme. This incorporates a launching ramp for trailed small boats and two shallow draft alongside berths.

2.2 Demand for Ship Waste Reception Facilities

There is currently no demand for reception facilities from vessels using the port of Aiwo with regard to garbage, quarantine wastes, oily wastes, special, hazardous and noxious wastes or sewage. With regard to the latter it is believed that phosphate/container vessels have either a sewage treatment plant or holding tanks as no sewage discharges have been observed by the Harbour Master.

2.3 Current Terrestrial Waste Management

The Nauru Rehabilitation Corporation is coordinating garbage collection and disposal in Nauru. Households can purchase 240 L mobile garbage bins for A$59.00 one-off payment. There is no charge for weekly collection by the compactor dumpster which discharges at the Mormon Dump. There was an incinerator but this is unserviceable and has been closed for several years. It is intended to form a waste management committee to address the problems of final disposal of garbage.

The Rehabilitation Corporation has begun a programme to separate recyclable materials at the tip face. Organic materials such as branches and leaves, is processed through a chipper and mulcher to create compost for use in the mine sites rehabilitation project. A new dumpsite will be selected and subjected to EIA in the near future. The existing site will be rehabilitated by excavating a deep trench, lining with impervious material and pushing the existing dump material into the trench, finally covering with soil.

No recycling of metal, glass or paper/cardboard waste occurs in the country, although collection of aluminium cans for recycling has been undertaken previously. A procedure has been established for waste oil to be treated and then burned as supplementary fuel at the phosphate mine. It is understood, however, that oily wastes are still often incorporated in the general garbage stream.

The Environment Unit of the Ministry of Industry and Economic Development has begun an environment education programme including, *inter alia*, school study kits, posters at boat ramps to encourage retention of rubbish on board the small craft and participation in World Cleanup Day.

The current management of medical and quarantine waste requires considerable revision and is recognised by the passage of the *Quarantine Service Act* this year. At present medical waste is collected daily and aircraft waste five times weekly in sealed bags for transport to the Mormon Dump for open pit burning. Arrangements are under way for staff from the Environment Unit to undergo on-the-job training in the Federated States of Micronesia. It is anticipated that a suitable incinerator will be made available through aid programmes.

There are three sewage discharge lines north of the boat harbour which discharge untreated sewage at the face of the reef. They service the hospital, Nauru Phosphate Corporation complex and a septic tank disposal pit. There are no plans at present for any extension of the sewerage system or for any treatment system.

A National Environment Coordination Committee has been established to implement the Action Plan prepared as part of the National Environment Management Strategy the Com-

mittee intends to address some of the issues identified in this report.

2.4 Summary and Conclusions

From discussion with the relevant authorities it would appear that the Republic of Nauru has no identified demand for ship waste reception facilities. There are no inter- island ferries in operation due to the relative isolation of Nauru and most of the travel to other islands and Australia and New Zealand is by the national airline.

Whilst Nauru is not a signatory to the Tokyo MOU most of the phosphate carriers trade to countries which are signatories and do exercise Port State Controls. There is insufficient trained technical staff to conduct such inspections or to enforce the requirements of the MARPOL 73/78 Convention and its Annexes and there appears to be little incentive to enact appropriate legislation in this regard. The Draft 1997 Marine Environment Act does establish penalties for illegal discharges and should cover most eventualities.

The transport and discharge of heavy fuel oil does present some degree of risk of pollution and it would be advantageous for Nauru to consider accession to the 1969 Intervention Convention and its 1973 Protocol and the 1992 Civil Liability Convention Protocol and 1992 Fund Protocol.

2.5 Conclusions

Nauru experiences little demand, if any, for the reception of waste from international shipping. Domestic shipping is minimal and comprises two small port vessels plus trailed private boats.

Nauru should give consideration to accession to the two conventions related to compensation for oil pollution damage, the1969 Intervention Convention and its 1973 Protocol and the 1992 Civil Liability Convention Protocol and 1992 Fund Protocol. Additionally, in support of the intent of the SPREP Protocol on regional co-operation in combating pollution by oil and other harmful substances in cases of emergency, consideration should be given to accession to the OPRC 90 Convention.

3. RECOMMENDED IMPROVEMENTS

The demand for the reception of waste from international shipping visiting Nauru is essentially nil, and domestic shipping activity is minimal, with consequently only minor demand for waste reception.

3.1 Legislative Issues and Status of Relevant Conventions

Nauru should accede to MARPOL 73/78, in order to enhance regional effectiveness and cooperation in the application of the convention.

3.2 Compliance Monitoring and Enforcement

No Port State Controls are currently exercised by Nauru. The nation should, however, participate in any regional scheme to ensure that Nauru is not considered a refuge from surveillance by ships trading in that area of the Pacific islands region.

3.3 Regional Waste Management Opportunities

Nauru has recently commenced burning waste oil as a supplementary fuel at the phosphate mine, including oil transferred from Kosrae, FSM. This scheme should be expanded if possible to accept more waste oil from the Pacific islands region. The longevity of this programme is uncertain, however, given the intention to cease phosphate mining operations in Nauru in the near future.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Aiwo

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Provide bins on wharves.	Nil demand. Nil reception required.
Recyclables	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.	Nil demand. Nil reception required.
Quarantine wastes	n/a	Nil demand. Nil reception required.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage.	Nil demand. Nil reception required.
Oily wastes (waste oil)	Provide waste oil collection drums at facilities used by small boats.	Nil demand. Nil reception required.
Oily wastes (oily water)	Nil action required. Demand minimal.	Nil demand. Nil reception required.
Sewage	n/a	Nil demand. Nil reception required.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Aiwo
Nation/Territory: Nauru

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1] kg/pers.day (at sea)	Garbage [1] Amount per ship visit (kg)	Garbage [1] Annual mass (t)	Garbage [1] Annual volume (m^3)	Sludge and Waste Oil [1] m^3/day (at sea)	Sludge and Waste Oil [1] Amount per ship visit (m^3)	Sludge and Waste Oil [1] Annual amount (m^3)	Oily Bilge Water [2] Amount per ship visit (m^3)	Oily Bilge Water [2] Annual amount (m^3)	Sewage [3] L/pers.day (in port)	Sewage [3] Amount per ship visit (m^3)	Sewage [3] Annual amount (m^3)
Merchantmen	18	10000	7	1.5	100	1.5	189.0	18.9	94.5	0.18	1.26	126	n/a	n/a	70	1.9	189.0
Cruise Liners	1500	20000				3.0	0.0	0.0	0.0	0.27	0.00	0	n/a	n/a	70	0.0	0.0
Inter-island Traders						1.5	0.0	0.0	0.0	0.05	0.00	0	5	0	30	0.0	0.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500				1.7	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	50	0.0	0.0
Warships (small)	20	110	5	2	1	1.3	130.0	0.1	0.7	0.01	0.05	0	5	5	50	2.0	2.0
Fishing (oceanic)	18	250				1.8	0.0	0.0	0.0	0.02	0.00	0	10	0	40	0.0	0.0
Fishing (local)	2	n/a	1	n/a	300	0.8	1.6	0.5	2.4	0.005	0.01	2	n/a	n/a	n/a	n/a	n/a
Local workboats	3	n/a	1	n/a	300	0.5	1.5	0.5	2.3	0.01	0.01	3	0.05	15	n/a	n/a	n/a
Yachts (itinerant)	3	n/a				0.5	0.0	0.0	0.0	n/a	0.01	0	n/a	n/a	20	0.0	0.0
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**20**	**100**			**131**		**20**			**191**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

NEW CALEDONIA

1. PRELIMINARY

1.1 Introduction

New Caledonia is a French administered Pacific territory. It has more than 20% of the world's identified nickel deposits, and the extraction, processing and export of nickel ore and nickel products dominates the local economy. Tourism is another major source of revenue.

Nations/territories most closely neighbouring New Caledonia are Vanuatu to the northeast, Fiji to the east, Australia to the west, and New Zealand to the southeast.

1.2 Geography

The total land area of New Caledonia is 18,575 km^2, with a declared EEZ covering 1,740,000 km^2. The territory mainly comprises a number of high island groups of volcanic origin, plus groups of low-lying coral atolls.

In addition to the port facilities in Noumea, a number of other ports operate around New Caledonia. These include dolphins with offshore conveyor systems for the loading of nickel ore into bulk carriers, small boat harbours and marinas, and minor commercial ports, including roadstead operations, in outlying islands.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

France, New Caledonia's territorial administrator, is a signatory to Annexes I, II, III, IV and V of MARPOL 73/78, plus the London Convention. The provisions of these MARPOL annexes have been given effect in French national law. Although France has not formally advised the IMO of an extension of the provisions of MARPOL 73/78 to New Caledonia, it is inferred that this is nevertheless the case. It is understood that Port State Controls are not exercised by either New Caledonia or French territorial authorities. Neither France nor the territory is a Party to the Tokyo MOU.

1.3.2 Local Legislative Issues

There are no local marine pollution or waste management laws currently in operation within New Caledonia, nor are any under development; nevertheless, a regime of inspection and audit of waste management contractors is in operation. Furthermore, Noumea port regulations prohibit the discharge into harbour waters of garbage, sewage and oily wastes. Environmental impact assessment in New Caledonia is undertaken and conducted to a level consistent with standards applying in metropolitan France.

The territory also has laws addressing plant and animal quarantine. These concentrate upon threats to agriculture and a re considered to provide minimal biodiversity protection.

2. PORT REPORT: NOUMEA

2.1 Description of Port and Associated Shipping/Boating Activities

Noumea is New Caledonia's main port and may be considered a major regional port. It is a sophisticated and modern port operation that supports a wide range of merchant, passenger, fishing, tourist, recreational and naval traffic, and is also a centre of maritime support and ship repair. In addition to the main commercial wharf areas for passenger and merchant ships, the port of Noumea also boasts three marinas and two anchorages dedicated to pleasure craft.

The main commercial facilities comprise a number of wharves and pens capable of taking up to 12 ships simultaneously. Depth alongside is in the order of 10 m. Anchorages for up to six ships are also available within the port area. A dedicated overseas passenger terminal has been constructed and Noumea is a major port of call for cruise liners plying South Pacific routes. A six-point mooring exists for the transfer of liquid petroleum products. Merchant traffic into and out of the port mainly comprises oil and LPG tankers, bulk ore carriers, container and ro-ro ships. The wharves do not possess cargo-handling gear and so rely upon visiting ships being geared.

An inter-island ferry, three small inter-island traders, and eight local fishing boats operate from Noumea, as do a number of police and fisheries patrol vessels, tugs and miscellaneous harbour craft. The French Navy maintains a permanent presence, with three patrol and two support vessels based within the port. A large number of tourist vessels, providing fishing, diving and pleasure cruising services, also operate from the port.

International traffic into and out of Noumea is dominated by containerised cargo, but also contains significant amounts of break-bulk items, such as building materials and vehicles. This is in addition to the considerable movement of dry bulk items through the port, mainly mineral ores and related products.

International merchant traffic into and out of Noumea principally operates between Australia, New Zealand, Singapore and France, with voyage duration ranging from as little as four days to as much as 40. Considerable trade is also conducted with neighbouring island states, especially Vanuatu and the French territory of Wallis and Futuna. Many ships in excess of 20,000 tons call into Noumea. In 1999, about 260 container/break-bulk carriers, 35 car ferries, 76 oil and gas tankers, and 200 bulk carriers visited Noumea. This is in addition to 270 visits by domestic inter-island traders and 55 overseas cruise liners.

Cruise liners, with combined complements of passengers and crews of the order of 2,000 persons visit Noumea continually, and it is common for two to three such ships being in the port simultaneously. The duration of visits varies from a few hours to overnight. About 10 major warships, generally carrying around 200 or more crew, visit the port on average every year and usually stay for two to five days. Around 60 FFVs visit Noumea each year, usually for two to three days.

A very large number of itinerant yachts call on New Caledonia each year. These vessels mostly come from Australia and New Zealand and neighbouring Pacific islands, but also further afield from the United States and Europe. Visiting yachts normally stay in berths at one of Noumea's marinas, and people are permitted to live onboard while in harbour.

There are no planned major increases to the capacity of the port or the range of activities, although a modest enhancement is intended for the wharf facilities provided for local fishing boats.

2.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Noumea is considerable, observing the number of ship visits, particularly large cruise liners. The requirement for ship waste reception facilities may be expected to be exacerbated by the exceptionally long voyages made by ships transiting directly between New Caledonia and Europe.

The regular visits of numerous cruise liners presents the requirement to deal with considerable amounts of garbage. Assuming an average of 1,500 passengers and crew each generating 2.5 kg/day, on a four-day transit from the previous port, with 50% of garbage (mainly food waste) disposed of to sea en route, then garbage in the order of 7 tonnes to 8 tonnes (with a volume of 12 to 13 m^3) could be landed at Noumea per ship visit. This equates to 385 tonnes to 440 tonnes of garbage annually from cruise ships alone (Note: These estimates are more refined than those presented in Appendix D which employ more generic modelling data). The reality is that much more garbage is likely, given the tendency of international shipping to retain garbage onboard until arrival at a suitable port, such as Noumea. This should be considered in the context that the maximum recorded amount of garbage in a single transfer from a cruise liner at Noumea was around 100 m^3.

To the garbage generated by cruise ships must also be added that from merchant vessels. Assuming that the 570 merchantman visits in 1999 seven days of accumulated garbage from crews of 18 (18 crew @ 1.5 kg/pers.day = 27 kg garbage per day; 7 days = 189 kg), then a further 107 tonnes of garbage per annum would be sourced from merchant ships.

The amount of cargo associated waste generated in Noumea, such as broken pallets, strapping and packaging material, is also likely to be quite significant, given the volume of shipping.

Oily wastes, in the form of sludge, waste oil and oily bilge waters are also collected in Noumea. Estimates of the amount collected for disposal are difficult to define, especially when considering that many international ships are now fitted with incinerators and/or holding tanks sufficient that discharge of the oily wastes would not be necessary in Noumea. However, assuming that the inter-island trading vessels do require to discharge in Noumea, and that they generate about 0.05 tonnes/day of sludge, then the 269 vessels which called on Noumea in 1999 (assuming a four-day round-trip voyage) potentially produced in the order of 55 tonnes of oil sludge. This is in addition to waste oil and oily bilge water.

No specific waste management plan exists for the Port of Noumea. Effective waste management procedures are, however, in place. Waste management is undertaken by contractors on behalf of the South Province Government. Charges are levied for the collection and disposal of waste. These are $A30 day for a 15 m^3 bin, plus $A115 for removal and $A10/tonne for disposal at landfill. Costs for the disposal of waste oil are not known.

2.2.1 Garbage

All forms of ship-generated garbage are accepted at Noumea. Reception facilities appear to be well provided and well maintained. Garbage is removed from the port area to a transfer station where it is sorted into categories. Aluminium and cardboard are separated from the waste stream and exported to Australia for recycling. Green waste is also removed and composted. All other garbage is disposed in the municipal landfill.

2.2.2 Quarantine Wastes

New Caledonia enforces barrier controls. Quarantine wastes are not at present, however, separated from non-quarantine material. All garbage is disposed in lined, deep landfill. It is intended to commission a waste incinerator in 2002, at which time quarantine wastes will be incinerated.

2.2.3 Oily Wastes

Modern, well-maintained reception facilities and services are provided for all types of waste oil and oily wastes. These include fixed wharf discharge points, sullage trucks and waste oil collection tanks. The latter are generally situated within bunded enclosures.

Waste oil is collected and then disposed by burning as fuel in the local power station. It is envisaged that waste oil may be incinerated when the new waste incinerator enters service in 2002.

Oily rags and used oil filters are not collected or disposed of separately. These items are contained within the general garbage stream and disposed to landfill.

2.2.4 Special, Hazardous or Noxious Wastes

No special procedures were in evidence for the separate collection and management of hazardous or noxious wastes. Nevertheless, it is understood that items such as batteries are removed from the garbage waste stream at the transfer station and are stockpiled awaiting the implementation of suitable means for disposal.

2.2.5 Sewage

The discharge of sewage from vessels within the Port of Noumea is banned. Port Moselle, an embayment within the greater port, does experience odour and water quality problems, but these derive from the discharge of wastewater and stormwater from the fish markets and the municipal stormwater system.

No holding tank pump-out facilities are provided in the harbour. Nevertheless, septic pump-out trucks are conceivably available to provide such services, and toilets, ablutions and laundry facilities are provided ashore in Noumea's marinas.

2.3 Discussion

Ship waste reception in the Port of Noumea is effective and well managed. Both international and local shipping are well catered for, with all wastes being managed and disposed of in an environmentally acceptable manner.

The only noted, albeit marginal, deficiencies are with the collection and disposal of quarantine waste and used oil filters. Quarantine waste is

currently handled within the general waste stream, introducing the risk of ineffective isolation and so non-containment of pathogens and other organisms of concern.

2.4 Current Terrestrial Waste Management Practices

All terrestrial wastes in the municipality of Noumea are well managed, although there is latitude to improve the collection and disposal of special and hazardous wastes. Garbage and oily wastes from terrestrial sources are handled in exactly the same manner as are their vessel-sourced equivalents; in fact, vessel-sourced waste enters and is treated within the general waste stream for Noumea. Hospital wastes are incinerated.

The current landfill operation for Noumea is not run in accordance with best international practice. A plan is in place to develop a new best practice landfill.

Sewage within Noumea is disposed of to septic tanks. These are pumped as required and the septage treated. Recovered sludge is either sold as a soil amendment or else disposed to landfill. Current sewage disposal measures do not present as environmentally unacceptable.

2.5 Summary and Conclusions

New Caledonia possesses a relatively sophisticated and sound technical and economic base. Through France, its territorial administrator, Annexes I to V inclusive of MARPOL 73/78 apply within New Caledonia, however, there is no evidence of active inspection of shipping to ensure compliance.

Essentially all forms of waste management are well managed in the territory. By virtue of its large land mass and technical competency, New Caledonia is self-sufficient in waste management, with the exception of the need to export certain materials for recycling and the current lack of an effective solution for the disposal of special items such as batteries, and presumably chemical wastes. The current demand for the reception of ship wastes is intense and well-catered for.

In conclusion:

- ship waste reception facilities and procedures at Noumea are generally well developed and well run and appear to be sufficient for the current, intense, level of demand. This includes both domestic and international shipping;
- current quarantine waste procedures are generally adequate but may be improved by implementing separate, dedicated means for the collection and disposal of quarantine wastes;
- effective means for the separate collection, handling and disposal of hazardous wastes need to be implemented;
- waste oil and oily wastes are effectively collected and treated, with the exception of used oil filters; and
- the discharge of sewage from vessels in Noumea does not present as either a waste management or water quality issue.

3. RECOMMENDED IMPROVEMENTS

New Caledonia experiences significant demand for the reception of ship-generated wastes. Current procedures are considered to be adequate for the management of all components of the ship-generated waste stream, with the exception of the handling and disposal of quarantine materials and hazardous wastes.

3.1 Legislative Issues and Status of Relevant Conventions

France should formally advise the IMO of the extension to New Caledonia of French accession to relevant IMO treaties.

3.2 Compliance Monitoring and Enforcement

The status of implementation of Port State Controls in the territory is uncertain. Nevertheless, regional cooperation in the application of Port State Controls should be enhanced.

3.3 Regional Waste Management Opportunities

- New Caledonia should evaluate options for export of hazardous wastes to neighbouring nations (Australia or New Zealand), for appropriate treatment/disposal.
- Potential exists for Noumea oil recovery services to play a wider regional role by accepting waste oil and oily mixtures from

neighbouring Pacific island states.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Noumea

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Nil action required. Current practices adequate.	Nil action required. Current practices adequate.
Recyclables	Review opportunities for recycling and implement measures as warranted. Link with wider municipal/national schemes.	Review opportunities for recycling and implement measures as warranted. Link with wider municipal/national schemes.
Quarantine wastes	n/a	Review quarantine procedures to ensure all wastes presenting quarantine risk are adequately disposed.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage.	Review current procedures to ensure diversion of hazardous/special wastes from general garbage.
Oily wastes (waste oil)	Nil action required. Current practices adequate. Ensure diversion of oily rags and used oil filters from general garbage stream.	Nil action required. Current practices adequate.
Oily wastes (oily water)	Nil action required. Current practices adequate.	Nil action required. Current practices adequate.
Sewage	Nil action required. Current practices adequate.	Assess requirement for provision of holding tank pump-out facilities (principally for itinerant yachts).

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Noumea
Nation/Territory: New Caledonia

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	15000	6	1.5	570	1.5	162.0	92.3	461.7	0.18	1.08	616	n/a	n/a	70	1.9	1077.3
Cruise Liners	1200	20000	5	1.5	55	3.0	18000.0	990.0	4950.0	0.27	1.35	74	n/a	n/a	70	126.0	6930.0
Inter-island Traders	12	2000	2	3	270	1.5	36.0	9.7	48.6	0.05	0.10	27	5	1350	30	1.1	291.6
Inter-island Ferries	200	300	2.5	n/a	110	1.5	750.0	82.5	412.5	0.05	0.13	14	2	220	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	10	5	25	1.7	3400.0	85.0	425.0	0.18	1.80	45	n/a	n/a	50	50.0	1250.0
Warships (small)	25	480	10	5	100	1.3	325.0	32.5	162.5	0.05	0.50	50	5	500	50	6.3	625.0
Fishing (oceanic)	18	250	12	2	60	1.8	453.6	27.2	136.1	0.02	0.24	14	10	600	40	1.4	86.4
Fishing (local)	8	n/a	4	n/a	400	0.8	25.6	10.2	51.2	0.005	0.02	8	n/a	n/a	n/a	n/a	n/a
Local workboats	4	n/a	1	n/a	2200	0.5	2.0	4.4	22.0	0.01	0.01	22	0.05	110	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	5	5	500	0.5	15.0	7.5	37.5	n/a	0.01	5	n/a	n/a	20	0.3	150.0
Local craft (day trips)	2	n/a	1	n/a	40000	0.5	1.0	40.0	200.0	n/a	0.001	40	n/a	n/a	n/a	n/a	n/a
					Total			**1381**	**6907**			**915**		**2780**			**10410**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

NIUE

1. PRELIMINARY

1.1 Introduction

Niue is a single uplifted coral atoll, fully self-governing in free association with New Zealand, with New Zealand maintaining responsibility for the external affairs and defence. The nation remains heavily dependent on foreign financial and technical assistance.

1.2 Geography

At 259 km^2 Niue is the largest single coral atoll in the world. Niue lies roughly 480 km to the east of Tonga, a fairly similar distance to the south of American Samoa, and roughly 930 km west of Rarotonga in the Cook Islands.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

Niue is not a member of the IMO and has not ratified or acceded to any international maritime conventions in its own right, although it is a party to a number of other multilateral treaties. Niue is not a signatory to MARPOL 73/78 or the London Convention on Sea Dumping. Both of the latter conventions have been adopted in the Niue Prevention of Marine Pollution Bill, although Niue is yet to accede to them.

The situation with regard to international treaties is a little confused, owing to the fact that under Niue's Constitutional arrangement, New Zealand acts on Niue's behalf in all foreign matters. However, New Zealand can only enter into international agreements for Niue at the request of the Niue government. As far as can be determined Niue has not requested New Zealand to enter into agreement on behalf of Niue with the IMO in general nor MARPOL 73/78 in particular. Hence it is understood that New Zealand's membership does not cover Niue. New Zealand has been requested by Niue's Crown Counsel to provide details on all international conventions and agreements it has entered into agreement on Niue's behalf to clarify the situation. The IMO has not been formally advised by New Zealand of the extension of New Zealand's accession to MARPOL 73/78 to also cover Niue.

1.3.2 Local Legislative Issues

The New Zealand *Marine Pollution Act 1974* is currently Niue law and provides for prevention and management of pollution at sea. Although the latter is the only legislation dealing with marine pollution *per se*, various other legislation and draft legislation dealing with relevant waste disposal and pollution issues also exist. The Plant Quarantine Regulations 1985 deal with disposal of garbage etc from ships, aircraft and other conveyances, however it does not directly provide for the regulation of sewage and ballast disposal. The *Water Resources Act 1996*, provides purpose to ensure the proper disposal of any waste products that will pollute water, and creates an offence for the pollution of water (including seawater).

The Prevention of Marine Pollution Bill 1996 deals specifically with marine pollution issues yet remains to be enacted. There are currently no specific environmental laws in Niue however an Environmental Bill has been drafted. The Environmental Bill is intended to be a framework Act, and it is anticipated that specific areas of concern, including marine pollution, coastal zone management, Environmental Impact Assessments, etc, will be provided for by way of regulation or amendment pursuant to the above-mentioned Bill.

2. PORT REPORT: ALOFI

2.1 Description of Port and Associated Shipping/Boating Activities

Alofi is Niue's only port and all visiting vessels call at Alofi. Alofi has the only wharf facility on the island and is also the major operating base for the majority of the 61 small local fishing craft which operate year round. Port facilities comprise a single concrete jetty protruding out to sea with an angled ocean deflecting front and an alongside working face of approximately 40 metres, and an apron area of approximately 1,100 m^2. Lighting is provided on the wharf for night operations. The wharf has sufficient cargo handling facilities and a limited storage area to handle current cargo demands. Extremely large machinery/cargo is sometimes required to be

dismantled to fit into barges and be lifted by local crane with 30 tonne maximum lifting capacity. All cargo handling plant and facilities on-shore are mobile except for a permanent mounted automated lifting derrick (10 tonne capacity).

Limited anchorage is available directly out in front of the wharf for large cargo and passenger vessels and if more than two such vessels are in port simultaneously, additional vessels are generally required to drift further offshore until space is available within the anchorage area. Anchoring is restricted as much as possible to a small area to reduce damage to the reef as no ship moorings are available at present. A small number of yacht moorings are installed seasonally and are in high demand in peak season when up to 30 plus yachts are sometimes present. An average of 150 itinerant yachts now visit Alofi annually with a growing trend visible.

Niue is currently serviced by two shipping lines (Cook Islands National Line and Reef Shipping) providing a regular service of one trip per month each to Alofi. Both services originate out of New Zealand with calls in the Chatham Islands, Tonga, Niue and then Rarotonga (or reverse), and are carrying predominantly containerised cargo with limited amounts of break bulk cargo, principally building materials and motor vehicles. Visits into Alofi are almost always a day in duration. Typical sailing time into and out of Alofi is three days to/from the next/previous port. Cargo vessels currently anchor off the wharf and discharge via a barge and launch operation. The latter operation involves the bulk of operations carried out by the 13.5 tonne government work launch with the exception of fisheries support deployments and servicing operations. The container vessels serving Niue average at about 1,500-2,000 GRT, have and estimated age of 20 years, are almost entirely powered by diesel engines, and have a complement of 10-15.

Petroleum products arrive via tanker (usually around 3,000 GRT) from Fiji via Tonga and are pumped by floating hose up to a tank farm (approximate capacity 1,000 m^3) immediately adjacent to the wharf (Bulk Fuel) from an anchored position off the end of the wharf usually with tie lines onto the wharf. Niue is generally the last port of call before returning to Fiji to reduce risks of large-scale spillage in Niue waters.

Alofi generally experiences the arrival of three cruise vessels a year on an irregular schedule, with vessels varying is size but typically arriving from Rarotonga and Tonga and offloading around 200-400 passengers with a turn around time in port of 12-24 hours. At least one naval vessel visits Alofi each year on average, usually with a crew of 100 plus and typically staying for two or three days. On average one small foreign-based fishing vessel visits Alofi annually, usually in the range of 15-30 m with average crew of three and tying along side for minor repairs or fuelling.

A number of plans to improve and increase the capacity of the port have been proposed over the years with one major development to extend the wharf being carried out 3 years ago to allow along side berthing and discharge operations, however rough seas destroyed the completed extension. It is anticipated that the only near future upgrade will be to the crane capacity (increase to 50 tonnes) and possible small boat harbour/marina development. The latter development would benefit local fishing operations and tourism activities (cruise ship passengers etc) as well as improve safety for barge operations.

2.2 Demand for Ship Waste Reception Facilities

There is currently a small but growing demand for waste reception facilities in Alofi by increasing numbers of visiting itinerant yachts. The disposal of sewage is currently prohibited from vessels and no facilities are currently available to cater for this. Varying amounts of packaging waste is generated from cargo ship loads and this is generally cleaned up by the Public Works Department (PWD) when on-shore cargo handling operations shift from the wharf to the PWD depot. This garbage ends up at the local landfill dump. This is an area requiring more vigilance as this operation is not always carried out effectively.

No waste management plan currently exists for the port of Alofi, although it is accepted that this area will be covered under an all-encompassing Niue WMP which is being developed. No specific fees are currently charged to visiting vessels for waste disposal although changes to this situation are under consideration.

2.2.1 Oily Wastes

There are no specific facilities available for the collection and disposal of waste oil on Niue (AusAID, 2000), although a waste oil collection facility is being constructed. No oily wastes are accepted from international shipping except for small packaged quantities deposited by yachts into quarantine bins (estimated <100 L/yr). Until recently all local derived oily waste has been used as either fuel for burning rubbish, as rust preventative on old machinery/plant, and line marking of sports fields. Yacht oily wastes have been incinerated along with other garbage.

Oily water interceptor tanks are present in the Bulk Fuel tank farm for tanker discharge and flushing operations. Only old and limited oil spill emergency equipment is available at the wharf.

2.2.2 Garbage

The only waste reception facilities in Alofi port at present are two regularly cleared 200 litre quarantine bins. Based on an established six month yacht season (May-October) and available estimates from quarantine services of the number of quarantine garbage bins collected and disposed of in a year (~100), the current annual demand for waste reception facilities by yachts and small local vessels is estimated to be in the vicinity of 20 m^3 or 7-7.5 tonnes (average 200L bin ~75kg). All wastes currently deposited into quarantine bins are incinerated. Local fishing boats produce very little garbage, most of which is taken home and either burnt or deposited in rubbish collection bins for local landfill. Current facilities are sufficient to handle this demand if maintained, however during peak flow incineration facilities are often stretched to the limit. No sorting is carried out for recycling purposes or isolation of hazardous waste.

Any increases to the current peak flows of garbage are expected to exceed quarantine incineration capacity and sustained peak flows for extended periods would also put pressure on current facilities. On rare occasions during heavy peak flows some bin loads have been burnt at the local landfill. Alofi port has no capacity at present to cater for wastes from large vessels, and it is anticipated that a zero acceptance policy will need to be maintained for all large international shipping, to carry another port with waste to be retained on board or discharge at another port or disposed to sea if permissible.

2.2.3 Quarantine

As noted above, the only provision for garbage in Alofi port at present are two quarantine bins. All quarantine wastes are required by law to be deposited into these bins and all visiting vessels are informed of this during mandatory quarantine inspections/clearance and in a quarantine "Notice to Masters". Current facilities are adequate to handle demand from those vessels permitted to offload wastes. All wastes are removed by truck from the wharf and incinerated however other non-quarantine wastes, sometimes hazardous, are also incinerated, though is not considered an appropriate and safe practice.

2.2.4 Special, Hazardous or Noxious Wastes

Very little waste under these categories are included in the waste received across the wharf (quarantine bins) and no specific facilities are available for hazardous or noxious wastes except for the recent introduction of collection points for used batteries and assorted chemicals through the Health Department waste management plan/program. These collection points are away from the port area and sorting and transporting of such waste from the current quarantine facilities to these points will need to be considered.

2.2.5 Sewage

Disposal of sewage and ballast from all vessels is prohibited by policy and as an accepted international practice, although specific legislation covering the discharge of sewage is not evident in current Niue laws. It is understood that large ships observe these prohibitions however it is suspected that some of the visiting itinerant yachts are discharging raw sewage into the port area. Toilet and shower facilities are available on the wharf with separate single units for yachts and the general public.

Terrestrial sourced sewage is currently collected and disposed of through septic tanks, water seal long-drops, and long-drop facilities. Septic sludge is disposed directly onto the ground in

designated areas (AusAID, 2000). With the island's main source of fresh water coming from an underground lens contamination from sewage is a major concern. While this is not currently a problem the current collection and disposal practices, with the exception of standard approved septic tanks, have been identified as ineffective and various mitigation measures have been proposed under the National WMP.

2.3 Discussion

With a zero acceptance of wastes from large vessels, the current demand for waste reception facilities at Alofi Port is considerably low, and current waste reception facilities, while limited, can be considered adequate if maintained and managed effectively. Management of landed wastes could be improved, for safety and environmental reasons, if oily, noxious and hazardous wastes are sorted and disposed of by a means other than incineration. Incineration facilities are considerably old and will need to be upgraded in the very near future in order to maintain current capacity to handle waste demands. Recycling of any wastes is not considered an option at present.

Predicted increases in yacht numbers and possible expansion of the local fisheries sector, currently being pursued by government, is expected to increase waste demand and additional services or extension of the current services will need to be considered. Monitoring and control of sewage or bilge (or ballast waters) is virtually non-existent at present and should be addressed along with the enactment of the Prevention of Marine Pollution Bill and strengthening of other legislation in order to ensure the effective control of marine pollution in Niue. Fees for collection and disposal of wastes will need to be incorporated into current mooring or immigration fees, or otherwise instituted in order to assist government in maintaining current and future services.

2.4 Current Terrestrial Waste Management Practices

With a small population, limited industry, and limited acceptance of wastes from port activities, Niue enjoys a relatively unpolluted environment and is not currently considered to have extensive waste management problems. While this may be the case, areas of improvement to present waste management practices to safeguard against any future problems are being addressed through the development of a National WMP as part of an AusAID waste management project. One of the main factors behind the project is the protection of the islands freshwater lens, which is considered one of, if not the, island's most valuable resource.

A waste stream analysis study was carried out in June/July 2000 under the AusAID WMP project to provide baseline data on the volume and characteristics of the waste produced by the community. With limited commercial and industrial activities domestic waste is the major solid waste component produced on the island. The analysis indicates that each household (av. 3.6 occupants) generates 1.30 kg/day solid waste, equating to 478.4 kg or 2.84 m^3 per annum (by av.wt: 6.5% disposable nappies; 8.1% metal cans; 14.7% paper/packaging; 6.9% plastic; 1.6% glass; 9.6% food scraps; 44.7% green waste; 8% other). The 517 occupied households generate an estimated 247.2 tonnes/year or 1465.34 m^3. Private transporting of waste to dumps is estimated at an additional 20% of the above volume.

There are currently seven waste tips on the island, the main tip is located in Alofi South (30-36m^3/wk) and the other six smaller tips (6 m^3/wk) spread fairly evenly around the island.

Calculations under the WMP estimate a dumping area of approximately 600 m^2 (based on a 2.5 m deep tipping face plus 200 mm cover material) will be required annually under current generation rates (1500 m^3/year), although this could be substantially reduced if green waste is separated. It is proposed that the number of tips be reduced to two which can be managed more effectively and allow limited resources to be used more efficiently (AusAID, 2000). Until recent nearly all waste was generally tipped, burned and pushed/crushed by bulldozer or loader with little to no cover material being applied. Under the waste management project more modern techniques of landfill have been employed, including the use of a sheepsfoot roller and covering of the landfill. Availability of land and cover material is not considered a major problem at present however the cost of proper landfill management is expected to be a constraint.

A domestic waste collection scheme has been in place for considerable time now, previously operated by the Health Department this has now been transferred to a local contractor. The collection service is provided to every household on the island at least once per week, and two to three times a week to each household in the capital Alofi. The contractor service consists of a high sided tip truck with collection capacity of ~6.4m^3. There are no limitations currently placed on quantity or type of waste collected and no specific charges are levied against service users. Putrescible waste is usually fed to pigs and poultry.

A small aluminium can recycling operation exists on the island. The operation is supported by a return fee of 5 cents per can and a government policy banning the import of glass bottled beverages (excluding hard liquor). *Ad hoc* recycling of vehicle batteries by local fishermen for lead occurs.

There are no specific facilities available at present to cater for the disposal of oily, noxious, chemical and hazardous wastes except limited collection sites where stockpiling is practiced until disposal alternatives can be identified. Materials being collected include old agricultural chemicals, used oil, and spent vehicle batteries. A hazardous waste audit carried out in July 2000 on all premises likely to produce, use or store hazardous waste identified a 2,110 L on-hand quantity of waste oil and a monthly accumulation of 340 L.

Quarantine wastes are incinerated in a diesel-fuelled incinerator though the incinerator is in need of major repair or replacement. The Health Department also operates an incinerator and most hospital wastes that are safe for incineration are incinerated. Some of the hazardous and old unidentifiable chemical wastes are likely to be packaged and stored for disposal under a SPREP program. Old asbestos waste products, mainly in the form of building materials are being disposed at a government land storage site, which has been deemed a contaminated area.

There are no sewage treatment facilities on Niue. Septic tanks, water seal longdrop, and longdrops are the three methods of sewage collection and disposal utilised by households. The Health Department operates a septic sludge removal service at a fee of $50 per tank. The Niue building code specifies requirements for the construction of septic tanks though these have often been ignored with less than 50% of households on the island utilising septic tanks (AusAID, 2000), with many tanks not meeting required design specifications. Sewage is considered a serious contaminant risk to the local groundwater lens and amendments to the Building Code and increased monitoring of septic tank installations is expected to improve the current situation.

2.5 Summary and Conclusions

Niue is a small nation with a small and fairly static population. With limited natural resources, options for achieving greater economic independence are limited and Niue remains heavily reliant on foreign financial and technical assistance. Niue has not ratified or acceded to MARPOL 73/78 or the London Dumping Convention, although both conventions have been adopted in a recent Prevention of Marine Pollution Bill awaiting enactment. The New Zealand *Marine Pollution Act 1974* is the current law in Niue covering marine pollution issues, although there are a number of provisions relating to pollution of water and waste management scattered throughout a range of other Acts.

While Niue is considered relatively unpolluted, and without extensive waste management problems, freshwater management and waste management remain key areas of environmental and public health focus. Terrestrial waste management facilities, with the exception of oily, noxious and hazardous waste facilities and some sewage facilities/procedures, are considered to be generally adequate yet require some considerable improvements and more efficient and effective management. Economic constraints are likely to impact on the effectiveness of maintained waste management on Niue.

With limited naval, foreign fishing, and passenger cruise vessel activity, international shipping into and out of Niue is limited mainly to inter-Pacific island trading and visiting itinerant yachts. With zero waste acceptance from large vessels, capable of processing or storing wastes for offloading in subsequent ports, ship waste reception facilities are considered just adequate to satisfy the current

demand from visiting itinerant yachts and small vessels permitted to offload waste.

In conclusion:

- current combined quarantine/ship waste reception facilities and procedures at Alofi, though limited, are considered adequate for visiting itinerant yachts and small vessels, with the exception of the current practice of incinerating all wastes without sorting.
- incineration facilities though adequate require upgrading/replacement and routine maintenance to maintain effectiveness of current quarantine waste disposal operations;
- the separation of oily, noxious and hazardous wastes from the port quarantine waste collection bins for appropriate disposal should be employed before incineration, alternatively offloading of such wastes should be prohibited until such time as Niue identifies a strategy to safely dispose of such materials;
- given the limited resources available to increase waste reception capacity, Niue should maintain a zero acceptance of wastes from large international vessels capable of on-board processing or storage of waste;
- the discharge of sewage in port is a concern with increasing numbers of yachts visiting annually. Where holding tanks are available discharge should be prohibited until certain distance offshore, and vessels without holding tanks should be required to use toilet and shower facilities provided on the Wharf;
- current legislation dealing with marine pollution is relatively old and does not adequately cover Niue's specific circumstances. It is appropriate that the Prevention of Marine Pollution Bill be enacted as soon as possible; and
- petroleum discharge operations are high risk in nature and old and limited oil spill emergency equipment currently available at the wharf should be upgraded to increase safety to the public and environment.

3. RECOMMENDED IMPROVEMENTS

Niue experiences limited demand for the acceptance of ship-generated waste, and current reception procedures for garbage are relatively effective, although procedures for the separation from the general waste stream of hazardous wastes need to be improved. As currently practiced, non-acceptance of most waste from international shipping is recommended to continue owing to the limited waste disposal infrastructure.

3.1 Legislative Issues and Status of Relevant Conventions

In consultation with New Zealand, Niue should ascertain the actual status of the application to Niue of IMO conventions to which New Zealand is a Party, given that New Zealand has a role in the foreign affairs of the nation. The feasibility of extending these conventions to Niue should be investigated, and if practicable, the conventions should be formally extended.

If extension of New Zealand membership is not practicable, then Niue should accede to MARPOL 73/78 in its own right.

3.2 Compliance Monitoring and Enforcement

The current application of Port State Controls is minimal. These should be developed in parallel with Niue's formal accession to MARPOL 73/78.

3.3 Regional Waste Management Opportunities

Niue should:

- evaluate options for the export of recyclable materials (aluminium and other scrap metals), and hazardous wastes to other ports in the Pacific islands region or further, possibly New Zealand.
- develop a waste oil collection scheme, linked with an export and recovery programme. Noting tanker delivery routes, export to Fiji is seen as the most likely option.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Alofi

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Current procedures considered adequate.	Nil acceptance, except from itinerant yachts. Current procedures considered adequate (although all garbage is treated as quarantine material).
Recyclables	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.
Quarantine wastes	n/a	Review quarantine waste classification system to ensure only wastes presenting quarantine risk enter quarantine waste stream.
Hazardous/special wastes	Review current procedures to ensure diversion from general garbage stream of hazardous/special wastes.	Nil acceptance.
Oily wastes (waste oil)	Provide waste oil collection drums at facilities used by domestic vessels. Ensure all oily wastes are collected (e.g. diverted from general garbage stream).	Nil acceptance, except from itinerant yachts using same procedures as for domestic vessels.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic vessels.	Nil acceptance.
Sewage	n/a	Ensure shore ablution facilities provided for itinerant yachts are sufficient for level of demand.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Alofi
Nation/Territory: Niue

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	1500	7	1	26	1.5	189.0	4.9	24.6	0.18	1.26	33	n/a	n/a	70	1.3	32.8
Cruise Liners	1000	20000	3	1	3	3.0	9000.0	27.0	135.0	0.27	0.81	2	n/a	n/a	70	70.0	210.0
Inter-island Traders						1.5	0.0	0.0	0.0	0.05	0.00	0	5	0	30	0.0	0.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats	5	n/a	1	n/a	240	0.5	2.5	0.6	3.0	0.01	0.01	2	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500				1.7	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	50	0.0	0.0
Warships (small)	20	110				1.3	0.0	0.0	0.0	0.01	0.00	0	5	0	50	0.0	0.0
Fishing (oceanic)	8	30	10	1	1	1.8	158.4	0.2	0.8	0.02	0.20	0	10	10	40	0.3	0.3
Fishing (local)	2	n/a	1	n/a	15000	0.8	1.6	24.0	120.0	0.005	0.01	75	n/a	n/a	n/a	n/a	n/a
Local workboats	2	n/a	1	n/a	200	0.5	1.0	0.2	1.0	0.01	0.01	2	0.05	10	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	5	5	150	0.5	15.0	2.3	11.3	n/a	0.01	2	n/a	n/a	20	0.3	45.0
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**59**	**296**			**116**		**20**			**288**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS

1. PRELIMINARY

1.1 Introduction

The Commonwealth of the Northern Mariana Islands (CNMI) is a commonwealth in political union with the US. All US Federal laws and regulations are in effect. The economy of CNMI relies upon substantial financial assistance from the US. Tourism and garment manufacturing are major sectors of the local economy.

1.2 Geography

The CNMI has 14 islands, variously of volcanic and limestone origin, with a total landmass of 477 km^2 and a declared EEZ of 1,823,000 km^2. Over 85% of the nation's population of around 60,000 resides on Saipan.

Nearest neighbours are Guam, the Republic of Palau and the FSM to the south, the Philippines to the west, Japan to the north and the Hawaiian Islands to the east.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

The CNMI has adopted the US Federal laws and regulations. The US is a signatory to MARPOL 73/78 Annexes I, II, III, and V. It is not a signatory to Annex IV. Local authorities exercise Flag and Port State controls. MARPOL 73/78 has been given effect in the *Coastal Zone Management Act* 1983 administered by the various US federal agencies under the Department of Lands and Resources. These include the Divisions of Environmental Quality (DEQ), Fish and Wildlife and the Resource Management. The US Coast Guard is responsible for all maritime enforcement and is the agency responsible for coordinating all marine pollution responses and contingency plans. The Coast Guard's main regional office is in Guam.

The US is a signatory to the London Convention, SPREP Convention, SPREP Dumping Protocol and the SPREP Pollution Protocol.

1.3.2 Local Legislative Issues

The CNMI has adopted the US Federal environmental laws and regulations. Therefore, all regulations and activities applying in ports within the CNMI are the same as in US ports. In addition to the *Coastal Zone Management Act* 1983 each US Federal Division has adopted all US laws addressing port and marine issues. Within the Act and the subsequent Division regulations, provisions have been made that directly relate to offences for the to the discharge of sewage, garbage and similar materials into port waters. The enforcement of these regulations is the responsibility of the Coast Guard with the assistance from the other US Federal agencies.

2. PORT REPORT: SAIPAN

2.1 Description of Port and Associated Shipping/Boating Activities

The CNMI has one commercial dock (Port of Saipan), located on the western side of the island of Saipan. Additional ports are located on the islands of Rota and Tinian; these were not evaluated during the current project. All international merchant vessels use the Port of Saipan, as well as all visiting naval vessels. Associated with this port is a smaller 'U' shaped dock, located at the northern end of the port, which is used by the government pilot, tug and police boats as well as the larger inter-island passenger vessels. A small fisheries dock is located within the harbour and a floatplane ramp is used for the small commercial slip way. To the south of the main commercial dock there are two marinas. One is used for commercial vessels, the majority of which are tourist boats (Commercial Marina) and the second is used for private vessels (Pleasure Marina).

The Commonwealth Ports Authority owns and is responsible for the commercial port and the associated docks within the harbour. The management of the commercial dock facility is leased out to private company, Saipan Stevedoring and Terminal Incorporated. The commercial marina is a joint venture between the government of CNMI and a private company

and the Pleasure Marina is privately owned and operated. There are only a few smaller docks located on the island and the majority of private boats are removed from the water when not used.

The commercial port of Tinian is in need of repair and its current usage is minimal. A rehabilitation and development plan has been developed but is yet to be implemented. It has been estimated that the rehabilitation program will cost in the order of US$50 million. The commercial port of Rota is currently in better condition and can accommodate small cargo (building supplies, vehicles) and passenger vessels. A development plan has also been formulated for Tinian port but has yet to be implement.

The commercial port of Saipan has one main dock that is separated into three main berths. The dock is constructed of concrete and the commercial berths have a combined length of 600 m and an average depth alongside of 13 m. All merchant ships use this wharf. The port can accommodate three cargo vessels at any one time. Permanent anchorage sites for a maximum of 10 merchant ships are available within the lagoon immediately off from the wharf and all vessels are required to lay-off at anchor while awaiting access to a berth. Additional anchorages are available outside the lagoon if required. All vessels come alongside the wharf to load or unload cargo. The wharf possesses cargo-handling gear, including cranes with lifting capacities of 200, 150, 120 and 50 tonnes, and an assortment of top lifters and fork lifts.

Associated with this port is a smaller 'U' shaped dock, located at the northern end of the dock, which is used by the government pilot, tug and police boats as well as the larger inter-island tourist vessels. These docks are constructed out of concrete and all vessels come alongside. The passenger "shuttle" vessels that service the islands of Rota and Tinian use this port as their main terminal location. Within the port there are several other small wharves used for an assortment of purposes. The largest of these is located on the opposite side of the commercial port and is used by the local fishing fleet. Associated with this dock are two old seaplane ramps, one of which is used for a small vessel slipway.

The two boat marinas are located approximately 2 km to the south of the commercial port. The commercial marina has three concrete wharfs and one small fuelling dock. Two of the wharves are used as permanent mooring berths for the commercial tourist operators. These docks can accommodate approximately 45 vessels (less than 25 m) at any one time. The third wharf is one continuous structure of approximately 100 m and is used by large government and private commercial vessels. The depth of water within the marina is 6 m. Ablutions and waste reception facilities are provided.

The Pleasure Marina is a series of floating docks connected to a concrete dock. This facility can accommodate approximately 100 vessels. Both power (inboard and outboard) and sailboats use this facility. The marina has a small fuelling dock. Shore ablutions and waste reception facilities are provided. There are no permanent mooring sites for commercial or private vessels within the lagoon of Saipan. Space is limited and seasonal typhoons preclude such arrangements.

International traffic into and out of Saipan is predominantly containerised cargo with some break bulk plus bulk cement carriers. Bulk cement is pumped into two silos (4,500 ton capacity) through an underground pipeline directly from the dock. Cargo-runs into and out of Saipan are variable and vessels typically originate from Asian countries (Japan, Taiwan, Korea, Indonesia, Singapore, Philippines, Thailand), Australia, Pacific islands, Guam and the US west coast. Container cargo traffic between the ports of Guam and Saipan arrive either loaded onto container ships or on large sea going barges towed by tug. The barge service is twice weekly and the distance between the two ports is less than 200 km. Typical sailing time into and out of Saipan is two days. International container ships servicing Saipan are usually of the order of 7,000 tonnes, up to 15 years of age and carry crews in the order of 15 to 22. An average of 330 such ships call into Saipan annually, with port stays typically of less than one day.

The main containerised export is garments. CNMI has a large garment industry. All raw materials must be imported and all garments manufactured are for export, principally to the US.

All bulk petroleum products originate directly from Singapore or are trans-shipped via Guam. On average, one tanker arrives each month. Tankers engaged in the Saipan run are usually about 4,000 tons. Tankers discharge their cargoes whilst alongside. All LPG is brought into the island as break bulk cargo in small cylinders on container vessels.

The CNMI government has one small police boat and two pilot boats. The US Coast Guard is responsible for patrolling the EEZ of the CNMI. The Coast Guard has an office, staffed by one man at the port, however larger vessels are not permanently stationed in the CNMI. These vessels are stationed in Guam. US Coast Guard vessels visit the ports of the CNMI an average of six times a year. The duration of the visits are less than 3 days and they are usually engaged in maritime training and surveillance programs in the region.

US Navy ships visit Saipan on a regular basis. Most ships come alongside the main wharf, but the bigger ships (aircraft carriers) must lay off the port, as they are too large to enter.

International research vessels usually Japanese, visit the port on average twice a year for up to five days at a time.

International cruise ships of various sizes visit Saipan approximately eight times a year, with the majority of the vessel arriving from Japan. The commercial port is the terminal for all domestic passenger travel within the Commonwealth. There is a significant passenger traffic through this port for daily commuter operations to the islands of Rota and Tinian. The latter port has a casino which attracts many passengers. These inter-island passenger vessels are about 700 tons, can accommodate 300 passengers, have a crew of 10 and are less than six years old.

The international and domestic long-line and purse-seine tuna fishing fleets that dominate the other ports of Micronesia are essentially absent from the CNMI, although some tuna boats use the port occasionally. The domestic commercial fishing fleet is small and concentrates on bottom fishing. This fleet currently consists of five vessels with an average length of 20 m. The fleet is based in the harbour and uses a small concrete dock to the north of the main dock. There are limited facilities at this dock.

In an average year, about 25 itinerant yachts and motorboats call into Saipan, with most activity during the summer months between April and October. Almost exclusively these vessels use the commercial or pleasure craft marinas located to the south of the commercial port.

Commercial tourist vessels (except the Shuttle) operate from the commercial marina. It is estimated there are approximately 40 such vessels ranging in size from 8 - 20 metres.

A small privately owned and managed slipway is located next to the small fisheries dock within the harbour. This facility has limited onshore facilities and is capable of servicing vessels up to 20 meters in length. All larger vessels use slipways further a field (Guam, Philippines, Australia, etc).

The Saipan Port Authority has drawn up plans for an expansion of the commercial dock. The development plan will increase the dock by another 350 m and increase the area for the shore based support activities. It is unknown if and when this expansion will take place.

There are no plans for any immediate changes or expansions to the existing ports within the country.

2.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Saipan is small. Waste is not accepted from international merchant vessels unless specifically requested. The largest potential demand arises from the domestic inter-island passenger and cargo vessels, the tourist operators and the small commercial fishing fleet. Waste from these vessels is accepted at the various ports.

US naval ships are classified as domestic vessels and therefore can remove wastes if required.

Visiting yachts and resident watercraft generate inconsequential quantities of garbage and oily wastes. There are over 250 small watercraft (8-13 metres) in Saipan, mostly powered by two stroke outboard motors. These boats are used on a daily basis and the majority are removed form the water and stored on land.

A waste management plan exists for all port activities within the CNMI. This plan is based on US Federal environmental regulations and controls the discharge of sewage, garbage and similar materials into port waters. The enforcement of these regulations is the responsibility of the Coast Guard.

Fees are charged to all vessels that require waste disposal at the commercial port. In addition, fees are charged for wharfage and other port activities. Fees are not directly charged to vessels at the two marinas, as waste disposal services are included in the mooring charges. However, fees are charged by the private contracting companies if specific waste removal is required (eg: slop tank discharge).

2.2.1 Oily Wastes

Oily wastes are not accepted from international vessels unless requested and only under unusual circumstances. Domestic vessels and US Naval ships can discharge waste oil whilst at the dock. The private waste collection companies are responsible for the collection and removal of all waste at the ports. Fees are charged. Similarly, oily wastes are accepted at the two marinas. The removal of these wastes is the responsibility of the commercial operators. Collection contractors use sullage trucks to pump out waste oil. Once removed, the oil is understood to be delivered to the oil storage and reception site at the local landfill site.

The removal and collection of oily water wastes, such as bilge water is undertaken in the same fashion as mentioned above. All vessels are prohibited from discharging bilge, grey water and sewage whilst at the port and within the lagoon and harbours.

Currently, all waste oil, irrespective of origin is stored at the landfill site. There is a need to clarify waste recycling options for the CNMI. Previously, a private company collected, stored and transported waste oil to Guam for recycling. This operation is no longer functional, however discussions are underway to reintroduce a similar service such a services.

2.2.2 Garbage

Waste is accepted from all domestic and US Navy vessels using the ports of the CNMI. Commercial garbage skips (1.2 x 2 x 1.5 meters) are currently used for garbage reception at the commercial port. Private waste collection companies are responsible for the collection and removal of all waste at this port. Similar garbage bins are used at the two marinas and the removal and maintenance of these items is the responsibility of the commercial operators. Garbage is removed from the port area on a regular basis. The pleasure marina has separates garbage drums for different refuse categories (glass, plastic and metal) and actively encourages recycling of wastes. Anecdotal information indicated that the commercial waste collection companies do separate and recycle items after collection from the port area.

The local landfill site is located less than 1 km from the commercial port and is owned and operated by the CNMI government. Waste oil, batteries, metal, glass and some plastics are separated and stored at the landfill site. The landfill site is the centre of much debate regarding environmental issues. The government is developing a new town landfill approximately 3 kilometres from the existing site.

2.2.3 Quarantine Wastes

All foreign vessels entering the ports the CNMI are subject to quarantine inspections from the Customs and Quarantine officers. A fee is charged to inspect all vessels and additional fees are imposed if goods are confiscated. All confiscated goods are incinerated. Alternatively, quarantine goods may be sealed and left on board the vessel till the vessel departs.

All other waste from international vessels are to be left on board and are not accepted by the port. Waste is only accepted from these vessels under certain circumstances and fees are charged.

2.2.4 Special, Hazardous or Noxious Wastes

No procedures were in evidence for the separate collection and management of hazardous or noxious wastes and it is understood that the demand for such services from marine sources is relatively minor. These products are not accepted at the commercial port and are left on board the vessels, presumably to be disposed of at other ports.

2.2.5 Sewage

The discharge to sea of sewage from all vessels whilst in port and within the lagoon is prohibited.

It is understood that sewage is not accepted from international merchant ships at the commercial port. Sewage is accepted from all domestic vessels and USN ships using the ports of the CNMI. Similarly, sewage wastes are accepted at the two marinas. A sewage removal system was included in a wharf upgrade at Saipan completed in 1999. All sewage is pumped from the vessels into trucks. The fate of this waste is uncertain, and it is understood that the sewage is ultimately pumped into the municipal wastewater system.

Shore ablution facilities are not located on the commercial dock, nor were any seen at the fisheries dock. Shore ablution facilities including showers and washing facilities are located at both marinas.

Water quality at the docks in the CNMI is acceptable and there is no major concern for environmental problems associated with vessels in the port. The port activities' contribution to water quality is minimal when compared to the terrestrial inputs.

The water at the commercial dock is regularly flushed and any contaminants would be removed from the vicinity of the dock.

Environmental monitoring of the ports and waters of the CNMI is ongoing. Periodic discharges from vessels have occurred in the past and the offenders have been located, prosecuted and fined.

2.3 Discussion

Waste reception services at the commercial port and boat marinas of Saipan are adequate for the current usage. The port as a rule does not accepts waste from international vessels and discourages the acceptance of waste from domestic vessels. However, the fate of all wastes from the ports needs to be reviewed and improved terrestrial management of waste should be developed.

There is a pressing need for a waste oil management plans for CNMI, which addresses all sources of oil. This programme should incorporate the correct storage, recycling and disposal of all waste oil. The government, as a priority needs to review possible opportunities to remove waste oil from the island. A new waste oil collection service may be an effective means of ensuring proper management and disposal of this material. Its effectiveness and environmental acceptability would be enhanced by raising awareness of its availability, and by providing a bunded area for the storage of the waste oil drums.

2.4 Current Terrestrial Waste Management Practices

Waste management in CMNI is considered one of the most critical issues confronting the nation. These issues are currently being addressed for each island within the state, with special emphasis on the major population centre of Saipan.

Waste oil needs to be captured and recycled or removed from the island. All types of waste, including solid waste, putrescibles and sewage are problematic in the CNMI. The Saipan landfill site is located in low-lying swamp area, providing little natural barrier to prevent or attenuate the leaching of pollutants into the sea and fresh groundwater lenses. These problems are currently being addressed.

Household garbage is collected in Saipan and the majority of households also remove waste themselves. All garbage is placed at the local landfill site. The community landfill site has environmental programs.

Recycling is limited in CNMI with the majority of products stored at the landfill site awaiting eventual recycling. Recycling could be viable for the CNMI especially if agreements with Guam can be undertaken to accept all recycled wastes.

Putrescible waste is usually fed to pigs and chicken or utilized for fertilizer on crops. Quarantine and hospital wastes are currently incinerated.

Sewage in Saipan is either routed to septic tanks or into community based systems that collect household sewage and discharge to sea. It is

understood all sewage is treated (primary treatment) before discharge.
There are no facilities in Saipan to handle hazardous wastes. It is intended to develop a dedicated storage area for the collection and containment of such materials prior to development of a permanent disposal strategy, which will involve export.

2.5 Summary and Conclusions

The Commonwealth of the Northern Mariana Islands is a small nation widely spread over a vast ocean with limited natural resources and an economy and infrastructure reliant upon overseas technical and financial assistance.

The CNMI has adopted the US Federal laws and regulations. By virtue of US commitments, the CNMI is effectively a signatory to MARPOL 73/78 Annexes I, II, III, and V and an Observer to the Tokyo MOU. Local authorities exercise Flag and Port State controls. The US Coast Guard is responsible for all maritime enforcement and is the agency responsible for coordinating all marine pollution management.

Waste management is a major environmental and public health issue for the nation. These issues are particularly important for the capital island of Saipan. The disposal of wastes is hampered by economic and technical constraints, not least of which is the lack of land suitable for landfill sites.

The current demand for the reception of ship wastes is relatively minor, and generally restricted to vessels operating domestically. International shipping into and out of Saipan is almost exclusively involved in inter-Pacific island trading; these ships are capable of retaining wastes for onboard treatment and/or disposal at alternative ports. Domestic vessels, however, have no alternative other than to discharge wastes, mainly garbage, at the ports or directly to sea.

In conclusion:

- present ship waste reception facilities and procedures within the CNMI for garbage, sewage and oily wastes are effective, however they need to be further improved, especially storage and recycling of waste oil and management of hazardous wastes;
- current quarantine waste procedures are adequate;
- waste management plans, including disposal options need to be further developed;
- the discharge of waste from vessels whilst in port needs to be continually policed; and
- waste management facilities within the CNMI are severely taxed by wastes of terrestrial origin, with ship waste contributing only a small proportion of the total waste stream.

3. RECOMMENDED IMPROVEMENTS

The procedures in place in Saipan for the management of ship-generated waste are generally adequate for domestic vessels and visiting US Navy ships, and a general policy of non-acceptance of waste applies to most other international ships. This policy is considered acceptable, given limited national waste management capacity. Although port reception practices are good, better procedures are recommended for the treatment or disposal of waste oils.

3.1 Legislative Issues and Status of Relevant Conventions

The United States should formally advise the IMO of the extension to the CNMI of US accession to relevant IMO treaties.

3.2 Compliance Monitoring and Enforcement

Nil specific recommendations. Current measures effective, although regional cooperation in the application of Port State Controls should be improved.

3.3 Regional Waste Management Opportunities

The CNMI should:

- evaluate and improve options for export of recyclable materials accepted from domestic shipping (glass, plastics, aluminium and other metals) to other ports in the Pacific islands region (most likely Apra, Guam) or further (possibly the US);
- identify and evaluate options for the export to a suitably equipped nation of hazardous wastes accepted from domestic shipping; and
- transfer waste oil to Guam or the US for appropriate treatment.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Saipan

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Nil recommendations. Current reception procedures adequate. Need to review adequacy of current landfill disposal operation.	Nil acceptance, except from USN ships.
Recyclables	Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from boats with national recycling scheme.	Provide suitable collection bins for aluminium cans in wharf areas. Encourage vessel operators to discharge aluminium wastes.
Quarantine wastes	n/a	Review quarantine waste disposal procedures to ensure all wastes presenting quarantine risk are properly destroyed.
Hazardous/special wastes	Review current procedures to ensure effective diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance.
Oily wastes (waste oil)	Current reception procedures generally adequate, assuming effective capture of all vessel-generated waste oil. Link ship-generated waste oil procedures to improvements in national measures (i.e. expand the existing scheme for re-use of waste oil by local electricity utility).	Nil acceptance except from US Navy ships.
Oily wastes (oily water)	Current reception procedures adequate, assuming effective capture of all vessel-generated oily wastes. Link ship-generated waste oil procedures to improvements in national measures (i.e. expand the existing scheme for re-use of waste oil by local electricity utility).	Nil acceptance from merchant ships.
Sewage	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.	N/a, though should ensure provision of adequate shore ablution facilities for fishing boat crews, with sufficient capacity to accommodate any likely increase in the intensity of activities above current levels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: **Saipan**
Nation/Territory: **CNMI**

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	7000	2	1	460	1.5	54.0	24.8	124.2	0.18	0.36	166	n/a	n/a	70	1.3	579.6
Cruise Liners	1000	15000	4	1	8	3.0	12000.0	96.0	480.0	0.27	1.08	9	n/a	n/a	70	70.0	560.0
Inter-island Traders						1.5	0.0	0.0	0.0	0.05	0.00	0	5	0	30	0.0	0.0
Inter-island Ferries	300	1000	1	1	750	1.5	450.0	337.5	1687.5	0.05	0.05	38	2	1500	n/a	n/a	n/a
Tourist Charter Boats	20	n/a	1	n/a	5000	0.5	10.0	50.0	250.0	0.01	0.01	50	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	5	4	8	1.7	1700.0	13.6	68.0	0.18	0.90	7	n/a	n/a	50	40.0	320.0
Warships (small)	20	350	4	4	50	1.3	104.0	5.2	26.0	0.01	0.04	2	5	250	50	4.0	200.0
Fishing (oceanic)	18	1000	30	3	10	1.8	1069.2	10.7	53.5	0.02	0.60	6	10	100	40	2.2	21.6
Fishing (local)	5	n/a	1	n/a	1000	0.8	4.0	4.0	20.0	0.005	0.01	5	n/a	n/a	n/a	n/a	n/a
Local workboats	4	n/a	1	n/a	600	0.5	2.0	1.2	6.0	0.01	0.01	6	0.05	30	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	5	5	25	0.5	15.0	0.4	1.9	n/a	0.01	0	n/a	n/a	20	0.3	7.5
Local craft (day trips)	2	n/a	1	n/a	4000	0.5	1.0	4.0	20.0	n/a	0.001	4	n/a	n/a	n/a	n/a	n/a
				Total				**547**	**2737**			**292**		**1880**			**1689**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

REPUBLIC OF PALAU

1. PRELIMINARY

1.1 Introduction

The Republic of Palau is an archipelago of over 340 high and low islands. Only eight of Palau's islands are permanently inhabited and over half the population resides on the capital island of Koror. The nearest neighbors are New Guinea and the Solomon Islands to the south, the Philippines to the west, Japan and Guam to the north and the Federated States of Micronesia to the east.

The Palau economy is based on aid, as well as tourism, agriculture and fisheries (international and domestic).

1.2 Geography

The total landmass of Palau is 458 km^2, with a declared EEZ covering 629,000 km^2. The highest elevation in the nation is 242 m.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

The Republic of Palau is not a member of the IMO, a signatory to MARPOL 73/78 nor do the local authorities exercise flag or port state controls. The provisions of Annexes I, II, III, IV and V of MARPOL 73/78 have however been given effect in the Palau National Environmental Quality Protection Board (EQPB) regulations. There are a series of codes within these regulations addressing specific issues, including marine pollution. The national regulations are continuously under review and are modified as necessary to suit emerging requirements. These regulations are being reviewed with the intention of identifying any gaps or inconsistencies with MARPOL 73/78 requirements, using the generic SPREP marine pollution bill as a benchmark. Environmental regulations are enforced in Palau, with fines imposed as warranted.

The nation is not a signatory to the London Convention, although advice from the EQPB officials indicated that the provisions of the Convention are observed and are reflected in the national EQPB regulations.

Palau is a signatory to the SPREP Convention, Dumping Protocol and Pollution Protocol.

1.3.2 Local Legislative Issues

Environmental regulations include those initiated by the National Congress, State Legislatures and traditional authorities. The Palau *Environmental Quality Protection Act* has a wide focus and allows the EQPB to regulate and enforce requirements. Included in this Act are marine pollution regulations. The marine pollution regulations evolve as new issues arise. This Act provides for various offences related to the discharge of sewage, garbage and similar materials into port waters.

The Palau EQPB is responsible for all environmental regulations within ports.

2. PORT REPORT: KOROR

2.1 Description of Port and Associated Shipping/Boating Activities

The nation's main port facility is located on the island of Koror, the business and administrative centre of Palau. The nation has one main commercial dock (Malakal Commercial Port), which is located in the south western end of the island of Koror and is used by all merchant ships and the commercial fishing fleet. There is also a small tanker port (Ameliik Tanker Port) used to deliver fuel directly to the island's power station. This facility is located on the western side of Babeithuap, north of the island of Koror.

There are numerous smaller docks located throughout the nation that are used for domestic passenger and cargo vessels, international yachts and private watercraft. The majority of these are located on the island of Koror. These docks generally have a concrete wharf with floating pontoons. Palau has a large tourist industry based on water activities and there are numerous outboard powered vessels (10-18 m) moored around the island, especially Koror. Waste reception facilities at these docks are rudimentary, with commercial operators responsible for removal of all waste.

The main commercial dock and the associated fisheries dock (Malakal Commercial Port) is privately owned and operated (Balau Transfer and Terminal Company). The government owns and operates the Ameliik Tanker Port and ownership of smaller docks is either private or state/municipal. All ports and docks are regulated and managed through the Transport Division of the national government.

The Malakal Commercial Port has three main berths. Two of these are used by all merchant ships and a third by the fishing industry. The commercial berths have a combined length of 150 m and an average depth alongside of 9 m. The port can accommodate two cargo ships at any one time. Anchoring sites for three merchant ships are available within the lagoon immediately off from the wharf. Additional anchorages are available within the lagoon if required. All vessels come alongside the wharf. The wharf does not possess any cargo-handling gear.

All international and the majority of the domestic tuna fishing fleet (long-line vessels) use the third dock. This is located at the eastern end of the main commercial dock. The wharf has a length of 75 metres width a water depth of 9 metres. It is used by smaller commercial and private vessels.

Government and private passenger and inter-island ferries use the various smaller wharves around the island. Larger live aboard dive vessels have permanent moorings within the lagoon.

International traffic into and out of Palau is predominantly containerised cargo, with some minor amounts of break-bulk items, principally motor vehicles and road construction materials as required. The typical cargo-run into and out of Palau originates from Guam. Both US and Asian vessels use Guam as a transshipping port. A percentage of voyages originating from Guam also call into the port of Yap (FSM) while *en route* to Koror. Typical sailing time for container ships into and out of Palau is two days to/from the next/previous port. International container ships servicing Palau are usually of the order of 7,000 tons, up to 15 years of age and carry crews in the order of 15 to 22. An average of 24 such ships call in Palau annually, with port stays typically of less than one day, although sometimes longer due to slow container-handling rates.

All bulk petroleum products originate from Guam on a monthly cycle in tankers of about 5,000 GRT. Oil is transferred at Malakal while tankers are berthed alongside the main wharf, while a mooring and floating transfer line are used at Ameliik. Oil is also distributed around Palau in 205 L drums carried on domestic trading vessels. All LPG is brought into the island in small cylinders on the container vessels.

The Palau government has one national patrol boat, which uses an Japanese wartime dock approximately 1.5 km from the commercial port. Construction of additional wharf space was in progress at the tome of the port survey. The Palau patrol boat periodically visits other ports within the country. Once each year, a US Coast Guard cutter arrives in port, usually from Guam. The duration of the visits are less than three days and the ship is usually undertaking maritime training programmes in the region. Periodic visits are also made by Australian, French and US Navy ships, which berth at the main wharf.

Large overseas flagged research vessels visit the port once every two years or so. International cruise ships also visit Palau approximately once each year, with the majority of ships arriving from either Guam or Asian ports. These vessels vary in size, crew and passenger numbers.

International and domestic tuna long-line vessels use the fisheries wharf. The majority of fishing vessels within currently operating around Palau are long-liners. An average of 15 vessels per month use the port and have a maximum stay of about five days. The long-liners average about 60 tons and have a crew of six to eight. The number of long-line vessels visiting Palau has declined considerably over recent years. It is not known if numbers will increase.

Activities of the international purse-seine fishing fleet (both fishing vessels and ‘motherships’) have also declined in Palau. The purse-seiners bunker and re-provision in Palau, and in some cases transfer their catches to the ‘motherships’. Catches are usually transferred to the “motherships” whilst at anchor within the lagoon. An average of five purse-seine vessels visit the port each year. The larger ‘motherships’

rarely come alongside, usually remaining at anchor within the lagoon.

About 25 itinerant yachts call into Palau each year, with most activity between April and October. Most yachts anchor within the lagoon.

Three large live aboard dive vessels use the commercial dock. These vessels usually stay at the port for less than 24 hours and spend their time either on charter within the lagoon or at permanent mooring sites. These moorings are located close to the diving sites on the outer barrier reef.

A small privately owned and managed slipway is located near the commercial wharf. It is capable of slipping vessels up to 100 tons. This is the only commercial slipway within Palau and is used by the international and domestic fishing fleet as well as the government and private passenger and cargo vessels. The Palau EQPB includes the port facilities and the slipway in their marine monitoring programme.

The Palau national government has proposed relocating the majority of the government offices and activities to the larger island of Babelthuap, to relieve the over crowding and congestion currently experienced in Koror. Included in this plan is a new government port capable of handling large international merchant ships. It is anticipated that it will be three to fie years before completion of this plan.

2.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Palau is small. Waste is not accepted from overseas merchant ships unless specifically requested. Fishing vessels and the domestic inter-island passenger and cargo vessels and the tourist operators represent the biggest source of waste.

The largest potential demand arises from the regular operations of the international and domestic tuna fishing fleet, mainly the long-liners. These vessels generally do not have either holding tanks or oil water separators and hence require shore based waste reception facilities. Concern has been expressed by government regarding the improper discharge of waste material directly into the lagoon from fishing vessels and their support ships.

Visiting yachts and resident small watercraft generate inconsequential quantities of garbage and oily wastes. There are about 250 small boats in the nation. Palau is renown for the large outboard motors used on these boats; it is not uncommon to see two 250 horsepower two stroke out board motors driving a 30 foot fibreglass skiff.

A waste management plan exists for the ports and the nation at large. This plan is currently undergoing further development and includes all waste reception facilities on the island.

Specific fees are charged to all vessels requesting waste disposal at the commercial port. The small local docks do not charge fees for waste disposal, however the removal of waste from vessels is the responsibility of the vessel owners. The EQPB enforces strict waste disposal laws and fines are issued to offenders.

2.2.1 Oily Wastes

Oily wastes are not accepted from international vessels unless requested and only under exceptional circumstances. Domestic vessels can remove waste oil whilst at the dock. There are no facilities to accept waste oil and all waste oil is carried ashore by hand in containers, and then stored in 205 L drums at the landfill.

It is reported that less than 1,000 L of waste oil is collected annually through the docks. The amount of oil waste collected has reduced recently due to the decline in activity of the international tuna fishing fleet. No facilities exist for the collection, treatment and disposal of oily water wastes, such as bilge water. All vessels are prohibited from disposing bilge water whilst at the port and within the lagoon.

Currently, all waste oil, irrespective of its origin is stored in 205 L drums. A small amount is recycled by the local power company, with the majority of this waste oil originating from their own generators.

2.2.2 Garbage

Commercial garbage skips (1.2 x 2 x 1.5 metres) are currently used for garbage collection at the commercial port. Contractors are responsible for the regular collection and removal of all waste,

which appears to be done to a good standard. The contractor charges for waste removal.

Waste from domestic vessels, including the tuna fishing fleet is accepted at the port. Fishing companies tend to make their own arrangements for the removal of waste material from their vessels. There is no separation of wastes nor any recycling at source on vessels in Palau.

All waste is taken to the local landfill site, approximately 5 km from the port. Waste oil, batteries and a percentage of aluminium cans are separated and stored at the landfill site.

2.2.3 Quarantine Wastes

All international vessels must pass Palauan quarantine inspection before the removal, if permitted, of any items from the vessels. All quarantine items are ideally incinerated, however at the time of the site visit the incinerator was not working. Incineration was undertaken at the hospital or airport, or burnt in an open pit at the landfill. Fees are charged for inspections and the collection of quarantine wastes.

2.2.4 Special, Hazardous or Noxious Wastes

No procedures were in evidence for the separate collection and management of hazardous or noxious wastes and it is understood that the demand for such services from marine sources is relatively minor.

2.2.5 Sewage

The discharge of sewage and greywater from all vessels whilst in port and within the lagoon is prohibited. However, concerns have been raised in the past regarding the dumping of sewage into the lagoon at night by the tuna fishing fleet and local craft.

Shore ablution facilities are provided at the commercial and fisheries docks. For a fee, vessels can have sewage removed by road tanker.

Water quality at the docks in Koror is considered acceptable with minimal detriment arising from shipping and harbour activities. The water at the commercial dock is regularly flushed. However, Koror's sewage outfall, discharging untreated wastewater, is located seawards of the dock.

The majority of the smaller private and state owned wharves have no ablution facilities and no sewage reception facilities.

2.3 Discussion

Garbage reception at the commercial port of Koror is adequate for current demand. However, the fate of waste collected from the ports needs to be improved, in concert with improvements to terrestrial waste management practices. No problem appears to exist with management of vessel-sourced sewage.

There is a need for facilities and procedures to be made available for the management of waste oil and hazardous materials.

2.4 Current Terrestrial Waste Management Practices

All types of waste, including solids, putrescibles and sewage are problematic in Palau. The majority of landfill areas are located in low-lying swamp areas. These issues are being addressed for each island within the country, with special emphasis on the major population centre of Koror. A waste management programme for both marine and terrestrial sources has been completed and implemented. This programme is currently under review with an emphasis upon recycling.

Household garbage is collected on Koror, but most of households dispose of their waste by other means. Putrescible waste is usually fed to pigs and chickens or used for fertiliser.

The population of Palau does not generally recognise rubbish disposal as a problem, and inappropriate dumping of waste and littering is a common occurrence. This situation is improving as a result of an intensive awareness campaign.

Recycling is limited in Palau. Aluminium cans are recycled, and limited quantities of waste oil are recycled at the local power station. Used batteries are segregated from the general waste stream and stored at the local landfill pending implementation of a recycling strategy.

Quarantine and hospital wastes are currently incinerated. However, waste from these sources may be burnt in open pits when incinerators are not operating or the quantity of material to be burnt exceeds the capacity of the incinerator.

Sewage in Koror is disposed either to septic tanks or village-based systems that discharge untreated sewage to sea.

There are no facilities or procedures in Palau at present to handle hazardous wastes. This is being addressed in the national waste management plan currently being developed.

2.5 Summary and Conclusions

The Republic of Palau is a small nation with limited natural resources spread over a large area of ocean. Its economy and institutions are reliant upon overseas technical and financial assistance. Palau is not a signatory to MARPOL 73/78, although the provisions of the convention have been given effect in national law, currently under review.

Waste management is a major environmental and public health issue for the nation. These issues are particularly important for the capital island of Koror. The disposal of wastes is hampered by economic and technical constraints, not least of which is the lack of land suitable for landfill sites.

The current demand for the reception of ship wastes is relatively minor, and generally restricted to vessels operating domestically. International shipping into and out of Palau is almost exclusively involved in inter-Pacific island trading; these ships are capable of retaining wastes for onboard treatment and/or disposal at alternative ports. Domestic vessels, however, have no alternative other than to discharge wastes, mainly garbage, at the ports or directly at sea. The low level of use may reflect limited provision of services, more than suggesting only limited quantities of waste are produced by domestic vessels.

In conclusion:

- ship waste reception facilities and procedures within Palau are adequate for the current level of use, but are unlikely to be capturing all waste generated. This is however especially the case for waste oil;
- current quarantine waste collection procedures are adequate, but the incinerator needs repair;
- waste management plans, including disposal options need to be improved;
- restrictions on the discharge of waste from vessels whilst in port needs to be continually enforced.
- waste management practices within Palau are severely taxed by wastes of terrestrial origin, with ship waste contributing only a small proportion; and
- any increase in the number of foreign fishing vessels visiting Palau ports will generate increased demand for reception of ship waste.

3. RECOMMENDED IMPROVEMENTS

The procedures in place in Palau for the management of ship-generated waste are of varying effectiveness. National waste management capacity is limited, including available land for disposal as well as technical and economic constraints. No waste should be accepted from international shipping, except in extenuating circumstances.

Although the level of activity has declined markedly in recent years, significant numbers of fishing vessels still use the port and the current drop in activity may only be of a transitory nature. These vessels present considerable potential demand for ship waste reception, including the extended stays in the neighbouring lagoon by tuna ‘motherships’.

It appears that fishing vessels, particularly the ‘motherships’ rarely discharge waste in Palau. It is unlikely that full compliance with MARPOL 73/78 can be achieved by these vessels, so if Palau is to permit extended stays in its waters, then it is incumbent upon the government to provide ‘adequate’ port waste reception facilities, supported by an effective compliance inspection regime. Adequate reception may involve the use of barges or lighters to collect wastes (garbage and waste oil) from these vessels while they remain at anchor.

3.1 Legislative Issues and Status of Relevant Conventions

Palau is not a Party to MARPOL 73/78, although largely compatible national enabling

legislation is in place. These regulations are currently under review to ensure adequacy, using the SPREP generic marine pollution bill as a model.

Palau should accede to MARPOL 73/78 Annexes I, II, III and V as a minimum. Notwithstanding the present existence of relevant national legislation, accession to MARPOL 73/78 will facilitate regional coordination of marine pollution prevention efforts and also provide Palau with the opportunity to draw on technical assistance from the IMO.

3.2 Compliance Monitoring and Enforcement

No Port State Controls are exercise at present by Palau. The nation should establish a suitable inspection and compliance enforcement capacity, exploiting opportunities for regional cooperation, information exchange and enhancement of indigenous technical capacity.

3.3 Regional Waste Management Opportunities

Palau should:

- evaluate and improve options for export of recyclable materials accepted from domestic shipping (aluminium and other scrap metals) to other ports in the Pacific islands region (most likely Apra, Guam) or further (possibly the US);
- identify and evaluate options for the export to a suitably equipped nation of hazardous wastes accepted from domestic shipping; and
- transfer waste oil excess to local recycling capacity to Guam or the US, if possible, for appropriate treatment.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Koror

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Nil recommendations. Current procedures adequate.	Nil acceptance, except from itinerant yachts and FFVs. Review adequacy of current reception arrangements for tuna support ships remaining at anchor.
Recyclables	Encourage vessel operators to dispose of aluminium separately to general garbage. Incorporate aluminium collected from boats with national recycling scheme.	Provide suitable collection bins for aluminium cans in wharf areas.
Quarantine wastes	n/a	Review quarantine waste disposal procedures to ensure all wastes presenting quarantine risk are properly destroyed.
Hazardous/special wastes	Review current procedures to ensure effective diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.
Oily wastes (waste oil)	Provide waste oil collection drums/tanks at facilities used by domestic shipping. Link ship-generated waste oil procedures to improvements in national measures (i.e. expand the existing scheme for re-use of waste oil by local electricity utility).	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs and support ships.

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic vessels.	Nil acceptance from merchant ships. Review adequacy of current reception arrangements for FFVs less than 400 GRT.
Sewage	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.	N/a, though should ensure provision of adequate shore ablution facilities for fishing boat crews, with sufficient capacity to accommodate any likely increase in the intensity of activities above current levels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Koror
Nation/Territory: Palau

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	7000	2	1	36	1.5	54.0	1.9	9.7	0.18	0.36	13	n/a	n/a	70	1.3	45.4
Cruise Liners	800	10000	5	1	2	3.0	12000.0	24.0	120.0	0.27	1.35	3	n/a	n/a	70	56.0	112.0
Inter-island Traders	30	300	2	1	300	1.5	90.0	27.0	135.0	0.05	0.10	30	5	1500	30	0.9	270.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats	20	n/a	5	n/a	100	0.5	50.0	5.0	25.0	0.01	0.05	5	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	5	3	1	1.7	1700.0	1.7	8.5	0.18	0.90	1	n/a	n/a	50	30.0	30.0
Warships (small)	20	110	15	15	12	1.3	390.0	4.7	23.4	0.01	0.15	2	5	60	50	15.0	180.0
Fishing (oceanic)	10	70	30	5	185	1.8	630.0	116.6	582.8	0.02	0.60	111	10	1850	40	2.0	370.0
Fishing ('mothership')	18	4000	10	35	20	2.8	2268.0	45.4	226.8	0.05	0.50	10	10	200	40	25.2	504.0
Fishing (local)	8	n/a	2	n/a	500	0.8	12.8	6.4	32.0	0.005	0.01	5	n/a	n/a	n/a	n/a	n/a
Local workboats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	0.05	0	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	5	3	20	0.5	12.0	0.2	1.2	n/a	0.01	0	n/a	n/a	20	0.2	3.6
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**233**	**1164**			**180**		**3610**			**1515**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

1. PRELIMINARY

1.1 Introduction

Papua New Guinea lies in the tropics just south of the Equator and consists of the eastern half of the island of New Guinea (often referred to as the mainland) and more than 600 other islands.

It is by far the largest and has the largest, most sophisticated and most diverse economy of any of the Pacific island states. Principal areas of economic export activity are forestry, minerals and petroleum (mainly copper, gold, silver, platinum and oil), cash crops (coffee, tea, cocoa, palm oil and copra) and fishing (tuna, crayfish, prawns).

Whilst this project only visited the ports of Lae and Port Moresby, the Harbours Board also administers a total of 15 other ports including Aitape, Alotau, Bialla, Buka, Daru, Kimbe, Kaviena, Kieta, Lae, Lorengau, Madang, Oro Bay, Port Moresby, Rabaul, Samarai, Vanimo and Wewak. Due to restricted drafts, some of these ports can only accept local coastal trading vessels. There is a significant trade in timber export (167 vessels in 1999) whereby vessels anchor in the roadstead and logs are rafted out from shore to be loaded by the ship's cranes. These vessels must clear Customs and Immigration in either Lae or Port Moresby. A number of other government and private wharves are regulated by the Maritime Division of the Department of Transport. Coastal and estuarine trading is extensive, with nearly 11,000 km of navigable waterways and around 200 registered vessels engaged in domestic trading. These are mostly older ships and range in size up to 1,500 tons.

1.2 Geography

The islands of Papua New Guinea lie east and north east of the "mainland" and consist of high volcanic mountains and low-lying coral atolls with several active volcanoes. The largest offshore islands are Bougainville, Manus, New Britain and New Ireland.

Closest neighbours are Australia to the south, Irian Jaya (a province of Indonesia) and the eastern half of the island of New Guinea to the west, the Federated States of Micronesia to the north and the Solomon Islands to the east.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

Papua New Guinea is a member of IMO and is a signatory to Annexes I, II, III, IV and V of MARPOL 73/78 and revised marine pollution regulations are being drafted to replace the existing *Prevention of Pollution of the Sea Act*. The current draft is based upon regional model legislation developed by SPREP. The SPREP Model is consistent with current international conventions and provides comprehensive legislation for all marine based pollution issues. The country is also a signatory to the London Convention.

Papua New Guinea is a signatory to UNCLOS III, the SPREP Convention and its two associated Protocols. The country is a signatory to the 1993 Tokyo MOU on Port State Controls and conducts limited inspections of foreign flag vessels. These inspections will be increased once the training programme for local surveyors is completed. Papua New Guinea registered vessels undergo annual survey by the Marine Safety Division of the Department of Transport. Licences for FFVs registering to operate in PNG waters oblige these vessels to observe marine pollution prevention requirements (although neither the details of this requirement, nor the method of verification are known to the author).

1.3.2 Local Legislative Issues

The *Prevention of Pollution of the Sea Act* (Chapter371) gives legal effect to Papua New Guinea's adherence to earlier international conventions on prevention of pollution and civil liability. This legislation is redundant as the international conventions referred to are no longer in effect.

Other items of relevant local legislation are the:

- *Dumping of Wastes at Sea Act* (Chapter 369)
- *Environment Contaminants Act* (Chapter 368)
- *Environment Planning Act* (Chapter 370)

- *National Agriculture Quarantine and Inspection Act 1997*
- *Merchant Shipping Act 1976*
- *Water Resources Act*
- *Papua New Guinea Harbours Board Act 1975*

As previously indicated the draft marine pollution bill will not only give effect to MARPOL73/78 and its five Annexes but will also enable implementation of OPRC 90 and other conventions. In January 2001 the National Executive Council approved the introduction a shipping levy, to be applied to all ships carrying 10 tonnes or more of oil in PNG waters, including within the EEZ. This new legislation, the *Shipping Levy Collections Act* and the Protection of the Sea Shipping Levy. It is intended that the levy will be used to contribute towards the costs of cleaning up oil spills.

A National Oil Spill Contingency Plan for Papua New Guinea was adopted on 20 December 1996.

By-laws made under the *Papua New Guinea Harbours Board Act* contain penalties of up to K2000.00 (US$600) for any vessel which pollutes any of the harbours under the management of the Board.

The Environment Department is conducting an extensive review of existing environmental legislation with a view to creating an all-encompassing Environment Act with supporting regulations. In this regard a draft Environment Bill 2000 of 16 October 2000 has been approved and passed to the Attorney General's Department for issue of a certificate of necessity. A hazardous material register is under preparation but external assistance would be of material benefit in regulating any trans-boundary movement of such substances.

2. PORT REPORTS

2.1 Port Moresby

Port Moresby is the capital of Papua New Guinea and is the second largest port in terms of annual marine traffic, with Lae handling more vessels and cargo according to the 1999 Shipping statistics. A new container wharf has been commissioned, designated as berth 4, with adequate space on shore for storage, discharge and loading of containers. The main wharf has four berths with Berths 1 and 2 handling general cargo from international shipping and Berths 3 and 4 used by coastal shipping. There are also several small ship jetties, one is used by the Navy to berth their two large patrol craft and two landing crafts, another is used by the inter-island ferries. Small tugs and harbour craft such as pilot boats and customs launches are berthed alongside a finger wharf. A fishing harbour is used by domestic and foreign fishing vessels for afloat repairs and maintenance and logistic support. There are also a number of privately owned and operated wharves (Burns Philp, Steamships and Craigs). Two barge ramps are available for the landing barges trading to coastal communities. There are two multiple buoy moorings for tanker loading/discharge operated by BP and Mobil/Shell. Mobil also have an alongside berth which is principally used for bunkering.

The port has significant traffic with 82 container, 153 general cargo, 43 tankers, 14 ro-ro, 6 cruise and 157 log ships arriving from overseas in 1999. In terms of coastal shipping there are 238 general cargo, 5 tankers, 87 barges, 5 passenger and 534 fishing vessel movements. The majority of the international traffic is between Australia, Japan, New Zealand and the United States.

The log ships also trade to Australia, India and Japan. The cruise vessels anchor in the harbour and only call between December and June as part of the Noumea/Suva/Port Vila cruise circuit.

A significant trade in copper concentrate is supported by the port, whereby the material is transported from the Ok Tedi by tug/barge combination for transfer to a larger vessel for export.

The container storage and handling area on the shore has recently been extended to cope with the increasing volume of traffic.

The fishing harbour is principally used by local vessels, with only three FFVs using the facility in 1999. The large number of fishing vessel movements indicated in the port statistics are probably generated by short voyages by the local fishing fleet. There are 10 small and six large vessels operating from Port Moresby ranging in length from 15 to 25 m.

A marina is operated by the Royal Papua Yacht Club (RPYC) which is used by local and international vessels. About forty of the local pleasure boats are live aboard and it is estimated that around half of them are fitted with sewage treatment plants such as the Lectra/San EC, which is US Coast Guard approved. The marina has regulations in its lease agreement regarding pollution of the waters of the marina. These prohibit any discharge of noxious, dangerous or offensive substance or thing.

The Interoil Company has submitted a proposal to the Papua New Guinea government for construction of a stripping refinery at Oponogono to refine the crude oil from the Kutubu field.

This refinery would only be capable of producing light products such as distillate, gasoline, jet fuel and kerosene. To supply the refinery would require around 10 trips per annum by a crude supply tanker of around 30,000 tons and a resultant increase in the coastal tanker movements to supply the outports which currently import product from Australia and New Zealand.

2.2 Lae

The port of Lae handles the most marine traffic in Papua New Guinea and serves as a transshipment port for container and tanker traffic to the other Pacific Island ports. There are three overseas berths with Berth #1 principally used for break bulk cargoes. This berth is around 120 m long and is connected to the shore by two concrete piers. Berths #2 and #3 are for container traffic and are 123 m and 184 m long respectively with depths alongside of 11 m. Berths #4and #5 are for coastal traffic of break bulk and containers and are 54 m and 35 m long respectively with depths alongside of 5 m and 3 m. There is a dedicated tanker berth to the East of the overseas berths which consists of a jetty and mooring dolphins. A barge ramp is also available for supply of coastal communities.

The overseas traffic is substantial with 126 container, 96 general cargo, 53 tanker, 14 ro-ro, 41 log carriers and 21 fishing vessels in 1999. The local traffic was 203 general cargo, 55 tankers, 65 barges and 77 passenger vessels in 1999. The port is a significant transshipment link for the Pacific Island liner trade in containers and for petroleum products. The container traffic inbound is from Australia, Singapore and the United States and outbound is mainly to the other Islands of the Pacific.

The tanker traffic inbound is from Australia and Singapore and outbound to the Pacific Islands. It would appear that the tanker traffic through Lae has increased considerably since the earthquake at Rabaul damaged much of the petroleum storage and handling facilities. BP, Mobil, New Guinea Oil and Shell all operate tank farms which are supplied through pipelines from the tanker jetty. This jetty is also used for bunkering of visiting ships. Some of the small inter-island vessels have internal tanks to transport refined product to the outports and plantations.

Ro-ro car carriers arrive from Japan and Korea and carry both new and used vehicles for distribution through Papua New Guinea and the other islands. There are only occasional visits by passenger liners which anchor in the roadstead. FFVs normally come to Lae for provisions and fuel. The inter-island passenger trade involves up to nine vessels each month which transport varying numbers of passengers on short duration voyages.

2.3 Demand for Ship Waste Reception Facilities

Given the significant marine traffic to the two ports there is only limited demand for ship waste reception facilities. Lae reports 2-3 requests each month for 2 to 3 m^2 of wastes, mainly from tankers. There are no facilities in Lae for receiving oily wastes and residues other than by tank truck but only a few requests for such services are received each year. A reprocesser collects aluminium cans and PET containers for crushing and transport to Port Moresby. Glass bottles are also collected, cleaned and sterilised for re-use by the local brewery. Open top containers are provided on the wharves for domestic garbage and are regularly emptied by contractor services.

Similar arrangements are in place in Port Moresby for recyclable materials. Open top drums are available on the wharf areas for domestic vessels which are periodically emptied by the Port Authority. Tanker trucks are available on request to the agent to receive oily wastes.

2.3.1 Oily Wastes

In Port Moresby oily waste can be collected by tanker truck or barge and taken to the tank farm for temporary storage. A periodic tanker back load of oily residues is made to Australia for final treatment and disposal. Arrangements for discharge of these oily residues are made by the ship's agent.

No facilities exist in Lae for reception and disposal of oily waste but it is understood that some contractors will receive oily waste by tank truck with the final fate of the material unknown.

2.3.2 Garbage

Provisions are made in both ports for the reception, collection and disposal of domestic garbage from those vessels using the port facilities. The privately owned wharves operate their own separate facilities, as does the Navy. The wharf areas in both ports are clean and well maintained and there is little evidence of indiscriminate disposal of garbage. The reception and disposal of garbage from international shipping is governed by the *Quarantine Act* and associated regulations.

2.3.3 Quarantine Wastes

The National Agriculture Quarantine and Inspection Authority (NAZQI) regulates the acceptance of quarantine material from international vessels and yachts in both ports. A flat fee of K300 (US$90) is charged for vessels and K50 (US$15) for yachts.

Most of the requests in Port Moresby are for the collection of quarantine wastes from passenger vessels and visiting warships; only two or three cargo vessels require disposal of a few cubic metres of quarantine waste each year. Until recently the quarantine waste was burned in open pits but this practice has been discontinued and the crematorium incinerator is now used for this material. A macerator/steriliser is being supplied to Port Moresby under the AusAID Program and a suitable building is under construction to house the system. The hospitals also have incinerators for medical wastes but these are of limited capacity.

Visiting yachts are boarded through the Yacht Club. All perishables such as fruit, vegetables and dairy products and any canned meats are collected in sealed plastic bags for disposal. Dry goods cupboards are sealed and the owners are instructed to retain any animals on board.

Similar procedures apply in Lae. About two or three requests are received each month for disposal of up to 3 m^3 quarantine waste, mostly from visiting tankers. Open pit burning is employed to dispose of waste and dunnage with a ready supply of off cut timber from a nearby sawmill. The residues are placed in bags, sealed and transported by the Authority's truck to the local dump. A request for provision of an incinerator under the AusAID Program is pending.

2.3.4 Special, Hazardous or Noxious Wastes

No procedures are in effect for the separate collection and management of hazardous or noxious wastes, there does not appear to be any demand for such services from marine sources.

2.3.5 Sewage

Both Lae and Port Moresby are relatively well flushed and by-laws prohibit discharges into the harbour waters. In Lae there is no treatment plant for the town so untreated sewage is directly discharged into the harbour. The relatively minor contribution from the smaller vessels is not considered significant. The larger international vessels have either treatment systems or holding tanks for sewage and are unlikely to discharge into the harbour waters.

In Port Moresby there is a primary sewage treatment plant which has direct ocean discharge at Paga Point. As in Lae the international vessels are not likely to discharge untreated sewage into the harbour waters. Local cargo/passenger and fishing vessels, tugs and other small harbour craft are unlikely to have any treatment or holding facilities on board and probably discharge directly overboard.
The RPYC berthing leases prohibit discharge of untreated sewage into the marina. The club has not actively enforce the requirement to fit treatment units because the nearby Hanuabada Village discharges untreated sewage directly into the harbour. Furthermore, sewage from the

squatter houses near the Post Courier flows through an open drain in the Sir Hubert Murray sports ground and discharges directly beside the marina. Until these problems are resolved there is little incentive for the Yacht Club to promote the installation of treatment systems on live aboard yachts.

2.4 Current Terrestrial Waste Management Practices

The National Capital District Council operates two refuse disposal sites, 6 Miles Dump east of the city and Baruni Dump west of the city, with the latter site under rehabilitation. Collection of domestic garbage is carried out by three contractors and a separate contractor handles industrial wastes. The Council operates 19 trucks, eight of these are compactor type and the remainder open top trucks. Two trucks are assigned to domestic waste collection with the remainder used for industrial waste collection.

Several recycling initiatives are in effect. Eight companies are dealing in scrap metals, a PET recycling plant is being commissioned and the bounty of K0.20 on plastic bags has been relatively successful in reducing volumes.

The 6 Miles Dump is operated as a landfill operation with dumping and burning followed by burial. A recent study found that there was inadequate compaction, only minimal soil cover, no leachate containment and no fencing to keep out scavengers. Although there is an environmental code of practice for the site, this is not adhered to by the operators.

In Lae there are two dumps at Boroni, 4 km from the city and approximately 2 km apart. One is operated by the city, the other by a private contractor and in close proximity to the river (approximately 1 km). Direct dumping is employed at both sites, there is no containment of leachate or fencing to keep out scavengers.

Both the Port Moresby and Lae disposal sites are licensed by the Department of Environment.

2.5 Discussion

The collection of ship wastes in Lae and Port Moresby appears to be satisfactory for garbage and quarantine wastes, but the open pit burning in Lae does result in emission of noxious fumes. In view of the relatively large amounts of quarantine wastes which are treated by the NAQIA staff in Lae, provision of an incinerator should be given some priority

The waste oil collection in Port Moresby appears to be operating in a satisfactory manner and presumably the waste oil shipped back to Australia is processed by one of the refineries. In Lae a similar system could be established by one of the oil companies using spare tank capacity for temporary storage pending back load to an Australian refinery. Given the nature of the tanker traffic, which is predominantly light product with dedicated tank allocation, there would be little demand for discharge of oily ballast in Lae. The larger tankers would operate with Segregated Ballast Tanks and not generate any oily ballast for discharge to shore facilities.

Until shore facilities are upgraded there appears to be little that can be done to prevent the discharge of sewage from small domestic vessels and harbour craft. Any contribution from these sources would be insignificant in volume when compared to the terrestrial contributions.

2.6 Conclusions

- Papua New Guinea should denounce the 1969 Civil Liability Convention and the 1971 Fund.
- Papua New Guinea should progress the adoption of national legislation to give effect to MARPOL 73/78 and OPRC 90.
- The *Merchant Shipping Act* Chapter 242 of 1975 refers to Papua New Guinea waters but it is not clear whether this refers to the Territorial Seas or the Exclusive Economic Zone.
- It is recognised that the waste management in Port Moresby could be improved but this has already been addressed in detail by a recent SPREP project.
- The operation of the dump site in Lae could be upgraded to prevent pollution of the river system.
- A further submission should be made for an incinerator at Lae under the AusAID Program.
- The city of Port Moresby should give consideration to preventing untreated sewage being discharged adjacent to the RPYC marina.

3. RECOMMENDED IMPROVEMENTS

Practices for the reception of ship-generated waste in Port Moresby and Lae are generally adequate. The non-acceptance of the more difficult to handle wastes (oily wastes and hazardous materials). However, noting the size of the nation, non-acceptance of non-quarantine garbage from international ships cannot be justified; ships should be able to transfer garbage to shore reception facilities in the major ports of PNG should they have need to do so. Furthermore, the adequacy of arrangements for reception of wastes, except garbage, from domestic shipping is of uneven quality and in need of review and improvement.

Papua New Guinea has the largest and most active port system and shipping sector of any of the Pacific island states. The PACPOL SW1 project only inspected the ports of Lae and Port Moresby, although the PNG Harbours Board administers 15 other ports including Aitape, Alotau, Bialla, Buka, Daru, Kimbe, Kaviena, Kieta, Lorengau, Madang, Oro Bay, Rabaul, Samarai, Vanimo and Wewak. A number of other government and private wharves are also in operation. Coastal and estuarine trading is extensive, with nearly 11,000 km of navigable waterways and around 200 registered vessels engaged in domestic trading. Therefore, although focused upon Port Moresby and Lae, waste reception improvements introduced at these two centres will need to be adopted at many other ports within PNG.

3.1 Legislative Issues and Status of Relevant Conventions

Papua New Guinea is a signatory to Annexes I, II, III, IV and V of MARPOL 73/78. Existing marine pollution regulations are being revised to ensure harmony with the requirements of MARPOL 73/78 and other marine pollution conventions. The revised regulations are to be based upon the SPREP model legislation.

3.2 Compliance Monitoring and Enforcement

The country is a Party to the 1993 Tokyo MOU on Port State Controls and conducts limited inspections of foreign flag vessels. It is anticipated that the rate of effort for these inspections will be increased once a training programme for local surveyors, currently underway, is completed. Papua New Guinea registered vessels undergo annual Flag State surveys.

Any FFV registering to operate in PNG waters is obliged, via conditions within the fishing licence, to observe marine pollution prevention requirements.

3.3 Regional Waste Management Opportunities

As the largest and most diverse economy in the Pacific islands region, PNG would appear to offer potential as a major waste reception and reprocessing destination. Any such potential is diminished, however, by its internal waste management challenges and its isolation from major shipping routes in the area. Nevertheless, PNG could assume a role in accepting wastes from neighbouring islands should it develop indigenous waste treatment/recycling capabilities.

Apart from accepting some wastes from neighbouring islands, PNG is also able to export wastes which it does not have the capacity to properly manage or recycle.

It is recommended that PNG:

- identify and evaluate options for the export to a suitably equipped nation (such as Australia) of hazardous wastes accepted from domestic shipping; and
- introduce a scheme for the acceptance of waste oil from neighbouring island states, in parallel with improvements to national waste oil recovery and re-use capabilities.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Lae

Waste Category	WASTE MANAGEMENT RECOMMENDATIONS	
	Domestic Shipping	**International Shipping**
Garbage	Nil recommendations. Current procedures adequate.	Provide collection services for ships requesting collection of non-quarantine garbage.
Recyclables	Provide separate collection receptacles for aluminium cans.	Provide aluminium collection bins in wharf areas.
Quarantine wastes	n/a	Collection procedures adequate. Need to improve disposal procedures.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance.
Oily wastes (waste oil)	Review current procedures to assess adequacy of collection services for medium to large domestic vessels; improve services as necessary. Provide waste oil collection facilities (such as drums or pump and tank systems) for small boats.	Nil acceptance.
Oily wastes (oily water)	Review current procedures to assess adequacy of collection and acceptability of fate of wastes. If deemed necessary, provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, for domestic vessels.	Nil acceptance.
Sewage	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.

Recommended Improvements to Port Waste Reception: Port Moresby

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Nil recommendations. Current procedures adequate.	Provide collection services for ships requesting collection of non-quarantine garbage.
Recyclables	Provide separate collection receptacles for aluminium cans.	Provide aluminium collection bins in wharf areas.
Quarantine wastes	n/a	Collection and disposal procedures adequate.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance.
Oily wastes (waste oil)	Review current procedures to assess adequacy of collection services for medium to large domestic vessels; improve services as necessary. Provide waste oil collection facilities (such as drums or pump and tank systems) for small boats.	Nil acceptance.
Oily wastes (oily water)	Review current procedures to assess adequacy of collection and acceptability of fate of wastes. If deemed necessary, provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, for domestic vessels.	Nil acceptance.
Sewage	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Lae
Nation/Territory: PNG

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	5000	4	1.5	340	1.5	108.0	36.7	183.6	0.18	0.72	245	n/a	n/a	70	1.9	642.6
Cruise Liners	1500	20000				3.0	0.0	0.0	0.0	0.27	0.00	0	n/a	n/a	70	0.0	0.0
Inter-island Traders	10	250	5	2	400	1.5	75.0	30.0	150.0	0.05	0.25	100	5	2000	30	0.6	240.0
Inter-island Ferries	50	250	2	n/a	75	1.5	150.0	11.3	56.3	0.05	0.10	8	2	150	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500				1.7	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	50	0.0	0.0
Warships (small)	20	110				1.3	0.0	0.0	0.0	0.01	0.00	0	5	0	50	0.0	0.0
Fishing (oceanic)	18	250	30	3	21	1.8	1069.2	22.5	112.3	0.02	0.60	13	10	210	40	2.2	45.4
Fishing (local)		n/a		n/a		0.8	0.0	0.0	0.0	0.005	0.00	0	n/a	n/a	n/a	n/a	n/a
Local workboats	4	n/a	1	n/a	1000	0.5	2.0	2.0	10.0	0.01	0.01	10	0.05	50	n/a	n/a	n/a
Yachts (itinerant)	3	n/a				0.5	0.0	0.0	0.0	n/a	0.01	0	n/a	n/a	20	0.0	0.0
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**102**	**512**			**375**		**2410**			**928**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: **Port Moresby**
Nation/Territory: **PNG**

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	5000	5	2	455	1.5	135.0	61.4	307.1	0.18	0.90	410	n/a	n/a	70	2.5	1146.6
Cruise Liners	1500	20000	2	1	6	3.0	9000.0	54.0	270.0	0.27	0.54	3	n/a	n/a	70	105.0	630.0
Inter-island Traders	10	250	3	2	330	1.5	45.0	14.9	74.3	0.05	0.15	50	5	1650	30	0.6	198.0
Inter-island Ferries	50	250	2	n/a	250	1.5	150.0	37.5	187.5	0.05	0.10	25	2	500	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500				1.7	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	50	0.0	0.0
Warships (small)	20	110	5	10	100	1.3	130.0	13.0	65.0	0.01	0.05	5	5	500	50	10.0	1000.0
Fishing (oceanic)	18	250	30	3	3	1.8	1069.2	3.2	16.0	0.02	0.60	2	10	30	40	2.2	6.5
Fishing (local)	3	n/a	1	n/a	11000	0.8	2.4	26.4	132.0	0.005	0.01	55	n/a	n/a	n/a	n/a	n/a
Local workboats	3	n/a	1	n/a	2000	0.5	1.5	3.0	15.0	0.01	0.01	20	0.05	100	n/a	n/a	n/a
Yachts (itinerant)	3	n/a				0.5	0.0	0.0	0.0	n/a	0.01	0	n/a	n/a	20	0.0	0.0
Local craft (day trips)	2	n/a	1	n/a	3000	0.5	1.0	3.0	15.0	n/a	0.001	3	n/a	n/a	n/a	n/a	n/a
					Total			**216**	**1082**			**572**		**2780**			**2981**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

SAMOA

1. PRELIMINARY

1.1 Introduction

Samoa was the first Pacific island nation to become independent, in 1962, after a period of administration by New Zealand. Agriculture and fisheries employ over two thirds of the labour force and furnish 90 % of all exports, predominantly tuna, coconut cream, coconut oil and copra.

1.2 Geography

Samoa comprises two main islands, seven smaller islands, and islets and rocks. Its total land area is about 2,820 km^2, which the two main islands of Upolu and Savaii containing 1,115 and 1,700 km respectively. The declared EEZ covers 120,000 km^2 and the highest elevation is 1,857 m. The capital Apia is located approximately midway along the north coast of Upolu and lies approximately 130 km from Pago Pago, American Samoa, and 3,000 km from Auckland.

Three ports are located on Upolu and two on Savaii. These ports support mixed passenger and cargo ferry activities, including ro-ro services. These ports are only used for domestic purposes at present, although this may change in the future. There are also numerous small boat anchorages around each island, which are primarily used by the local commercial long-line tuna fishing fleet (vessel length of 6 – 10 m).

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

Samoa is not a signatory to MARPOL 73/78 nor do the local authorities exercise flag or port state controls. The government of Samoa is currently in the process of signing the various annexes of MARPOL 73/78 and is receiving assistance and guidance in this from the SPREP PACPOL programme.
In addition, the government of Samoa is currently reviewing their *Lands and Environment Act* with the intention of clarifying any gaps or inconsistencies with MARPOL 73/78. The government of Samoa is a signatory of the SPREP Convention, Dumping Protocol and Pollution Protocol and will incorporate these and other recommendations into the revised *Lands and Environment Act*.

The nation is not a signatory to the London Convention, although advice from the Ports Authority and the Department of Environment and Conservation indicated the provisions of the Convention are observed.

1.3.2 Local Legislative Issues

The Lands and Environment Act, 1989 encompasses natural resource protection, environmental management and pollution control. This Act has since been amended to become the *Lands, Surveys and Environment Act*. The Act is still under review and included a section on Environmental Impact Assessment regulations. This act does not directly address marine pollution concerns. Currently several new bills are under consideration. One of these is a comprehensive Shipping Bill, which incorporates international conventions on marine pollution. In addition, a new Fisheries Bill, Port Authority Bill and Maritime Zone Bill are also in development. The Port Authority Bill will control shipborne pollution. Fines for offenders are being incorporated into these Bills.

2. PORT REPORT: APIA

2.1 Description of Port and Associated Shipping/Boating Activities

Samoa has one main commercial port (Apia Port), which is located in Apia, the nation's capital, on the western side of the island of Upolu. All international merchant vessels use this port. Associated with this port is a smaller dock, located towards the shore that is used for the four government owned ferries and ro-ro cargo vessels (MV *Lady Samoa II*, MV *Tausala Salafai*, MV *Fotu-O-Samoa* and MV *Lady Naomi*. These vessels use this dock as their main terminal and service the other islands of Samoa, American Samoa and Tokelau. The three smaller ports are used by these domestic services. There is also a fisheries harbour located in Apia, used by the domestic

commercial fishing fleet. The fishing fleet mainly comprises long-line tuna vessels of varying sizes.

The Samoan Ports Authority manages all port and harbour activities. Operation of the wharf facilities is leased out to private companies. The Fisheries Division of the Samoan government is also involved with the management of the commercial fishing wharf.

The commercial port has one main berth for all merchant ships. The wharf is constructed of concrete and the main berth has an approximate total length of 80 m and a depth alongside of 9 m. The port can accommodate one cargo vessel at any one time. A smaller basin, located inside the main berth, has an approximate length of 30 m. This basin is normally used by the national patrol boat and small commercial vessels. The commercial port has a three-point mooring within the harbour that is used to transfer petroleum products and LPG to shore via a submerged pipe.
All ships are required to lay-off at anchor outside the harbour and reef (Malava Bank) while awaiting access to the cargo berth. All ships, except petroleum and LPG tankers come alongside the wharf. The wharf does not possess any cargo-handling gear. The Port Authority operates two tugboats.

The fisheries harbour and associated fisheries market has one single L shaped concrete wharf which forms a basin. The main berth has a length of 25 m and additional berthing space is available on the other walls of the basin. Depth of water in the fishing harbour is 5 m. The majority of the domestic commercial tuna fishing fleet uses this port for all their activities. The Samoan tuna fleet is owned and operated by Samoan companies, with restrictions on foreign owned vessels entering the fishing grounds. The majority of the fishing vessels are small, traditional style ‘a’lias’.

International traffic into and out of Apia is predominantly containerised cargo, with some minor amounts of break-bulk items, principally vehicles. The typical cargo-run into and out of Apia originates from Australia, New Zealand or American Samoa. All these vessels call into other Pacific island ports. Typical sailing time for container ships into and out of Apia is two days to/from the next/previous port. International container ships servicing Apia are usually of the order of 9,000 tons, up to 15 years of age and carry crews in the order of 15 to 22. An average of 190 such ships call into Apia annually, with port stays typically of less than one day.

All bulk petroleum products originate from the Vuda Point oil terminal in Fiji, with an average of four vessels per month. These are approximately 4,500 tons. LPG tankers, of about 2,800 tons, visit the port approximately nine times each year, on service routes originating from Australia or New Zealand and via other Pacific island states.

The main dock has several steel tanks located within a bund close to the wharf for the collection, storage and discharge of coconut oil. This oil is pumped directly through pipelines to vessels moored alongside the dock.

The Samoan government has one national patrol boat, which is based at the large commercial dock. The vessel is 110 tons and has a crew of 18. This vessel patrols the EEZ of Samoa and periodically visits the other ports within the country.

On average, quarterly visits are made by naval forces of Australia, New Zealand and other countries. The duration of most of these visits is less than three days, and the ships are usually frigates or smaller patrol craft.

International cruise ships visit the commercial port of Apia quarterly and have a stay of less than one day. These vessels vary in size, crew and passenger numbers. The last vessel to arrive in port before the field inspection was particularly large by normal standards for Apia. The ship displaced 38,000 tons and carried a crew of 280 with 525 passengers.

About 80 domestic commercial fishing vessels operate from the fisheries harbour, with the duration of trips typically only overnight. Long-line vessels currently operating in Samoa can be categorized into two distinct groups. The largest category is the small traditional style aluminium catamarans, ‘a’lias’, powered by twin outboard engines (normally 40 horsepower two strokes). These vessels have a crew of 3-5 and undertake short fishing trips. It is estimated that there are over 200 such vessels currently operating within the nation. The second, much smaller, category comprises the larger long-line fishing vessels,

(up to 25 m) that average 60 tons, have a crew of six to eight and spend longer periods at sea. These vessels are of both monohull and catamaran designs. It is anticipated that the number of long-line vessels using the fisheries harbour, currently quite congested, will increase in the future.

Tuna purse-seine vessels do not use the ports of Samoa, however several companies have the rights to fish within the EEZ. These vessels operate from Pago Pago. However, the Port Authority indicated that long-line vessels have used the commercial port to bunker, as fuel is cheaper in Apia than in neighbouring Pago Pago.

An average of 15 itinerant yachts and large power cruising vessels call into Apia each year. These boats anchor in the small anchorage opposite the commercial wharf area. The majority of the activity is during the winter months between April and October.

There is no commercial slipway in Samoa. The small size of the majority of the fishing fleet allows these vessels to be manually removed from the water for repair and maintenance. All larger vessels use slipways further a field.

The commercial port has completed the design work and obtained funding to expand the main wharf and apron. This expansion will provide an extra berth and increase the container storage area. It is expected that this expansion will be completed by late 2002. There is also a development plan that provides for a small boat marina within the harbour, complete with toilet and washing facilities ashore. It is unknown when this project will commence.

Discussions have been initiated in order to locate a suitable secure anchorage and harbour site for the domestic long-line fishing fleet. Several sites have been evaluated and site location yet to be determined.

2.2 Demand for Ship Waste Reception Facilities

Current demand for port waste reception facilities in Apia is modest. Waste is not accepted from international merchant vessels unless specifically requested (and this did not occur in 1999 or 2000). Most demand comes from the government owned ferries and trading vessels, although the periods that these ships spend at sea is relatively short, with a commensurately small capacity for waste generation. These vessels are fitted with oily water separators, slops tanks and sewage holding tanks. All garbage is reported to be removed from these vessels when in port.

Similarly, waste produced by the domestic tuna fishing fleet, however the majority of these vessels are powered by small outboard motors and generate little waste. Fuel transfer systems at the fishing harbour are rudimentary and spillage is common. The larger long-line vessels (less than 10) do not have holding tanks or oil water separators and hence require shore waste reception facilities.

Visiting yachts and resident small watercraft generate inconsequential quantities of garbage and oily wastes.

A waste management plan is currently under development for the ports of Samoa. The Samoan *Port Authority Act* prohibits the discharge of oily waste and sewage within the ports. This Act does not extend to regions that are not designated port areas. The Lands and Environment Act, currently under review, will incorporate all marine and terrestrial locations within Samoa.

Fees are charged to all vessels that require waste disposal at the commercial port. In addition, fees are charged for wharfage and other port activities. Fees are charged for vessels permanently moored at the fisheries wharf.

2.2.1 Oily Wastes

Oily wastes are not accepted from international vessels unless specifically requested and this will only be done under exceptional circumstances. Domestic vessels can remove waste oil whilst in port. No facilities exist for the collection, treatment or disposal of oily water wastes, such as bilge water.

There are no facilities to accept waste oil from vessels at any of the docks and therefore any waste oil discharged to shore must be carried by hand. It is reported that less than 1,500 L of waste oil is collected annually through the docks. All waste oil is stored in steel drums and transferred to the landfill site for storage. A

recycling program for waste oil had been in place in Samoa, however this programme has been curtailed. Some waste oil is used to treat timber and other wood items and a small amount is recycled and burnt at the power station.

Vessels are prohibited from discharging oily bilge water while in harbour waters.

An oil spill occurred in 2000 from a tanker discharging kerosene through the submerged fuel line. The spill was wind driven onto shore north of the commercial dock, but was contained and cleaned-up by applying the port's oil spill contingency plan and response equipment.

2.2.2 Garbage

Commercial garbage skips (1.2 x 1.5 x 1.5 metres) are currently used for garbage reception at the commercial port, including the ferry terminals. The Port Authority contracts out the removal of waste from the port to private companies. The regular removal of waste from these skips appears to be satisfactory. A fee is charged by the contractor to remove garbage, with all waste taken to the local landfill site.

The fishing harbour uses a combination of the larger commercial bins and used 205 L drums as waste reception devices. These are empted on a regular basis as part of the Apia's municipal garbage collection service. A proportion of fishing vessels dispose of waste items independently.

There is no apparent separation of recyclable materials at source for garbage from port areas in Samoa.

2.2.3 Quarantine Wastes

All international vessels entering the port of Samoa are subject to quarantine inspections. A fee is charged to inspect all vessels and additional fees are charge if goods are seized. Quarantine goods may alternatively be sealed and left onboard until departure. All confiscated goods are incinerated, in an incinerator located at the port. No quarantine bins were in evidence around the port of Apia, although food waste from overseas yachts was seen to be placed in general garbage bins. Practices of this sort may negate the effectiveness of Samoa's quarantine barriers.

2.2.4 Special, Hazardous or Noxious Wastes

No procedures were in evidence for the separate collection and management of hazardous or noxious wastes and it is understood that the demand for such services from marine sources is relatively minor. These products are reportedly retained onboard international vessels to be disposed of at other ports, although it must be assumed that that generated in domestic shipping is not disposed of in an appropriate manner.

2.2.5 Sewage

The discharge of sewage from all vessels whilst in port and within the lagoon is prohibited. However, concerns have been raised in the past regarding the dumping of sewage into the lagoon at night by the tuna fishing fleet and local craft.

Shore ablution facilities are not provided at the main port nor are there any services to remove sewage from vessels. Toilet facilities are provided at the ferry terminals and at the fish market next to the fishing harbour.

Water quality in Apia harbour is considered acceptable and there is no current concern for environmental problem associated with sewage discharges from vessels using the harbour. The harbour receives freshwater inputs from a stream that flows into the harbour next to the port. This stream drains the town of Apia and in episodes of high rainfall inflows of pollutants and nutrients may be high. The stream appears to receive household and animal wastes and would contribute to any decline in water quality within the harbour.

Water quality at the domestic ferry terminals away from Apia is also reported to be acceptable. Each of these sites is well flushed.

Water quality at the fishing harbour is reported to be considered acceptable; however this is an enclosed area and is likely to be poorly flushed. It is therefore considered vulnerable to any inputs which the potential to degrade water quality.

There is no management plan specifically addressing water quality issues around the port, however the Port Authority has an environmental code of practice.

2.3 Discussion

Waste reception services at the commercial port, ferry terminals and fisheries harbour in Samoa appear to be adequate for the current level of demand, which is mainly garbage. However, little effort is made to capture the total waste stream, particularly for oily wastes, and it can be speculated that a significant proportion of the wastes generated by domestic vessels are not disposed of in an environmentally acceptable manner. Furthermore, the long-term sustainability of the disposal methods employed for waste sourced from port areas also needs review.

Current quarantine waste measures may only be partially effective, observing the apparently uncontrolled disposal of food wastes and associated packaging from visiting yachts.

2.4 Current Terrestrial Waste Management Practices

Waste management is considered one of the most critical environmental issues confronting the nation of Samoa. This issue is being addressed, with special emphasis on the capital, Apia.

Domestic garbage is collected in Apia and some of the other areas on Upolu in a regular service. Households usually collect and store their garbage in plastic bags or 205 L steel drums. Some households dispose of their waste independently, and some putrescibles fractions are fed to pigs or used for compost. Collected garbage is transferred to the local landfill, although illegal tipping and dumping does occur.

Apia's landfill is located approximately 20 km from the commercial port. It is owned and operated by the Samoan government. A proportion of waste oil, batteries and aluminium cans and other metals are removed from the general waste stream and stored at the landfill site. Recycling of the metal products occurs, via export to either Australia or New Zealand.

Hospital wastes are currently either incinerated or disposed of to landfill.

Sewerage in Apia is almost universally routed to septic tanks for disposal. Contractors in Apia are available to periodically pump septic tanks and dispose of the septage.

There are no facilities in Samoa to handle hazardous wastes. It is intended to develop a dedicated capture and storage procedure for the collection and containment of such materials prior to development of a permanent disposal strategy; this may involve export.

A comprehensive waste reduction, recycling and disposal plan has been developed for Samoa. This id the 1996 National Waste Management Policy, developed by the Department of Lands, Survey and the Environment.

2.5 Summary and Conclusions

Samoa is a small nation with a relatively large population with limited natural resources and an economy and infrastructure reliant upon overseas technical and financial assistance.

Samoa is not a signatory to any components of MARPOL 73/78 nor do local authorities exercise flag or port state controls. Samoa is currently in the process of becoming a party to MARPOL 73/78, and is receiving assistance and guidance in this endeavour through PACPOL. The government of Samoa is currently reviewing their *Lands and Environment Act* with the intentions of addressing any gaps or inconsistencies with MARPOL 73/78.

Samoa is a signatory of the SPREP Convention, Dumping Protocol and Pollution Protocol and will incorporate these and other recommendations into the revised *Lands and Environmental Ac*t. The nation is not a signatory to the London Convention, although it is understood that the provisions of the Convention are observed.

The current demand for the reception of ship wastes is relatively minor, and generally restricted to vessels operating domestically. International shipping into and out of the nation is almost exclusively involved in inter-Pacific island trading; these ships are capable of retaining wastes for onboard treatment and/or disposal at alternative ports. Domestic vessels,

however, have no alternative other than to discharge wastes, mainly garbage and oily wastes, at the ports or directly to sea.

Waste management is a major environmental and public health issue for the nation, particularly for the capital of Apia. There is a need to upgrade waste oil management procedures for ports and the nation as a whole, and quarantine procedures at the port may also need review. In common with most Pacific island states, economic and technical constraints hamper improvement to waste management performance in Samoa.

In conclusion:

- ship waste reception facilities and procedures within Samoa can be further improved, especially collection of waste oil and oily wastes. Reception facilities for international shipping are acceptable, although minimum facilities for the collection of garbage and oily wastes are required for vessels engaged in domestic activities;
- current quarantine waste procedures at the port of Apia may not be adequate;
- the current waste oil collection service is not effective;
- waste management plans, including disposal options need to be further developed;
- the discharge of waste from vessels whilst in port needs to be policed and fines distributed to offenders; and
- waste management facilities within Samoa are severely taxed by wastes of terrestrial origin, with ship wastes contributing only a small proportion of the total national waste stream.

3. RECOMMENDED IMPROVEMENTS

Practices for the reception of ship-generated waste in Samoa are currently inadequate. While non-acceptance of wastes from international merchant ships is a viable option, the adequacy of arrangements for domestic shipping, and those engaged in regional voyages (e.g. to American Samoa and Tokelau), is questionable.

3.1 Legislative Issues and Status of Relevant Conventions

Samoa is not currently a Party to MARPOL 73/78, although it is intended to accede to the convention in the near future. National marine pollution prevention legislation is currently in place, and it is intended to review this in parallel with accession to MARPOL 73/78.

3.2 Compliance Monitoring and Enforcement

Samoa does not presently exercise either Port or Flag State Controls. These programmes should be developed, drawing upon regional inspection and enforcement resources and procedures to build and enhance Samoan national capacity and effectiveness.

3.3 Regional Waste Management Opportunities

Samoa should:

- evaluate and improve options for export of recyclable materials accepted from domestic shipping (aluminium and other scrap metals) to other ports in the Pacific islands region or further;
- identify and evaluate options for the export to a suitably equipped nation of hazardous wastes accepted from domestic shipping; and
- rejuvenate the national waste oil recovery and recycling capability, and investigate opportunities for accepting waste oil from neighbouring states (such as Tokelau. Alternatively, a scheme for the collection and transfer of waste oil to Vuda Point for recycling should be established.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Apia

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Improve provision of bins in wharf areas (including fishing boat harbour).	Nil acceptance, except from itinerant yachts and vessels engaged in Samoa – American Samoa and Samoa – Tokelau services; provide bins on wharves for ferry passengers and ensure waste from regional trading vessels is collected for disposal.
Recyclables	Provide separate collection receptacles for aluminium cans.	Provide aluminium collection bins in wharf areas.
Quarantine wastes	n/a	Improve quarantine waste collection systems for itinerant yachts, specifically those remaining in Apia for extended periods.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance.
Oily wastes (waste oil)	Provide waste oil collection facilities (such as drums or pump and tank systems).	Provide waste oil collection facilities (such as drums or pump and tank systems), especially for wharves used by regional inter-island trading vessels.
Oily wastes (oily water)	Critically review requirement and if deemed necessary, provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic vessels.	Nil acceptance.
Sewage	N/a, although shore ablution facilities should be provided in all wharf areas as a prudent management measure.	Provide shore toilet and ablution facilities for itinerant yachts.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Apia
Nation/Territory: Samoa

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	9000	3	1	240	1.5	81.0	19.4	97.2	0.18	0.54	130	n/a	n/a	70	1.3	302.4
Cruise Liners	1500	20000	3	1	4	3.0	13500.0	54.0	270.0	0.27	0.81	3	n/a	n/a	70	105.0	420.0
Inter-island Traders	10	200	3	2	100	1.5	45.0	4.5	22.5	0.05	0.15	15	5	500	30	0.6	60.0
Inter-island Ferries	230	900	1	n/a	80	1.5	345.0	27.6	138.0	0.05	0.05	4	2	160	n/a	n/a	n/a
Tourist Charter Boats	6	n/a	1	n/a	400	0.5	3.0	1.2	6.0	0.01	0.01	4	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	5	3	4	1.7	1700.0	6.8	34.0	0.18	0.90	4	n/a	n/a	50	30.0	120.0
Warships (small)	20	110	5	10	24	1.3	130.0	3.1	15.6	0.01	0.05	1	5	120	50	10.0	240.0
Fishing (oceanic)	18	250	30	4	6	1.8	1101.6	6.6	33.0	0.02	0.60	4	10	60	40	2.9	17.3
Fishing (local)	2	n/a	1	n/a	32000	0.8	1.6	51.2	256.0	0.005	0.01	160	n/a	n/a	n/a	n/a	n/a
Local workboats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	0.05	0	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	5	4	50	0.5	13.5	0.7	3.4	n/a	0.01	1	n/a	n/a	20	0.2	12.0
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**175**	**876**			**325**		**840**			**1172**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

SOLOMON ISLANDS

1. PRELIMINARY

1.1 Introduction

Note: The report on the Solomon Islands is the result of a desktop study only. No field surveys have been conducted.

The Solomon Islands is an archipelagic island chain extending between 5 to 12 º South latitude and 155 to 170 º East longitude. The eastern reaches of Papua New Guinea are extremely close to the Solomons, with other near neighbours being New Caledonia and Vanuatu to the south and south east respectively, and Australia to the south west. Timber is a major resource, as are phosphate, gold, and tuna.

1.2 Geography

The nation comprises over 100 islands and has the second largest land mass of the Pacific island states. The capital, Honiara, is located on the island of Guadalcanal. The other main islands are Malaita, Choiseul, New Georgia, Santa Isabel, and San Cristobal. Outer islands are often coral atolls or raised coral platforms.

1.2.1 Legislative Issues

1.2.2 Status of IMO Conventions

The Solomon Islands is a member of the IMO but the nation has not yet acceded to any of the marine pollution prevention treaties relevant to this project except for the London Convention. The Solomons is at present awaiting confirmation on its Observer status to the Tokyo MOU on Port State Controls.

1.2.3 Local Legislative Issues

The *Environment Act 1998* addresses environmental protection, pollution prevention and waste management. Waste disposal is also addressed by the *Public Health Act 1980* and subordinate regulations.

The extent of any marine pollution prevention requirements in Solomon Islands legislation is not known, although there are several items of legislation which address ports and shipping and that may be relevant. These laws, and the issues they address are:

CAP 158	carriage of goods by sea
CAP 159	light dues and harbours
CAP 160	merchant shipping fees
CAP 161	ports
CAP 163	shipping

In addition to these laws, CAP 34 addresses quarantine issues.

2. REPORT

2.1 Shipping and Ports in the Solomon Islands

Ports in the Solomon Islands are administered by the Solomon Islands Ports Authority. The Solomon's two principal ports are Honiara and Yandina, with Honiara the nation's main port of entry. It has a 120 m deepwater berth with a depth alongside of 10 m. There is also an 85 m wharf with a depth alongside of 3.4 m. Oil products are transferred to shore through a pipeline near the main wharf. Two Pacific patrol boats are based in Honiara.

Yandina, in the Russell Islands, is a copra export port. There is a 50 m wharf and a sheltered anchorage for vessels up to 150 m in length is also available nearby. Noro (Cutter Point) is the Commodities Export Marketing Authority's buying and export centre in the Western province. It is also the major shipping port for the fish cannery and for logging operations. It is understood that Noro Point is undergoing expansion to improve its capacity.

Gizo, is the administrative centre and port of entry for the Western Province. The port has a jetty with a depth alongside of 2.8 m, sufficient only for small trading vessels. Other ports in the Solomon Islands are used exclusively for the export of logs and timber and there are numerous landings and sheltered anchorages throughout the islands used by local trading vessels.

The Solomons has regular shipping links with Australia, New Zealand, Hong Kong, Japan and Europe, as well as neighbouring Pacific island states. The number of cruise ship visits have

declined considerably over recent years but occasional calls are still scheduled (although it is understood that these have been suspended due to the internal situation). Oil is delivered to the Solomons principally from either New Guinea or Fiji, but can be sourced directly from Singapore on occasions. LPG carriers are also understood to call on Honiara on routes originating in Australia.

Honiara is home to the FFA and the Solomons permits access to its waters by a substantial number of FFVs, supported by 'motherships'. It is understood that motherships often remain at anchor for extended periods in coastal waters, undertaking a degree of processing of the catch.

The Solomon Islands supports a substantial domestic trading and inter-island passenger fleet. It is expected that this fleet is very active and its operations widely dispersed, given the size of the population, the geographical spread of the nation and the number of islands that make up the nation. It is also assumed that these are mainly old and small vessels, of a few hundred tons at most.

2.2 Demand for Ship Waste Reception Facilities

It may be speculated that the principal demand for ship waste reception, mainly for garbage and oily wastes, arises from the domestic trading fleet. It is also a reasonable assumption that current waste reception and disposal facilities and procedures are minimal, as would be the expected case for onboard marine pollution prevention equipment and procedures in domestic trading vessels.

2.3 Terrestrial Waste Management

Honiara has a municipal refuse collection service operated by contractors, with wastes transported to a landfill 6 km from the town. The collection service is reported to be unreliable. The landfill is located on the edge of a mangrove area and is reported to present serious environmental problems, including scavenging, vermin, odour, uncontrolled leachate, contaminated surface water and uncontrolled burning. Access to the site is not controlled and activities are not supervised. Dumping of wastes along the access road leading to the tip is a common occurrence.

It is understood that waste oil in the Solomons, is currently reused for purposes such as chain saw lubrication, or else disposed to landfill or via municipal sewerage systems. Honiara is served by two diesel power stations and the Solomon Islands Electricity Authority (SIEA) operates diesel generators in most other regional towns. The SIEA has previously tried using waste oil as a supplemental fuel, albeit unsuccessfully.

2.4 Summary and Conclusions

The Solomon Islands can be anticipated to support a sizeable domestic trading fleet which is likely to generate considerable amounts of waste, particularly oily wastes. It may also be assumed that current waste reception facilities are either rudimentary, or non-existent, and that most vessel generated waste from domestic shipping is dumped at sea or disposed inappropriately ashore. The demand for waste reception by international shipping is assumed to be slight, consistent with that of other states within the region.

The legal foundation for marine pollution prevention in the nation would be insubstantial, noting that the nation is not a Party to either MARPOL 73/78 or OPRC 90.

Current waste management practices in the Solomon Islands are largely ineffective and environmentally damaging.

3. RECOMMENDED IMPROVEMENTS

It is anticipated that the principal demand for the reception of ship-generated wastes arises from the Solomon Islands' extensive domestic trading fleet, and that current measures for the reception and treatment/disposal of these wastes are rudimentary (and possibly seriously deteriorated owing to recent internal conflict and the ensuing economic constraints).

3.1 Legislative Issues and Status of Relevant Conventions

As a minimum, the Solomon Islands should accede to MARPOL 73/78, and having done so, enact complementary national enabling legislation: The SPREP generic marine pollution bill provides a suitable model.

3.2 Compliance Monitoring and Enforcement

The current application of Port State Controls is understood to be minimal. These should be developed in parallel with the Solomon Islands eventual accession to MARPOL 73/78.

3.3 Regional Waste Management Opportunities

The Solomon Islands should:

- evaluate options for the export of recyclable materials (aluminium and other scrap metals), and hazardous wastes to other ports in the Pacific islands region or further, possibly Australia, for appropriate treatment or disposal.
- If treatment and re-use of waste oil within the Solomons is not viable, then establish a waste oil export and recovery scheme, based upon the delivery routes of tankers servicing Solomons ports (i.e. to Australia or Fiji).

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Honiara, Gizo, Noro and Yandina

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Provide bins in wharf areas. Include wharves in municipal collection rounds.	Provide bins in wharf areas, ensuring exclusion of noxious and quarantine materials.
Recyclables	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas.
Quarantine wastes	n/a	Review quarantine waste classification system to ensure only wastes presenting quarantine risk enter quarantine waste stream. Improve quarantine waste storage, transport and disposal procedures to ensure all wastes presenting quarantine risk are properly contained and destroyed.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance, except in extenuating circumstances.
Oily wastes (waste oil)	Provide waste oil collection facilities (such as drums or pump and tank systems), especially for wharves used by domestic inter-island trading vessels.	Nil acceptance.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, especially for domestic inter-island trading vessels.	Nil acceptance.
Sewage	Nil data available – specific recommendations not possible, although shore ablution facilities should be provided in wharf areas as a prudent management measure.	Nil data available – specific recommendations not possible, although shore ablution facilities should be provided in wharf areas as a prudent management measure.

THE KINGDOM OF TONGA

1. PRELIMINARY

1.1 Introduction

The Kingdom of Tonga's closest neighbours are Fiji to the West, American Samoa, Wallis and Futuna and Samoa to the north and Niue to the east. The Tongan economy revolves around agriculture, with tropical produce accounting for nearly 70 % of total exports. The major export commodity is seasonal, being squash to Japan by refrigerated cargo vessels.

1.2 Geography

Tonga is an archipelago of 170 islands with only 36 inhabited. There are three principal island groups, Tongatapu is the largest island and both the capital and seat of government are located in Nuku'alofa.

The EEZ is relatively large and supports an offshore tuna fishery which exports whole fish to markets in Hawaii and Japan. The port of Nuku'alofa is the principal import/export terminal of Tonga. The port of Pangai on the Ha'apia group and the port of Neiafu on the Vava'u group import general cargo, oil and LPG, with some export of agricultural products.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

The Kingdom of Tonga is a member of the IMO and a signatory to 1972 London Convention, MARPOL 73/78 and its five Annexes, the 1990 OPRC and the UNCLOS III. Tonga is not yet a signatory to the SPREP Convention and its two associated Protocols.

Draft legislation has been prepared giving effect to the requirements of MARPOL 73/78 and its Annexes but the Legislative Assembly will not consider this until it is translated into the Tongan language. In the meantime, the technical staff of the Marine and Ports Department inspect Flag State vessels and conduct Port State inspections on foreign vessels. Tonga is not a party to the Tokyo MOU.

The draft legislation is based on the SPREP model legislation and includes, *inter alia*, a levy on those vessels using the ports of 2 to 4 cents per GRT for funding of pollution prevention and control programmes. This is principally based on similar legislation enacted in Australia and New Zealand.

1.3.2 Local Legislative Issues

The local legislation related to waste management has not been updated for a number of years. Relevant Acts are the *Territorial Sea and Exclusive Economic Zone Act* 1978, The *Garbage Collection Act* 1980. Cabinet decision 217/85 established a requirement for EIA, EIR and FEIR to be submitted for any new development projects. The *Fisheries Act* 1989 is the most current legislation relating to the marine environment. It is recognised that some of the draft legislation regarding management of garbage is contingent upon provision of a new sanitary landfill to serve Nuku'alofa and the surrounding area.

2. PORT REPORT: NUKU'ALOFA

2.1 Description of Port and Associated Shipping/Boating Activities

Nuku'alofa port is a fairly deep harbour basin of approximately 3 by 10 kilometres surrounded by fringing reefs. There are two main channels into the alongside berth, one from the north available to all vessels and the other from the east for vessels of less than 110 m LOA. The Marine and Ports Department provide and maintain good solar powered navigation aids. There are two alongside berths with a depth of 12 metres and a mooring dolphin for discharge of oil and LPG cargoes.

Nuku'alofa, as the major port of Tonga, supports container, ro-ro, general cargo and tanker traffic. Reefer vessels out of Kobe in Japan load fresh squash at Neiafu and Pangai. The average inbound voyage for freight/container vessels is six days with one to two days to discharge cargo. Tankers from Vuda Point have a one-day voyage but frequently proceed to Neiafu and

Pangai after the initial cargo discharge in Nuku'alofa.

Approximately 200 vessels per annum use the port ranging in size from 4,000 to 50,000 GRT for passenger ships and from 1,500 to 14,000 GRT for merchant ships. The vessels principally come from Pacific Island states and Pacific rim countries such as American Samoa, Australia, Cook Islands, Fiji, New Zealand and French Polynesia.

The inter-island cargo/passenger vessels range in size from 35 to 60 metres and make around 135 round voyages to the Vava'u and Ha'apia groups of islands.

The port does have an incinerator for any quarantine material from foreign vessels but will not accept "wet" wastes such as foodstuffs. The Marine Department recently took delivery of an oily waste incinerator, provided under an AusAID programme, with a capacity of 30 litres/hour.

2.2 Demand for Ship Waste Reception Facilities

Due to quarantine requirements the port will only accept waste that can be incinerated. All waste is considered to be quarantine. The recent overnight visit of a Japanese friendship cruise liner placed a considerable workload on the resources of the Quarantine Section with large quantities of material requiring incineration. It would appear that there is little demand for reception facilities from visiting vessels at present with only an occasional request in the course of a year.

2.2.1 Oily Wastes

The Port Authority has not received any requests for reception of oily wastes and presumes that slop tanks are discharged at other ports in the region that can accept oily residues. The inter-island vessels discharge oily bilge water outside the port limits as they have no treatment systems on board. The three patrol craft operated by the Navy have oily water separators and slop tanks which are periodically emptied into 205 L drums for contractor pick up and disposal.

As previously indicated, the Marine Department has recently accepted delivery of an oily waste incinerator. The system consists of an 800 litre collection tank, filters, 2 x 1,500 litre feed tanks and has a design capacity of 30 litres/hour using LPG.

2.2.2 Garbage

The majority of vessels retain their garbage on board for either disposal at sea or in ports that can accept plastics. The wastes generated in the ports by inter-island vessels and work boats, with the exception of food wastes, is collected in open top 205 L drums, for pick up by the garbage truck and taken to the dump for disposal. Any food wastes are collected to feed the family's chickens and pigs.

The large number of yachts visiting Tonga each year is a cause for concern in terms of waste management. About 300 call on Tongatapu annually plus 520 for Vava'u 50 for Ha'apia and 36 for Euia. It is understood that only limited facilities are available other than in Tongatapu. The recent SPREP Solid Waste Management Project did not address the issue on the other islands

2.2.3 Quarantine Waste

Nuku'alofa's quarantine incinerator has a capacity of 1,500 litres /hour but the sorting of bottles and cans is under active consideration to reduce volumes requiring treatment. The use of deep pit disposal is also under review with the area of the Viani Research Farm as a possible location with 1.5 m pits to receive sealed plastic bags for burial.

2.2.4 Special Hazardous And Noxious Waste

There has been no demand from visiting vessels for discharge of special, hazardous or noxious wastes and the current rubbish management system does not address the segregation or separate disposal of these wastes.

2.2.5 Sewage

No provision is made at any of the ports for pump out of sewage from any vessels. The larger vessels have either sewage treatment plants or holding tanks and there have been no requests for this service to the port authorities. The smaller vessels using the port discharge

directly into the harbours as do the visiting yachts. As there is a reasonable tidal range it is presumed that there would be good flushing in the harbours and from visual examination there did not appear to be any identifiable residues from the yachts moored alongside at Nuku'alofa.

2.3 Discussion

Ship waste reception facilities appear to be adequate for the larger vessels but could be improved for the smaller vessels and yachts by provision of closed top receptacles at the main wharf in Nuku'alofa and in suitable locations in Ha'apia and Vava'u.

There does not seem to be any practical solution to the sewage problem for small craft and yachts. Even if a pump out facility is provided it would then discharge into the main sewer increasing the point source pollution at the reef edge.

The ports of Ha'apia and Neiafu have 23 container vessels, 12 oil tankers, 3 LPG tankers and 6 cruise vessels visiting per annum. The latter anchor 1 mile west of the wharf which is restricted to vessels up to 100 m LOA and with a draft of less than 6 m, the wharf face is 43 m long. As previously indicated Vava'u hosts more than 500 cruising yachts each year and although there is garbage collection, the quarantine requirements could preclude any provision of receptacles for garbage collection on the wharf.

2.4 Terrestrial Waste Management

The disposal of comparatively small amounts of garbage from vessels pale into significance when compared with the terrestrial problems. A study is currently under way in Tongatapu to formulate options and priorities for an integrated solid waste management plan for Nuku'alofa under the SPREP programme and financed by the European Communities from a grant of the European Development Fund.

There is only limited recycling of aluminium cans for compaction and shipping by a private contractor. Other than this, waste is not segregated in any way at the existing disposal site. The Ministry of Works allegedly operates garbage collection trucks on the three main islands on behalf of the Health Ministry, which also has approved disposal sites, but the sites on Vava'u and Hai'apia have not been gazetted as required under the Act.

The Tukutonga disposal site does not meet contemporary management standards. This is recognised by the Ministry of Health who currently have an ongoing project to construct and operate a sanitary landfill at a different location.

Nuku'alofa has a collection system for sewage in the city which is discharged into the sea at the end of the fringing reef. Septic tanks are also used with periodic pump out by contractors for disposal into pits at the existing dump.

2.5 Summary and Conclusions

The nation's principal maritime activities take place at Nuku'alofa (Queen Salote wharf) and Neiafu (Government wharf). The management of wastes from merchant, cruise and naval vessels does not appear to present any significant problems for the Port Authority.

Smaller vessels such as cargo/passenger ferries and international yachts do create problems with regard to collection and disposal of garbage, oily bilges and sewage from their operations. The provision of pump out services for sewage and the collection of garbage from these vessels would not be practical or feasible until the terrestrial facilities are upgraded.

Current Laws and Regulations, other than the *Fishery Act*, are outdated. It is recognised by the Ministry of Marine that legislation must be enacted to give effect to MARPOL 73/78 and its five Annexes and the Tokyo MOU to enable full participation in the SPREP programmes.

The collection of oily bilges would appear to be a viable option once the oily waste incinerator is operational.

2.6 Conclusions

- Draft legislation giving effect to MARPOL 73/78 should be adopted by the Government as soon as practical to provide adequate penalties for illegal discharges and funding for pollution prevention and response programmes.
- As a signatory to OPRC 90 it is incumbent on Tonga to fully participate in any regional agreements and in this regard

should accede to the SPREP Convention and its two Protocols.

- Once terrestrial waste management systems are upgraded, consideration should be given to deep disposal of quarantine wastes.
- The current oily waste contractor could also provide an oily bilge recovery service for small vessels.
- If the terrestrial sewage system is upgraded consideration could be given to provision of pump out services for visiting international yachts.
- As a signatory to the London Convention, Tonga should also ratify the associated 1996 Protocol in order to maintain the currency of those substances which fall under the aegis of the convention.

3. RECOMMENDED IMPROVEMENTS

Practices for the reception of ship-generated waste in Tonga are generally adequate, mainly because of the limited demand from international trading ships. While non-acceptance of wastes from international merchant ships is a viable option, the adequacy of arrangements for reception of wastes, except garbage, from domestic shipping is in need of improvement.

Tonga intends to improve ship waste reception capabilities. New laws being drafted include a compulsory pollution levy, rated on ship displacement, on all ships visiting Tongan ports.

Many hundreds of itinerant yachts visit Tonga each year, tending to congregate in small ports and anchorages remote from the main population centres. Little practicable latitude exists to receive wastes from these vessels; it is important that waste from these vessels is managed through a combined approach of education and information for the boaters, and effective quarantine barrier measures for any waste which must be landed.

3.1 Legislative Issues and Status of Relevant Conventions

Tonga is a Party to MARPOL 73/78, although it does not at present have effective national enabling legislation in place. This is currently being addressed, with draft legislation prepared based upon the SPREP generic marine pollution prevention bill.

3.2 Compliance Monitoring and Enforcement

Tonga exercises both Port and Flag State Controls, but is not a Party to the Tokyo MOU. These programmes should be developed, drawing upon regional inspection and enforcement resources and procedures to build and enhance Samoan national capacity and effectiveness.

3.3 Regional Waste Management Opportunities

Tonga should:

- evaluate and improve options for export of recyclable materials accepted from domestic shipping (aluminium and other scrap metals) to other ports in the Pacific islands region or further;
- identify and evaluate options for the export to a suitably equipped nation of hazardous wastes accepted from domestic shipping; and
- introduce a scheme for the transfer to Fiji for recycling, of waste oil received from Tongan shipping which is excess to the capacity of the Tongan waste oil incinerator.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Nuku'alofa

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Improve standard of bins in wharf areas.	Nil acceptance, except from itinerant yachts.
Recyclables	Provide separate collection receptacles for aluminium cans.	Provide aluminium collection bins in wharf areas.
Quarantine wastes	n/a	Generally adequate, although critical appraisal required of capacity to accept quarantine waste from larger cruise ships.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance.
Oily wastes (waste oil)	Provide waste oil collection facilities (such as drums or pump and tank systems).	Nil acceptance.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, for domestic vessels.	Nil acceptance.
Sewage	N/a, although shore ablution facilities should be provided in wharf areas as a prudent management measure.	N/a, although shore ablution facilities should be provided in wharf areas as a prudent management measure.

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Nuku'alofa
Nation/Territory: Tonga

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	3000	3	1	162	1.5	81.0	13.1	65.6	0.18	0.54	87	n/a	n/a	70	1.3	204.1
Cruise Liners	1500	20000	2	1	14	3.0	9000.0	126.0	630.0	0.27	0.54	8	n/a	n/a	70	105.0	1470.0
Inter-island Traders						1.5	0.0	0.0	0.0	0.05	0.00	0	5	0	30	0.0	0.0
Inter-island Ferries	100	250	3	n/a	135	1.5	450.0	60.8	303.8	0.05	0.15	20	2	270	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	4	2	10	1.7	1360.0	13.6	68.0	0.18	0.72	7	n/a	n/a	50	20.0	200.0
Warships (small)	20	110	5	10	80	1.3	130.0	10.4	52.0	0.01	0.05	4	5	400	50	10.0	800.0
Fishing (oceanic)	18	250	30	2	14	1.8	1036.8	14.5	72.6	0.02	0.60	8	10	140	40	1.4	20.2
Fishing (local)	2	n/a	1	n/a	7000	0.8	1.6	11.2	56.0	0.005	0.01	35	n/a	n/a	n/a	n/a	n/a
Local workboats	3	n/a	3	n/a	700	0.5	4.5	3.2	15.8	0.01	0.03	21	0.05	35	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	6	4	900	0.5	15.0	13.5	67.5	n/a	0.01	9	n/a	n/a	20	0.2	216.0
Local craft (day trips)	2	n/a	1	n/a	750	0.5	1.0	0.8	3.8	n/a	0.001	1	n/a	n/a	n/a	n/a	n/a
					Total			**267**	**1335**			**201**		**845**			**2910**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

TUVALU

1. PRELIMINARY

1.1 Introduction

Tuvalu is a nation of low-lying coral atolls and is presently listed by the UN as one of the least-developed of nations, with GDP per capita estimated at $US 800 in 1995 (CIA, 2000).

Tuvalu is essentially bereft of natural resources, with the exception of those provided by the sea. A major component of Tuvalu economy is income generated by licensing international fishing vessels to operate within the nation's EEZ.

Pacific island nations/territories most closely neighbouring Tuvalu are Wallis and Futuna, Samoa and Fiji to the south, and Tarawa, Kiribati in the Gilbert Islands to the north.

1.2 Geography

The total land area of Tuvalu is 26 km^2, with a declared EEZ covering 900,000 km^2. The nation comprises nine low-lying coral atolls, with the highest point above sea level of the order of five metres. Land is at a premium in Tuvalu, particularly on the island of Funafuti (Fogafale). Almost half of Tuvalu's population of nearly 11,000 lives in Funafuti, which has a total land area of about 2.5 km^2. Population growth rate was estimated at 1.4% in 2000.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

Tuvalu is not a member of the IMO, although it is a signatory to Annexes I, II, III, IV and V of MARPOL 73/78. The provisions of these annexes have been given effect in national law via the *Marine Pollution Act 1992*. The Act is currently undergoing review with the intention of clarifying any gaps or inconsistencies with MARPOL 73/78 requirements, plus those proposed in the generic SPREP marine pollution bill. Government officials advised that Port State Controls are exercised by Tuvalu authorities, although the nation is not a Party to the Tokyo MOU.

The nation is not a signatory to the London Convention, although advice from the Marine Department of the Tuvalu government is that the provisions of the Convention are observed, as reflected in the *Marine Pollution Act 1992*. As for MARPOL 73/78, the pending review of the Tuvaluan law is intended to ensure consistency with the latest requirements of the London Convention, as amended.

1.3.2 Local Legislative Issues

In addition to the *Marine Pollution Act 1992*, Chapter 88 of the Laws of Tuvalu, addressing port and marine issues, also provides for various offences related to the discharge of sewage, garbage and similar materials into Tuvalu port waters.

There are currently no specific environmental laws in Tuvalu and no legislative requirement for environmental impact assessment. While latitude exists within existing laws to require due consideration of environmental requirements, the Tuvalu National Environmental Management Strategy proposes the drafting of specific environmental laws in the longer-term.

2. PORT REPORT: FUNAFUTI

2.1 Description of Port and Associated Shipping/Boating Activities

Funafuti is Tuvalu's main, albeit small, port. All ships visiting from overseas call on the capital, and the port is also the base of operations for the inter-island passenger and cargo service operated by the Tuvalu government. This inter-island service visits all of the other inhabited atolls within Tuvalu, in roadstead operations serviced by small boats.

Port facilities comprise a single L-shaped pier, with the main cargo berth having a length of about 50 m and a depth alongside of 8 m. Anchorages are available within Funafuti Lagoon immediately off from the wharf; ships are sometimes required to lay-off at anchor while awaiting access to the cargo berth. The wharf does not possess any cargo-handling gear, nor does the port have any Pilot vessels or

workboats. The 40 tonne training vessel of the Tuvalu Maritime Training College is based at Funafuti, as is the Pacific Patrol Boat *Te Mataili*. About 40 small local fishing boats operate from Funafuti, mostly confining their activity to day or overnight journeys.

A 1,000 tonne combined passenger ferry/cargo-carrier, *Nivaga II*, is based in Funafuti. The ship is registered to carry up to 250 passengers and is engaged on inter-island trading within Tuvalu, with occasional visits to Fiji.

International traffic into and out of Funafuti is predominantly containerised cargo, with some minor amounts of break-bulk items, principally building materials. The typical cargo-run into and out Funafuti originates in either Australia or New Zealand, with calls in Noumea and Suva, then onto the Wallis and Futuna Islands and Apia, or the same general route in reverse. Typical sailing time for container ships into and out of Funafuti is two to three days to/from the next/previous port. International container ships servicing Funafuti are usually of the order of 3,000 tonnes, up to 15 years of age and carry crews in the order of 10 to 15. Over the period 1997 to 2000, an average of 45 such ships have called on Funafuti annually, with port stays typically of the order of a day, although sometimes longer due to slow container-handling rates.

Funafuti also takes delivery of bulk refined oil supplies via light tanker typically arriving from Vuda Point. Tankers delivering to Funafuti are generally engaged on the Vuda Point, Port Vila, Nuku'alofa service. Tankers come alongside the wharf to discharge cargo.

Cruise vessels do not visit Funafuti on a regular basis, although it is reported that one visit will typically occur every two years. These characteristically involve around 500 passengers or more, plus crew, on a six-hour visit. Major warships, carrying around 200 crew, also visit the port on average every two or so years and usually stay for two to three days.

Funafuti typically hosts three or four foreign fishing vessels (FFVs) each year; some of the many dozens which fish for tuna under licence within Tuvalu's EEZ but do not usually call into port except for urgent repair or medical reasons. A fishing 'mothership' may anchor off Funafuti for two to three days annually for the purpose of trans-shipment of catch from the FFVs.

A small number of itinerant yachts call on Funafuti each year, with most activity during the cyclone season from October to March. It is reported that up to eight to ten yachts may be at anchor off Funafuti at any one time during this period.

A small slipway operates near the wharf. The slipway is capable of taking minor local craft of only a few tonnes displacement.

There are no planned increases to the capacity of the port, although a proposal to compel FFVs to bunker in Funafuti as a licence condition for fishing in the Tuvalu EEZ has been mooted. This has the potential to substantially increase the number of vessels visiting Funafuti annually, and hence demand for waste reception.

2.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Funafuti is relatively small. Most local vessels generate minimal amounts of waste and merchant ships spend minimal periods at sea on the trip into Funafuti. The biggest potential demand arises from the regular operations of the inter-island passenger/cargo service, provided by the vessel *Nivaga II*.

Assuming: 80% average passenger capacity (ie. 200 passengers) plus 20 crew, each generating garbage at the rate of 1.5 kg/day; nil discharge of waste either at sea or at other ports of call; and an average 3 day trip around the Tuvalu atolls; then the ferry could potentially have on average 1 tonne of garbage for disposal upon arrival in Funafuti. Cargo-associated waste, such as used packing material and damaged 205 L drums, would add to this amount. Although fitted with an oily water separator, the cargo ferry would also need to dispose of other oily wastes periodically. Inconsequential quantities of garbage and oily wastes would be generated by visiting yachts and resident watercraft.

The irregular visits of cruise liners nevertheless has the potential to present Tuvalu authorities with a substantial amount of waste material. Assuming 600 passengers and crew each generating 2.5 kg/day, on a two-day transit from the previous port, with 50% of garbage (mainly

food waste) disposed of to sea en route, then garbage in the order of 1.5 tonnes to 2 tonnes could be landed at Funafuti. This would prove particularly challenging for the existing infrastructure and services, without considering the end-fate of the waste material (Note: These estimates are more refined than those presented in Appendix D which employ more generic modelling data).

No waste management plan exists for the port of Funafuti, and no waste reception facilities or procedures were in evidence (uncontrolled dumping of rubbish was evident within the port area). No specific fees are charged to visiting vessels for waste disposal, although port, wharfage and harbour fees are collected.

2.2.1 Oily Wastes

Oily wastes are collected from shipping on an informal and *ad hoc* basis, albeit a relatively effective one. The local BP agent will accept waste oil from visiting yachts and the Tuvalu patrol boat, provided the waste oil is generally free of detergents and other contaminants. The waste oil is stored in 205 L drums at the oil depot and periodically sent to Vuda Point in drums as deck cargo on visiting tankers. In Fiji the oil is recovered for eventual disposal through use as a fuel in a Fiji steel furnace. This service is provided by BP at no cost. When observed the drums of waste oil were stored in a non-bunded area.

It is reported that only a few hundred litres of waste oil are collected annually through this scheme. No waste oil is understood to be received from local vessels, with the exception of that from the Tuvalu patrol boat. The service is not apparently publicised and relies upon vessels requesting BP to accept their waste oil.

No facilities exist for the collection, treatment and disposal of oily water wastes, such as bilge water.

2.2.2 Garbage

At present, there is no provision for the acceptance of any garbage at Funafuti, whether from international or domestic shipping, including the inter-island ferry. Anecdotal evidence indicates that the usual practice for passengers and crew is to dispose of garbage before leaving the ship; in the case of Funafuti, this is understood to involve passengers disposing of most of their garbage directly to sea while the vessel is alongside Funafuti wharf. Waste foodstuffs are often retained for feeding to the pigs at Funafuti, some of which are free-ranging.

Although no reception facilities are provided for garbage from international shipping, this is not considered to have any great significance. Noting the usual sailing patterns of the Tuvalu merchant trade it should be a comparatively simple measure for these ships to retain garbage onboard until arrival at another port of call.

In contrast to normal the situation for routine operational garbage from international shipping, the port of Funafuti is adversely affected by cargo-associated wastes. These are mainly in the form of derelict shipping containers and 205 L drums. Unserviceable containers and drums have accumulated in the immediate vicinity of the port, with the number of drums probably exceeding several hundred.

The total absence of garbage reception facilities at Funafuti is an inadequate situation. Although acceptance of waste from all shipping is not appropriate, provision needs to be made for proper collection and disposal of garbage from domestic shipping, particularly the passenger ferry.

2.2.3 Quarantine Wastes

Tuvalu enforces barrier controls, although their effectiveness is uncertain. Only small amounts of quarantine wastes are generated from shipping. This is typically collected from visiting yachts if necessary, although it is understood that this material is often fed to pigs, possibly negating the quarantine controls.

If necessary, any large quantities of quarantine waste are burned in open pits, with diesel used to aid combustion. The effectiveness of such treatment is questionable, and is likely to have adverse environmental consequences, noting the very close proximity of any site within Tuvalu to groundwater and the sea.

2.2.4 Special, Hazardous or Noxious Wastes

No procedures were in evidence for the separate collection and management of hazardous or noxious wastes, and it is understood that the demand for such services from marine sources is

relatively minor. Nevertheless, quantities of these wastes would be generated, mainly from the inter-island trading vessel.

2.2.5 Sewage

Sewage management and general degradation of water quality within Funafuti Lagoon is emerging as an environmental management issue for Tuvalu. The fundamental cause of the deterioration in water quality is ineffective sewage disposal practices in Funafuti, compounded by the presence of over 4,000 pigs within the capital.

The contribution of vessel sourced sewage is relatively minor. Notwithstanding this, *Nivaga II* is likely to be the most substantial point source of sewage discharge within the lagoon. The ship is fitted with sewage holding tanks, and it is reported that sewage is retained while the ship is within the port. Similarly, other ships with holding tanks are required to refrain from discharging while alongside at Funafuti. No shore ablution facilities were in evidence in the port area.

2.3 Discussion

With the exception of waste oil collection and some collection of quarantine wastes, no ship waste reception services exist for the port of Funafuti. The non-provision of services is not considered an issue for international shipping, with the exception of unserviceable containers and 205 L drums, and itinerant yachts, but is inadequate for domestic shipping. This is particularly the case for the inter-island trading vessel, which is also the most significant source of waste of all vessels visiting Funafuti on a regular basis. Additionally, there is a need for better procedures for the management and disposal of cargo-related waste.

The waste oil collection service is an effective means of ensuring proper management and disposal of this material. Its effectiveness and environmental acceptability would be enhanced by raising awareness of its availability, and by providing a bunded area for the storage of the waste oil drums.

The demand for collection and disposal of all categories of ship waste, as well as that specifically associated with fishing, can be expected to increase should Tuvalu proceed with the proposal to require bunkering at Funafuti by all foreign fishing vessels licensed to operate within the Tuvalu EEZ.

2.4 Current Terrestrial Waste Management Practices

Waste management in Tuvalu, particularly on Funafuti Atoll, is considered one of the most critical issues confronting the nation. This issue is being addressed via the AusAID Pacific Waste Management Project. Limited land, coupled with high population density, 'in-migration' to Funafuti and a growing population make waste management particularly problematic. This is so for all types of waste, including solid waste, putrescibles and sewage. The low-lying nature of the atolls, coupled with their narrowness, means that there is little natural barrier to prevent or attenuate the leaching of pollutants into the sea and fresh groundwater lenses. This is exacerbated by the relatively poor rate of flushing of the internal waters of the atolls. Nutrification of internal waters within Fogafale Atoll has already been noted.

The main waste management problems for Tuvalu have been identified as:

- public health;
- visual amenity;
- water lens quality (brackish to fresh, but not potable);
- lagoon water quality;
- soil condition; and
- ecosystem health.

A Tuvaluan waste study was conducted in 1995. The survey found that each household (av. 7.7 occupants) generates 9.4 kg/day solid waste, equating to 34.2 m^3 per annum (by wt: 23% vegetable matter; 1% Al cans; 9% tin cans; 35 plastics; 11% glass bottles; 2% paper; 50% other). The approximately 500 homes on Fogafale (Funafuti) generate about 17,000 m^3 to 20,000 m^3 waste per annum.

A legacy of American use of Tuvalu during the Second World War is the existence of 10 borrow pits on Funafuti Atoll. These range in size from 677 m^3 to 129,000 m^3 (AusAID, 1998). The borrow pits have become increasingly used as uncontrolled rubbish dumps. There is also significant visual evidence of uncontrolled

dumping of solid wastes on roadsides and within remnant vegetation areas on Funafuti Atoll.

A limited domestic solid waste collection system has been established. This was established with overseas aid and comprises two tractor/trailer combinations for waste collection, combined with the purchase of 120 L mobile garbage bins by participating households and businesses. The service has not met expectations, owing to equipment serviceability and reliability problems (only one tractor remains operational); incomplete take-up of the service by households (only 20% of households paid the $10 annual collection fee in 1996); and a perception that the cost of the service is in excess of what most residents can reasonably afford.

Cultural issues also augur against comprehensive solid waste management. Rubbish disposal is not generally recognised as a problem by the population, and inappropriate dumping of wastes and littering is endemic. This has obvious adverse effects upon visual amenity, as well as problems with odour, vermin and public health.

A national objective of Tuvalu is to reduce the amount of waste generated, and to better manage that which is disposed to landfill. Such ambitions are hampered by technical, economic and cultural factors. The operation of a landfill employing modern techniques is constrained by the lack of suitable land, the close proximity of any site to groundwater and the ocean, and the extremely limited supply of suitable material for daily covering of planned landfill.

Putrescible waste is often fed to pigs and poultry, and it is understood that this may also be the fate of some quarantine wastes.

Sea dumping is under active consideration by the Tuvalu government as a disposal option. It is intended that larger, inert items, such as car bodies and unserviceable shipping containers, would be dumped into the deep waters surrounding Tuvalu.

Quarantine waste is currently burned in open pits, with diesel added as necessary to assist combustion. Hospital wastes, including bio-hazardous materials, sharps and drugs are similarly disposed by burning in an open pit.

Some limited recycling is practiced. Aluminium cans are crushed into billets and exported for recycling. About two TEUs are filled for export each year. It is estimated that the recovery and recycling rate for aluminium cans is less than 50% (AusAID, 1998).

Nil sewage treatment facilities exist within Tuvalu, with most sewage going to septic tanks. Sewage is a critical problem for Funafuti, exacerbated by the presence of pigs, many of which are free-roaming.

An incinerator was supplied to Tuvalu by Australia in 1995 for the destruction of medical wastes; the system is yet to be commissioned although the intention is to establish the incinerator at the hospital in the ‘near-future’. It is possible that this incinerator could also be used for the disposal of quarantine items. A waste oil incinerator has been installed at the power station, although this has yet to become fully operational due to design flaws.

Nil facilities exist within Tuvalu for the handling of hazardous waste. It is intended to develop a dedicated storage area for the collection and containment of such materials prior to development of a permanent disposal strategy; this may involve export.

2.5 Summary and Conclusions

Tuvalu is a very small nation with limited natural resources and an economy and infrastructure reliant upon overseas technical and financial assistance. Tuvalu is not a member of the IMO but has become a Party to MARPOL 73/78, including Annexes I to V inclusive. The nation is not a signatory to the London Convention. The legal requirements of MARPOL 73/78 are not fully enshrined within national law, although this situation is currently being addressed. Port State Controls are exercised.

Waste management is a major environmental and public health issue for Tuvalu, particularly the capital Funafuti. The disposal of wastes is hampered by severe economic and technical constraints, not least of which is the lack of land suitable for landfill sites.

The current demand for the reception of ship wastes is relatively minor, and generally restricted to vessels operating domestically.

International shipping into and out of Funafuti is almost exclusively involved in inter-Pacific island trading; these ships are capable of retaining routine operational wastes for onboard treatment and/or disposal at alternative ports. Domestic vessels, however, have no alternative other than to discharge wastes, mainly garbage, at Funafuti, barring disposal at sea.

In conclusion:

- ship waste reception facilities and procedures at Funafuti are essentially non-existent. This is considered acceptable for international shipping, although minimum facilities for the collection of garbage and oily wastes are required for vessels engaged in domestic activities;
- procedures for the management of cargo-associated waste (primarily unserviceable shipping containers and 205 L drums) need to be improved and the existing stockpiles at the port cleared;
- current quarantine waste procedures are inadequate and possibly ineffective;
- the current waste oil collection service is effective, albeit its availability should be more widely publicised;
- the discharge of sewage from ships at the port of Funafuti contributes to the degradation of water quality. Few practical options exist to ameliorate this situation, other than requiring ships with holding tanks to retain sewage onboard until clear of the lagoon;
- waste management facilities in Funafuti are severely taxed by wastes of terrestrial origin. Noting this, Tuvalu should not normally accept waste from overseas vessels, with the exception of visiting yachts; and
- any increase in the number of foreign fishing vessels visiting Funafuti (as mooted as a condition of future fishing licences) will generate increased demand for reception of ship waste, possibly compelling Tuvalu to accept such materials.

3. RECOMMENDED IMPROVEMENTS

Overall, Tuvalu has inadequate procedures for the management of ship-generated waste, with minimal latitude to improve this situation owing to lack of land and technical and economic constraints. No waste should be accepted from international shipping, except in extenuating circumstances.

3.1 Legislative Issues and Status of Relevant Conventions

Although a Party to MARPOL 73/78 Annexes I to V inclusive, national enabling legislation is considered generally deficient. These shortcoming should be addressed either by suitable amendment of existing, legislation or adoption of new laws, using the SPREP generic marine pollution bill as a model.

3.2 Compliance Monitoring and Enforcement

Opportunities for regional cooperation in the application of Port State Controls should be improved, including information exchange and building of indigenous technical capacity.

3.3 Regional Waste Management Opportunities

Tuvalu should:

- evaluate and improve options for export of recyclable materials accepted from domestic shipping (aluminium and other scrap metals) to other ports in the Pacific islands region or further;
- identify and evaluate options for the export to a suitably equipped nation of hazardous wastes accepted from domestic shipping; and
- expand the existing scheme for transfer of waste oil to Vuda Point for recycling to capture more of the waste oil generated by Tuvalu shipping.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Funafuti

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Provide bins in wharf area. Include port precinct in municipal collection rounds.	Nil acceptance, except from itinerant yachts. As far as practicable, return cargo-associated wastes (e.g. used drums and ISO containers) to source.
Recyclables	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.
Quarantine wastes	n/a	Improve quarantine disposal procedures to ensure all wastes presenting quarantine risk are properly destroyed.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance.
Oily wastes (waste oil)	Provide waste oil collection drums at facilities used by small boats for refuelling.	Nil acceptance.
Oily wastes (oily water)	Critically review requirement and if deemed necessary, provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, principally for domestic vessels.	Nil acceptance.
Sewage	Investigate feasibility of installing shore ablution facilities in wharf area.	Ensure large ships alongside in Funafuti do not discharge untreated sewage (e.g. ban use of heads if necessary).

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: Funafuti
Nation/Territory: Tuvalu

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	3000	2.5	2	50	1.5	67.5	3.4	16.9	0.18	0.45	23	n/a	n/a	70	2.5	126.0
Cruise Liners	600	20000	2	0.5	0.5	3.0	3600.0	1.8	9.0	0.27	0.54	0	n/a	n/a	70	21.0	10.5
Inter-island Traders	200	1000	7	2	40	1.5	2100.0	84.0	420.0	0.05	0.35	14	5	200	30	12.0	480.0
Inter-island Ferries				n/a		1.5	0.0	0.0	0.0	0.05	0.00	0	2	0	n/a	n/a	n/a
Tourist Charter Boats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500	3	2	1	1.7	1020.0	1.0	5.1	0.18	0.54	1	n/a	n/a	50	20.0	20.0
Warships (small)	20	110	4	14	20	1.3	104.0	2.1	10.4	0.01	0.04	1	5	100	50	14.0	280.0
Fishing (oceanic)	18	250	30	2	4	1.8	1036.8	4.1	20.7	0.02	0.60	2	10	40	40	1.4	5.8
Fishing (local)		n/a		n/a		0.8	0.0	0.0	0.0	0.005	0.00	0	n/a	n/a	n/a	n/a	n/a
Local workboats		n/a		n/a		0.5	0.0	0.0	0.0	0.01	0.00	0	0.05	0	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	10	10	12	0.5	30.0	0.4	1.8	n/a	0.01	0	n/a	n/a	20	0.6	7.2
Local craft (day trips)	2	n/a	1	n/a	10000	0.5	1.0	10.0	50.0	n/a	0.001	10	n/a	n/a	n/a	n/a	n/a
					Total			**107**	**534**			**51**		**340**			**929**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

VANUATU

1. PRELIMINARY

1.1 Introduction

Vanuatu, formerly known as the New Hebrides, established itself as a republic upon independence from the joint colonial administration of Britain and France in 1980. The nation has a population of 190,000 with a growth rate (2000 estimate) of 1.74%.

About 70 domestic inter-island trading vessels are registered in Vanuatu, varying in size from 50 tons up to 450 tons. These are engaged in mixed cargo and passenger ferry services between islands. Vanuatu also operates a ships registry, which lists about 60 ships from 15 nations.

Principal exports are copra, beef, cocoa, timber and coffee. In common with other Pacific island states, most commodities are imported.

Pacific island states most closely neighbouring Vanuatu are New Caledonia to the south, the Solomon Islands to the northwest, and Fiji to the east.

1.2 Geography

Vanuatu is an archipelagic chain of over 80 islands of mixed volcanic and coral atoll origin. The population is concentrated on the larger islands, with the most inhabited islands being Efate and Espiritu Santo. Port Vila, the capital is located on the former, while Luganville is located on the latter. Port Vila and Luganville are Vanuatu's two official ports of entry. They are also the focal points of inter-island trading within the nation.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

Vanuatu is a signatory to Annexes I, II, III and V of MARPOL 73/78. The provisions of these annexes have not yet been given effect in national law, although a Bill giving effect has been drafted; the timing of the passage through Parliament of this legislation is uncertain. Vanuatu is also a signatory to the London Convention; as for MARPOL 73/78, the London Convention is also awaiting drafting and proclamation of national enabling legislation. The nation is also a Party to the Tokyo MOU on Port State Controls and an active ship inspection and compliance regime has been initiated.

Notwithstanding the current absence of national enabling legislation, Vanuatu does have catchall legislation intended to give effect to international maritime treaty obligations. This is CAP155 – Laws of the Republic of Vanuatu – Maritime (Conventions), to provide for the application in Vanuatu of certain international maritime conventions. In effect, CAP 155 gives the authority of national legislation to scheduled international maritime treaties upon signature by Vanuatu. Therefore, MARPOL 73/78 requirements are given effect in Vanuatu law simply by the operation of this Act.

1.3.2 Local Legislative Issues

No comprehensive environmental protection legislation currently exists within Vanuatu. An ambitious Bill, the *Environment and Resource Management Bill*, has been drafted to correct this shortcoming, but its passage through the parliamentary process to date has been slow and it is uncertain when, and in what final form, the Bill will become legislation. The Bill is intended to address issues such as EIA, waste management, pollution prevention, hazardous materials management, coastal resources management and marine pollution. One of the requirements of the Bill is the establishment of a national Waste Management Policy and Implementation Plan.

Environmental impact assessment is already covered to some extent by other legislation (such as the *Forestry Act*), but the system is largely *ad hoc* and provides little certainty of outcomes. Similarly, the *Public Health Act* is currently relied upon to regulate waste disposal, although there are acknowledged shortcomings in this approach. Quarantine is regulated by the *Quarantine Act* and administered by the Vanuatu Quarantine and Inspection Service (VQIS).

In addition to national legislation, municipal authorities have by-laws focused upon waste management and pollution prevention. These typically address litter and waste disposal, including uncontrolled dumping.

2. PORT REPORTS

2.1 Luganville

2.1.1 Description of Port and Associated Shipping/Boating Activities

Luganville is the principal port of the northern portion of the nation. There are five separate wharves at Luganville: the main wharf is used for servicing international merchant and cruise liner traffic, while the remainder principally support inter-island trading. The main wharf is operated by the Vanuatu government, while the other wharves are managed by individual enterprises. All ships come alongside in Luganville, with the exception of gas carriers and tankers delivering to one of the two oil distributors which use single point moorings. A small shipyard is located in Luganville, and the town is also the site of the Vanuatu Maritime College.

International merchant traffic into Luganville is mainly associated with deliveries of refined oil products, LNG and containerised goods. Exports are mainly meat in refrigerated containers and wood products, either containerised or break-bulk. Copra is also exported from Luganville in bulk carriers, although loading is effectively undertaken as a break-bulk operation. Container ships usually remain at Luganville in the order of one day, compared to copra carriers which may require three days to a week to load. Annual container movements inwards amount to around 4,000 TEUs. About 50 cargo ships (40 container and 10 copra) visit Luganville annually, as well as 12 product tankers and two or three LPG carriers.

Large cruse liners are occasional visitors to Luganville, with the frequency of visits varying from one or two a month to only one every few months. Visits typically last in the order of 8 to 10 hours. The liners characteristically carry 1,000 to 1,500 passengers, plus another 500 crew. In-bound voyage is usually of one to three nights duration, as is the outbound. Cruise ships more frequently visit Champagne Beach, also on the Island of Espiritu Santo, with an average of one ship visit per week. Liners anchor off Champagne Beach and transfer passengers ashore by boat; there are no other transfers between ship and shore. Quarantine Officers enforce barrier requirements during these visits.

Luganville also supports an active inter-island trading fleet. About 30 ships, ranging in size from less than 50 tonnes to around 300 tonnes operate from Luganville. Operations of the inter-island trading fleet are dispersed across all of Luganville's available wharves. These vessels typically have crews of up to 20, who live onboard, and engage in mixed-cargo and passenger ferry services. Typical loads include copra, drummed oil and other commodities delivered to and from outlying islands. There is also carriage of livestock, albeit at a low-scale, from the outlying islands to Luganville for slaughter at the Santo Meat Packers. Time alongside in Luganville can extend for many days, and longer during maintenance and repair activities. These vessels may carry up to 100 passengers on overnight journeys between islands, with trips between Port Vila and Luganville taking up to four days.

Itinerant yachts are frequent visitors Luganville, with most activity during the cyclone season from October to March. It is understood that more than 50 such yachts call in each year, with up to 10 at anchor within the Segond Channel at any one time during the busier period. About eight day charter vessels, engaged in diving, fishing and cruise services, operate from Luganville, and a small ferry service operates between Luganville and the resort on nearby Aore Island.

There are no planned increases to the capacity of the port in the short to medium-term. It is anticipated, however, that the main wharf will be doubled in length within 20 to 30 years.

2.1.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Luganville should be quite significant with respect to garbage and oily wastes. The principal source of this waste is the large domestic inter-island trading fleet centred upon the port. The survey revealed that the actual amount of waste

collected from vessels visiting Luganville was not commensurate with the level of activity at the port, and was actually significantly less.

International shipping does not usually require to discharge waste while in Luganville, with the occasional exception of cruise liners. Systems for the collection of either garbage or oily wastes from domestic shipping were not in evidence at the time of the survey.

No waste management plan exists for the port of Luganville, and no waste reception facilities or procedures were in evidence apart from those administered by VQIS. Specific fees for quarantine inspection and waste collection and disposal are charged to visiting vessels requesting garbage collection. Visiting vessels are charged conventional port, wharf and pilotage fees.

2.1.2.1 Oily Wastes

Oil company agents currently run a free, informal system for the collection of waste oil from boats. The service is principally used by visiting yachts. Waste oil is collected in 205 L drums and then made available for local use such as roadside dust suppression of lubrication of chainsaws. It was reported that only a few hundred litres of oil are collected in this manner annually. It is understood that some local trading vessels collect waste engine oil in drums and return it to shore for proper disposal or re-use, although a great deal of the waste oil expected from this fleet is unaccounted for.

No procedures were in evidence for the collection of oily bilge water. Considering that the domestic trading vessels centred upon Luganville are unlikely to be fitted with oily water separators, demand for an oily bilge collection service in Luganville is a reasonable expectation.

2.1.2.2 Garbage

No bins are provided on wharves for the use of shipping, although waste collection can be arranged through shipping agents. All garbage landed by international ships is considered to present a quarantine risk and is accordingly treated as quarantine waste (see Quarantine Waste section). No schemes were in evidence for collection of garbage from domestic vessels; it is possible that this waste may be dumped at sea or dumped ashore, as piles of rubbish were in evidence at a number of the private wharves visited during the survey.

Wharf areas were not included in the municipal rubbish collection rounds at the time of the port survey, although pick-up and disposal can be arranged for a fee of Vt 20,000 (about $US 150) for a load of up to 7 m^3. Mounds of rubbish were observed to be burning at the time of the visit to the boatyard; the composition of the rubbish in these piles is uncertain.

2.1.2.3 Quarantine Wastes

As mentioned, all solid garbage landed in Vanuatu from overseas ships is treated as quarantine waste. VQIS charges Vt 3,000 (about $US 20) for each cubic metre of quarantine waste. This amount covers the inspection and disposal costs. Waste is transferred to shore in plastic bags and only dry garbage is accepted. An additional charge of Vt 20,000 (about $US 150) per truck load (up to 7 m^3) is levied by the Luganville municipality for collection and carriage of the waste to the local landfill. Quarantine waste is deposited in a deep pit where it is burned before burial.

The liner *Sky Princess*, carrying 1,200 passengers and 500 crew, unloaded quarantine garbage during the period of survey in Luganville. This was the first occasion that the ship had transferred garbage since leaving Honolulu 20 days previously with a full load of passengers and crew. Waste material landed was:

- paper/plastic/wood 25 m^3
- compacted tin cans 2 m^3
- crushed glass 4 m^3
- incinerator ash 2 m^3
- old mattresses 6 each
- oily engine wastes 15 x 205 L drums (included used oil filters, oily rags and waste oil)

All of this material was treated as quarantine waste.

In the case of small vessels arriving from overseas, such as yachts, VQIS inspectors meet all vessels arriving at Santo and collect all garbage to be landed plus any vegetable or animal matter likely to act as a vector for unwanted pests or pathogens. The quarantine

waste is collected in plastic bags. A total of Vt 3,000 (about $US 20) is charged for this service; Vt 2,500 for the inspection and Vt 500 for the collection and disposal of the quarantine waste.

2.1.2.4 Special, Hazardous or Noxious Wastes

No arrangements were in evidence for the collection of noxious or hazardous wastes from any of the wharf areas or from the shipyard. Chemical wood preservatives are brought in through Luganville for use in the local sawmill, with empty chemical drums returned to Fiji for re-use. No indications were apparent of any history of disposal from ships in the port of any full or empty containers damaged during transit or transfer operations.

Given the passage through Luganville of packaged chemicals and the amount of ship repair and maintenance undertaken in the port it must be assumed that wastes requiring special treatment are generated. The lack of any evidence of the collection and disposal of such wastes suggests that they are dumped at sea or ashore, or else disposed ashore through the general waste stream.

2.1.2.5 Sewage

The Segond Channel experiences strong and frequent tidal runs, resulting in regular and effective flushing of the waterway. Therefore, water quality within the area of Luganville is not considered to be poor. Normal controls on the discharge of sewage from ships in coastal waters are considered effective in preventing any deterioration in water quality (although it should be considered that inter-island traders probably do discharge sewage into the harbour, noting the lack of shore ablutions. The small number of persons living onboard renders these inputs inconsequential in environmental terms). Noting the natural attributes of the harbour and current controls and practices, no additional action is deemed necessary for the maintenance of harbour water quality.

2.2 Port Vila

2.2.1 Description of Port and Associated Shipping/Boating Activities

Port Vila is Vanuatu's principal cruise ship destination, its second busiest international freight terminal and the principal port of the southern portion of the nation. There are three separate cargo wharves. The main wharf is used for servicing international merchant and cruise liner traffic, while the other two are engaged inter-island trading. The main wharf is operated by the Vanuatu government, while the other wharves are managed by private enterprises. All ships come alongside in Port Vila, with the exception of tankers which transfer product via subsea flowlines while at anchor. The Vanuatu Mobile Force maintains a small patrol boat base in the port and there are a number of yacht harbours and two small shipyards. Port Vila bay also provides a large, sheltered anchorage which is employed by ships when awaiting an alongside berth.

International merchant traffic into Port Vila is mainly associated with deliveries of refined oil products, LPG, containerised goods and motor vehicles. Other break bulk cargoes include building materials, packaged chemicals, cement and steel products. The port handles about 2,000 TEUs inwards per annum. Exports are modest and amount to only about 400 TEUs each year. There is also a limited amount of copra exported through the port. Typical periods alongside are one to two days, although slow container handling rates can extend this. Ships may also have to remain in the port roads for several days awaiting a berth. About 150 general cargo ships (container, ro-ro and vehicle ferries) arrive in Port Vila each year, mainly arriving from and departing for other ports in the region.

Large cruse liners are regular visitors, with about 50 calls each year. Visits typically last in about 12 hours, although occasional overnight stays are also made. About three visits in an average year are made by large foreign warships.

Port Vila is the centre of operations for the inter-island domestic trading fleet in the southern regions of Vanuatu. In excess 40 ships operate from Port Vila, ranging as far as Espiritu Santo. Virtually all of these vessels are loaded and unloaded by hand, so periods alongside may range up to almost a week, depending upon cargoes. All of Port Vila's wharves are used by these vessels. In addition to routine passenger and cargo services, between 2,000 and 3,000 live cattle per year are transported from outlying islands to Port Vila in inter-island traders. About 200 to 300 head of cattle are carried each trip,

and they are unloaded directly across the beach near the abattoir.

Port Vila is one of the most popular sailing destinations in the South Pacific and the destination or starting point for several popular international yacht races, each involving up to 30 vessels and often culminating in a regatta in Port Vila. Yachting activity is year–round with a seasonal peak between June and September. Around 30 yachts can be expected in Port Vila at any time, with 50 or more during peak periods. Accommodation for yachts includes harbour moorings and about Mediterranean berths. People live onboard the yachts while in port.

Many day charter vessels, engaged in diving, fishing and cruise services, operate from Port Vila, as well as regular ferry services resorts and residential areas on islands within the harbour. Ports and Harbours operates two small harbour work vessels/pilot boats plus a tug and a handful of fishing vessels are based in the port.

An upgrade to the port, planned to be completed in 2001, will permit handling of ships of up to 40,000 tons. This will permit bigger product tankers to access deliver to Port Vila, reducing deliveries from about 35 to four or five ship visits annually.

2.2.2 Demand for Ship Waste Reception Facilities

The demand for port waste reception facilities in Port Vila should be extensive with respect to garbage and oily wastes, mainly from the domestic inter-island trading fleet. The survey revealed that the actual amount of waste collected from vessels visiting Port Vila was considerably less than that expected.

International shipping does not usually require to discharge waste while in Port Vila, with the occasional exception of cruise liners. Systems for the collection of either garbage or oily wastes from domestic shipping were not in evidence at the time of the survey.

No waste management plan exists for the port of Port Vila, and no waste reception facilities or procedures were in evidence apart from those administered by VQIS. No fees are collected for waste management, apart from those related to quarantine wastes.

2.2.2.1 Oily Wastes

No systems exist in Port Vila for the collection of oily wastes or oily bilge water from ships and boats. It is understood that yachts wishing to dispose of waste oil are advised to deposit it with general garbage. Waste oil generated by the Vanuatu patrol boat is used by firefighting authorities as a fuel for training fires.

2.2.2.2 Garbage

No bins are provided on wharves for the use of shipping, although waste collection can be arranged through shipping agents. As for Luganville, all garbage landed by international ships is treated as quarantine waste. No schemes were in evidence for collection of garbage from domestic vessels.

The private wharves in Port Vila were not included in the municipal rubbish collection rounds at the time of the port survey, although the service does run directly past these docks. The office and workshop areas of the Main Wharf are included in the municipal rounds, although collection is erratic and Port and Harbours personnel report that reliance is often placed upon stevedoring companies to remove waste in lieu of the municipal service.

Bins are provided at the yacht facilities for general garbage. Thee yacht facilities are included in the municipal refuse collection rounds.

2.2.2.3 Quarantine Wastes

All garbage landed in Vanuatu from overseas ships is treated as quarantine waste. Additionally, VQIS inspectors meet all yachts on arrival in Port Vila and collect any quarantine items for disposal ashore.

A gas-fired quarantine waste incinerator was installed at the main wharf as part of a New Zealand aid programme, but this is now disused as a result of a land tenure dispute. Quarantine waste is now transferred in open truck to he Port Vila landfill and deposited in a deep, lined pit where it is burned before burial. A batch of quarantine waste was observed while undergoing destruction at the landfill. The quarantine material had remained uncovered in the open pit for three days before being ignited. Full incineration was considered unlikely noting the ponded water in the pit, and it was reported

that the same procedure is employed during the wet season when torrential rains may extinguish the fire.

2.2.2.4 Special, Hazardous or Noxious Wastes

No arrangements were in evidence for the collection of noxious or hazardous wastes from any of the wharf areas.

2.2.2.5 Sewage

Wharf areas in Port Vila are very well sheltered from the open ocean, and are essentially set in small bays, channels and inlets and protected by islands within a harbour within a larger bay. This physical structure limits flushing of the harbour waters, with the result that they are vulnerable to pollutant inputs. Water quality testing in Port Vila has confirmed that sections of the harbour are showing degraded water quality. Sewage discharge is not permitted in harbour waters.

Although the yachting facilities provide shore ablutions, it must be assumed that yachts at moorings in the harbour occasionally discharge sewage, especially considering the difficulties associated with accessing shore facilities while at a mooring. No sewage pump-out facilities are provided, and access to the berths by sullage trucks is not physically possible. Yachts requiring to discharge sewage are advised to proceed to sea. Domestic trading vessels may also be assumed to discharge sewage while in harbour, noting that toilets are not provided at one of the private wharves from which they operate.

The discharge of sewage from vessels in Port Vila has the potential to contribute to degraded water quality. It is considered that improved measures are needed to ensure that water quality in the harbour is protected from vessel sourced sewage.

2.3 Discussion

Ship waste management procedures in Vanuatu are generally deficient in all areas. Although demand from international shipping for waste reception is apparently low, no facilities or procedures were evident for the management of wastes arising from internal shipping activities. In the case of Port Vila, it is also necessary to improve measures for vessel-sourced sewage, noting the sensitivity of the harbour to pollutant inputs.

The treatment of all solid waste sourced from overseas shipping is considered unnecessary and an overly cautious approach. Quarantine inspection procedures and barrier controls should be reviewed with the aim of focusing the quarantine effort upon quarantine threats.

2.4 Current Terrestrial Waste Management Practices

2.4.1 Luganville

The Luganville Municipal Council operates garbage collection service plus a landfill approximately 6 km from the town. The local abattoir, on the outskirts of Luganville, also operates its own landfill. The garbage collection service centres on two trucks, one a 7 m^3 tipper, and collects from residences and commercial premises within the town. The reliability of the collection service suffers from frequent vehicle serviceability problems.

The municipal facility uses an abandoned quarry. The site is not lined nor run as a sanitary landfill but is nevertheless reasonably well operated. Scrap iron and similar re-useable materials are separated upon arrival, and green waste is also separated and windrowed. The remaining garbage is further separated into burnable and non-burnable material. Burnable waste is placed into a large pit and burned, whereas the non-burnable fraction is placed directly into a separate pit. There is no process for regularly covering garbage, with the result that birds and other vermin are attracted to the landfill. Odour can also be a problem, as is scavenging. Contaminated leachate from the landfill is not considered to pose a pollution threat to either groundwater or marine waters. Visual inspection of the site suggested that oil and other inappropriate wastes are disposed at the landfill.

A 1994 aid project funded by the Asian Development Bank aimed to improve urban infrastructure in Vanuatu, including the establishment of a new sanitary landfill and provision of new refuse collection trucks. It was intended that the new vehicles and landfill would be operational by 1999. This has not

occurred and it is understood that the project has been abandoned.

An aluminium can collection service had been operating in Luganville. Cans were exported to Australia for recycling. This scheme is now defunct, although collection bins were still in evidence around Luganville at the time of the port survey. No other recycling activities are understood to occur within Luganville, with the exception of the scrap iron recovered at the landfill.

Waste oil is collected by the local oil agents and made available for use by locals for purposes such as corrosion inhibitor or as a dust suppressant. Both the sawmill and the meatworks operate boilers, the former fuelled largely by tallow and the latter by wood offcuts. It is possible that either could also burn recovered and filtered waste oil.

Luganville uses septic tanks for the disposal of sewage. Two septage collection trucks, operated by private contractors, work within the town for the periodic emptying of sludge from septic systems. Sludge is disposed of at the municipal landfill.

2.4.2 Port Vila

Port Vila municipality operates a modern lined landfill at Bouffa, about 10 km from the port. The authority operates a fleet of six refuse collection trucks. Garbage is delivered to the landfill without segregation except for a proportion of green wastes which are mulched. The landfill was built with a leachate pond system and groundwater quality is monitored. The leachate ponds have not been used as designed and are reported to overflow during the wet season. The ponds are also improperly used for the dumping of septage sludge.

Hospital wastes in Port Vila are incinerated or disposed to landfill. VQIS operate a quarantine incinerator near Port Vila airport. No specific procedures exist for the management of hazardous wastes and these largely enter the general waste stream for disposal at the landfill.

There is a recycling collection system within Port Vila for aluminium cans and some non-ferrous metals. Recovered materials are exported to Australia for recycling. Beer and soft drink bottles are collected and refilled in local bottling plants.

The local electricity utility, UNELCO, in cooperation with the oil companies, has established a scheme for the export to Fiji of waste oil. This amounts to one or two TEUs per annum of waste oil in 205 L drums (40 drums per TEU). The waste oil enters the waste oil collection and re-use scheme operating within Fiji. Only high-quality, unadulterated waste oil is collected for export.

Septic tanks are relied upon for sewage treatment in Port Vila. Inappropriate development and septic tank positioning on the shores of Port Vila Bay is believed to have contributed to the degradation of port water quality. Contractors, operating sullage collection trucks, are engaged to remove sludge from septic tanks.

2.5 Summary and Conclusions

Vanuatu is a Party to MARPOL 73/78, including Annexes I to V except Annex IV and is also a signatory to the London Convention and the Tokyo MOU. Port State Controls are exercised.

Waste management is a major environmental issue for Vanuatu. The disposal of wastes is hampered by economic and technical constraints.

The current demand for the reception of ship wastes, particularly for domestic shipping, is relatively high, although poorly catered for. International shipping into and out of Funafuti is almost exclusively involved in inter-Pacific island trading; these ships are capable of retaining routine operational wastes for onboard treatment and/or disposal at alternative ports. Domestic vessels, however, apparently discharge all of their garbage and oily wastes at sea (mainly in coastal waters) in the general absence of port reception facilities.

Waste management is a major environmental issue for Vanuatu. The disposal of wastes is hampered by economic and technical constraints.

In conclusion:

- ship waste reception facilities and procedures at Luganville and Port Vila are essentially non-existent, with the exception

of quarantine waste. This is considered acceptable for international shipping, although facilities for the collection of garbage and oily wastes are required for vessels engaged in domestic activities;
- current quarantine waste collection procedures are adequate and possibly overly-cautious. Quarantine waste transfer and disposal procedures are potentially ineffective;
- procedures for the identification, segregation and proper handling of hazardous wastes need to be implemented;
- some waste oil collection services exist in Luganville and Port Vila, but these need to be promoted and expanded in order to capture oily wastes originating from shipping;
- the discharge of sewage from small ships and yachts must be assumed. This is not considered to pose adverse environmental consequences at Luganville, but would contribute to degraded water quality in Port Vila; and
- Vanuatu has the capacity to accept more wastes from overseas vessels (assuming a streamlining and improvement in quarantine waste procedures), although current demand for these services from international shipping is minimal.

3. RECOMMENDED IMPROVEMENTS

Procedures for the reception and management of ship-generated waste in Vanuatu are of varying quality. Demand for waste reception form international shipping is generally low, and within the capacity of Vanuatu to deal with. The nation has a large and active domestic inter-island trading fleet which has been assessed as the most significant source of ship-generated marine pollution. Current measures for the management of wastes from these vessels are considered inadequate, however, the concentration of activities of these vessels in either Luganville or Port Vila provides great opportunity for targeted improvement measures.

3.1 Legislative Issues and Status of Relevant Conventions

Vanuatu is a Party to MARPOL 73/78 Annexes I, II, III and V inclusive. Although national enabling legislation has been enacted for this convention, this legislation is not as effective or comprehensive in application as intended by the IMO. National enabling legislation needs to optimise MARPOL 73/78 requirements. This could be achieved either by suitable amendment of existing, legislation or adoption of new laws, using the SPREP generic marine pollution bill as a model.

Vanuatu should also accede to the SPREP Convention and its Protocols as a matter of priority.

3.2 Compliance Monitoring and Enforcement

Vanuatu has recently improved Port and Flag State inspection and compliance enforcement procedures; latitude exists for improvements in regional cooperation in the application of Port State Controls.

3.3 Regional Waste Management Opportunities

Vanuatu should:
- Evaluate and improve options for export of vessel-sourced recyclable materials (aluminium and other scrap metals) to other ports in the Pacific islands region or further.
- Identify and evaluate options for the export to a suitably equipped nation of hazardous wastes accepted from domestic shipping.
- Expand and improve the existing scheme for transfer of waste oil to Fiji for recycling, and identify opportunities to export waste oil to other destinations (such as Australia).

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Luganville

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Provide bins in wharf areas. Include wharves in municipal collection rounds.	Provide bins in wharf areas, ensuring exclusion of noxious and quarantine materials.
Recyclables	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas.
Quarantine wastes	n/a	Review quarantine waste classification system to ensure only wastes presenting quarantine risk enter quarantine waste stream. Improve quarantine waste storage, transport and disposal procedures to ensure all wastes presenting quarantine risk are properly contained and destroyed.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance, except in extenuating circumstances.
Oily wastes (waste oil)	Provide waste oil collection facilities (such as drums or pump and tank systems), especially for wharves used by domestic inter-island trading vessels.	Nil acceptance.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, especially for domestic inter-island trading vessels.	Nil acceptance.
Sewage	N/a, although shore ablution facilities should be provided in wharf areas as a prudent management measure.	N/a, although shore ablution facilities should be provided in wharf areas as a prudent management measure.

Recommended Improvements to Port Waste Reception: Port Vila

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Provide bins in wharf areas. Include wharves in municipal collection rounds.	Provide bins in wharf areas, ensuring exclusion of noxious and quarantine materials.
Recyclables	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.	If recycling of aluminium cans found to be viable for nation as a whole, provide suitable collection bins in wharf areas.
Quarantine wastes	n/a	Review quarantine waste classification system to ensure only wastes presenting quarantine risk enter quarantine waste stream. Improve quarantine waste storage, transport and disposal procedures to ensure all wastes presenting quarantine risk are properly contained and destroyed.
Hazardous/special wastes	Review current procedures to ensure diversion of hazardous/special wastes from general garbage. Link ship-generated hazardous waste measures to national scheme for capture and export.	Nil acceptance, except in extenuating circumstances.
Oily wastes (waste oil)	Provide waste oil collection facilities (such as drums or pump and tank systems), especially for wharves used by domestic inter-island trading vessels.	Nil acceptance.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities, especially for domestic inter-island trading vessels.	Nil acceptance.
Sewage	Ban the use of heads in vessels in Port Vila, except for those fitted with adequate sewage treatment plants. Provide shore toilet facilities at all docks and wharves in Port Vila.	Ensure ships alongside in Port Vila do not discharge untreated sewage (e.g. ban use of heads if necessary).

PACPOL SW1: Estimates of Potential Annual Demand for Port Waste Reception

Port: **Luganville**
Nation/Territory: **Vanuatu**

Vessel Type	Average No. Persons Onboard	Average Displacement (t)	Av. Period at Sea Before Calling at Port (days)	Average Duration of Port Stay (days)	No.Port Visits per annum	Garbage [1]				Sludge and Waste Oil [1]			Oily Bilge Water [2]		Sewage [3]		
						kg/pers.day (at sea)	Amount per ship visit (kg)	Annual mass (t)	Annual volume (m^3)	m^3/day (at sea)	Amount per ship visit (m^3)	Annual amount (m^3)	Amount per ship visit (m^3)	Annual amount (m^3)	L/pers.day (in port)	Amount per ship visit (m^3)	Annual amount (m^3)
Merchantmen	18	3000	3	1.5	65	1.5	81.0	5.3	26.3	0.18	0.54	35	n/a	n/a	70	1.9	122.9
Cruise Liners	1500	20000	2	1	12	3.0	9000.0	108.0	540.0	0.27	0.54	6	n/a	n/a	70	105.0	1260.0
Inter-island Traders	15	250	2	2	1800	1.5	45.0	81.0	405.0	0.05	0.10	180	5	9000	30	0.9	1620.0
Inter-island Ferries	100	250	2	n/a	50	1.5	300.0	15.0	75.0	0.05	0.10	5	2	100	n/a	n/a	n/a
Tourist Charter Boats	10	n/a	1	n/a	2000	0.5	5.0	10.0	50.0	0.01	0.01	20	n/a	n/a	n/a	n/a	n/a
Warships (large)	200	2500				1.7	0.0	0.0	0.0	0.18	0.00	0	n/a	n/a	50	0.0	0.0
Warships (small)	20	110	5	4	6	1.3	130.0	0.8	3.9	0.01	0.05	0	5	30	50	4.0	24.0
Fishing (oceanic)	18	250				1.8	0.0	0.0	0.0	0.02	0.00	0	10	0	40	0.0	0.0
Fishing (local)		n/a		n/a		0.8	0.0	0.0	0.0	0.005	0.00	0	n/a	n/a	n/a	n/a	n/a
Local workboats	2	n/a	1	n/a	150	0.5	1.0	0.2	0.8	0.01	0.01	2	0.05	8	n/a	n/a	n/a
Yachts (itinerant)	3	n/a	5	5	50	0.5	15.0	0.8	3.8	n/a	0.01	1	n/a	n/a	20	0.3	15.0
Local craft (day trips)	2	n/a	1	n/a		0.5	1.0	0.0	0.0	n/a	0.001	0	n/a	n/a	n/a	n/a	n/a
					Total			**221**	**1105**			**249**		**9138**			**3042**

Notes:

1. Estimates are indicative only and assume all waste is retained onboard for disposal ashore (including food waste) without any treatment (eg. compaction or shredding).
2. Does not include tank washings or non-segregated ballast water.
3. Sewage only considered if port water quality is degraded or vulnerable to sewage inputs from vessels.

WALLIS AND FUTUNA

1. PRELIMINARY

1.1 Introduction

Note: The report on Wallis & Futuna is the result of a desktop study only. No field surveys have been conducted.

France administers Wallis & Futuna as an overseas territory. The economy is concentrated upon traditional subsistence agriculture and fishing, with income derived from leasing fishing rights to FFVs, mainly Japanese and South Korean. Exports from the territory are minimal and comprise mainly copra sand tropical agricultural produce.

1.2 Geography

Wallis & Futuna comprises three main islands (Wallis [also known as Uvea], Futuna and Alofi) and 20 islets. There are no permanent settlements on Alofi due to a lack of water. The islands are of volcanic origin and have a total area of 255 km^2, with a maximum elevation of 765 m. Nearest neighbours are Fiji to the south, Samoa to the east, Tokelau to the north east and Tuvalu to the west.

1.3 Legislative Issues

1.3.1 Status of IMO Conventions

France, the territorial administrator, is a signatory to Annexes I, II, III, IV and V of MARPOL 73/78, plus the London Convention. The provisions of these MARPOL annexes have been given effect in French national law. Although France has not formally advised the IMO of an extension of the provisions of MARPOL 73/78 to Wallis & Futuna, it is inferred that this is the case.

1.3.2 Local Legislative Issues

It is not known if any local marine environment protection laws or regulations are in force. It is a reasonable assumption that quarantine regulations are in place.

2. REPORT

2.1 Shipping and Ports in Wallis & Futuna

Ports are situated at Mata-Uta, the territorial capital on Wallis (Uvea) Island and Leava on Futuna Island. Sailing time between these two points is in the order of 10 to 12 hours.

Wallis & Futuna is serviced by small dray cargo ships of up to about 3,000 tons. These ships mainly carry containers but also have a break bulk capability. It is understood that two to three general cargo ships arrive each month. Typical routes into and out of the territory depart from, or leave for, Suva, Funafuti and Noumea, with occasional direct links to Luganville in Vanuatu. Sailing time between Wallis & Futuna and Suva is in the order of two to three days, and the same for Funafuti. The trip between Wallis & Futuna and Noumea takes around five to six days. Longest scheduled stays in both Mata-Uta and Leava are overnight.

No regular cruise ship services visit the territory, although it is possible that occasional charter or special purpose cruises call in. It can also be assumed that deliveries of refined petroleum products are periodically made by light tanker from Vuda Point.

No French Navy ships are based in Wallis & Futuna, although it is assumed that French forces based in the French Pacific territories undertake patrols on an irregular basis. It is also speculated that a small number of itinerant yachts call on the territory.

2.2 Demand for Ship Waste Reception Facilities

It may be speculated that the principal demand for ship waste reception, mainly for garbage and oily wastes, arises from domestic vessels. It is also a reasonable assumption that this maritime activity would generate negligible quantities of waste. The demand for waste reception from international merchant ships would most likely be minimal, and possibly non-existent.

The current status of waste reception and disposal facilities and procedures is not known.

2.3 Terrestrial Waste Management

No information is available on current terrestrial waste management practices in Wallis & Futuna.

2.4 Summary and Conclusions

It can be anticipated that the demand for ship waste reception in Wallis & Futuna is modest and restricted to that arising from a small domestic trading fleet providing passenger links, and possibly limited cargo services, between Wallis Island and Futuna Island. The demand for waste reception by international shipping is assumed to be slight, consistent with that of other states within the region.

The legal foundation for marine pollution prevention in the nation would be adequate, noting that France, the territorial administrator, is a Party to MARPOL 73/78.

3. RECOMMENDED IMPROVEMENTS

It is anticipated that the principal demand for the reception of ship-generated wastes arises from domestic vessels. It is also speculated that Wallis & Futuna experiences limited demand for the acceptance of waste from international shipping.

3.1 Legislative Issues and Status of Relevant Conventions

France should formally advise the IMO of the extension to Wallis & Futuna of French accession to relevant IMO treaties.

3.2 Compliance Monitoring and Enforcement

Nil information is available, thereby precluding any meaningful evaluation or recommendations.

3.3 Regional Waste Management Opportunities

Wallis & Futuna should:

- Evaluate options for the export of recyclable materials (aluminium and other scrap metals), and hazardous wastes to other ports in the Pacific islands region or further, possibly New Zealand.
- Develop a waste oil collection scheme, linked with an export and recovery programme. Noting tanker delivery routes, export to Fiji or New Caledonia are seen as the most likely options.

3.4 Ship-waste Reception and Management Recommendations

Recommended Improvements to Port Waste Reception: Mata-Uta and Leava

Waste Category	Waste Management Recommendations	
	Domestic Shipping	**International Shipping**
Garbage	Provide bins in wharf areas. Include wharves in municipal collection rounds (if available).	Nil acceptance, except from itinerant yachts.
Recyclables	If recycling of aluminium cans found to be viable for territory as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.	If recycling of aluminium cans found to be viable for territory as a whole, provide suitable collection bins in wharf areas. Encourage vessel operators to dispose of aluminium separately to general garbage.
Quarantine wastes	n/a	Nil data available – specific recommendations not possible.
Hazardous/special wastes	Ensure diversion from general garbage stream of hazardous/special wastes.	Nil acceptance.
Oily wastes (waste oil)	Provide waste oil collection drums at facilities used by domestic vessels. Ensure all oily wastes are collected (e.g. diverted from general garbage stream).	Nil acceptance, except from itinerant yachts using same procedures as for domestic vessels.
Oily wastes (oily water)	Provide oily waste collection (such as barge or truck mounted pump and tank systems), and treatment (such as gravity separation system) facilities. These facilities should be available for domestic vessels in at least one port.	Nil acceptance.
Sewage	Nil data available – specific recommendations not possible, although shore ablution facilities should be provided in wharf areas as a prudent management measure.	Nil data available – specific recommendations not possible, although shore ablution facilities should be provided in wharf areas as a prudent management measure.

Appendix D

Estimates of Potential Annual Demand for Port Waste Reception in Pacific Island Ports

Appendix D

Estimates of Potential Annual Demand for Port Waste Reception in Pacific Island Ports

This Appendix contains estimates of the theoretical potential yearly demand for ship waste reception facilities which vessels *normally* using the subject port may require, as per IMO guidance.

Estimates for waste generation rates for oily wastes, garbage and sewage have been drawn from a variety of sources. These are summarised in Tables 6, 7 and 8 of this report. It is stressed that the models used for predicting waste generation rates are imprecise and the real situation in ships is inherently subject to great variability. This is compounded by a general lack of comprehensive records for all aspects of the port shipping profiles necessary to populate the waste estimation tables. At best, these estimates should be viewed as providing imprecise predictions of the order of magnitude of waste which shipping normally associated with a Pacific island port *may* generate and wish to transfer to shore reception facilities for subsequent recycling or disposal.

In making these estimates a number of assumptions have been necessary. Principal ones are:

- All waste is retained onboard (NB: this includes food waste, which is likely to be lawfully disposed to sea by ships sailing in open-sea areas).
- Indicative crew and passenger numbers have been assumed for some classes of vessels (e.g. tourist charter boats, local workboats and yachts).
- Tourist vessels engaged in day cruises make an average of four trips each week.
- Private local craft make an average of two day trips each week.
- With the exception of international (oceanic) fishing vessels, tuna 'motherships' and itinerant yachts, people do not remain onboard vessels while in harbour, hence actual waste generation while in harbour is significantly reduced for all categories of vessels.
- International merchant ships, cruise liners and large warships have no need to dispose of oily bilge water to shore reception facilities (i.e. it is assumed that they are equipped with IMO approved systems permitting treatment of oily bilge water at sea).
- Estimates of the rates of generation of oily wastes and oily bilge water are based upon information in the literature and best professional judgement.
- Sewage estimates reflect the amount predicted to be generated while the vessel is actually in port, and assume that all passengers and crew remain onboard.

Appendix E

Record of Consultations for PACPOL SW1

Appendix E

Record of Consultations for PACPOL SW1

Persons listed in this section were consulted either during the course of the field surveys or during the research and report writing phases of the project.

American Samoa

Name	Position	Organisation
Christopher King	Port Operations	American Samoa Department of Port Administration
Togipa Tausaga	Director	American Samoa Environmental Protection Agency
Lieutenant Tom Griffiths	Detachment Commander	US Coast Guard, Pago Pago
Nicholas King Jr	Safety and Environmental Compliance Officer	American Samoa Power Authority
Elizabeth Sualevai	Senior Quarantine Officer	American Samoa Department of Agriculture
Julie McCoy		Harbor Refuse and Environmental Services
Pete Pele		TNT Refuse Services

Cook Islands

Name	Position	Organisation
Tony Armstrong	Chief Executive Officer	Ports Authority – Cook Islands
Captain Don Silk	Harbour Master	Rarotonga Port Authority
Ned Howard	Director	Director of Marine
Tanya Temata	Senior Environment Officer	Environment Service, Rarotonga

Federated States of Micronesia

Chuuk

Name	Position	Organisation
Julieta Albert	Environmental Officer	Environmental Protection Agency
Rieo Kokis	Port Manager	Transportation

Kosrae

Name	Position	Organisation
Wadel Kincre	Port Director	Department of Public Works
Marbe Martin	Manager	Private company
Jack Sigrah	Manager	Private company

Pohnpei

Name	Position	Organisation
Paul James	Seaport Manager	Pohnpei Ports Authority
Arilluno Susaia	General Manger	Pohnpei Ports Authority

Yap

Name	Title/Position	Organisation
Moses Marpa	Chief, Transportation Division	Public Works and Transportation
Andy Talileichig	Division Chief	Marine Resources Management Division
Leo Yinug	Acting Executive Director	Environmental Protection Agency - Yap State
Captain Serphen H. Single	Sea/Port Manager	Public Works and Transportation

Fiji

Name	Position	Organisation
Captain Inoke Ratotodro	Manager, Maritime Affairs	Maritime & Ports Authority of Fiji
Captain Jesse James Dunn	Senior Port State Control Officer	Maritime & Ports Authority of Fiji
Viliame Oioi	Pollution Control Officer	Maritime & Ports Authority of Fiji
Mr. Seko	Harbour Master	Port of Labasa
Apakuki Yauvoli	Terminal Manager	SCF Labasa
Captain Dr. P Heathcote	Regional Maritime Legal Adviser	Secretariat of the Pacific Community
Captain Waisale Salu	Director Marine	
Captain Muni R Goundar	Principal Marine Officer	Marine Department
Rajesh Chand	Senior Agricultural Quarantine Officer	Quarantine Department
Aubrey Low	Manager	Williams and Gosling Ltd.
Aliferete Raibaki	Waste Management Officer	Suva City Council
Vandana Naidu		Department of the Environment
Daniel Bianchini		Shell, Fiji
Tina Seniloli		Mobil Oil, Fiji
Sher Bahadur		National Fire Authority
Tikaram Satia	Boarding Officer	Quarantine Department
Jone Cakau	Property/Safety Officer	Maritime & Ports Authority of Fiji
Geoff Norton	Director – Share Holder	Aqua Food Limited, Vuda Point
Tim McLeod	Boat Owner	Private Marina User, Vuda Marina
Pusp Naidu	Terminal Manager, Vuda Point	Shell, Fiji
Captain Robert Southey	Harbour Master	Port Denarau Marina Ltd
Mike Tiffany	Power Captain	Royal Suva Yacht Club

French Polynesia

Name	Position	Organisation
Christophe Ajonc	Engineering and Planning Manager	Port Autonome de Papeete
Jean-Marc Lannuzel	Technical Manager	Port Autonome de Papeete
Ronald Blaise	General Manager	ONYX (Waste contractor – VIVENDI)

Guam

Name	Position	Organisation
Francisco Camacho	General Manager	Port Authority of Guam
Frank Santos	Harbour Master	Ports Authority of Guam
Colonel Thomas Tamares	Chief	Port Authority Police
Lieutenant James Borders	Marine Safety Officer	US Coast Guard, Marianas Section
Jose Esteves	Environmental Health Specialist	Guam Environmental Protection Agency
Frederick Otte	Environmental Manager	Shell Guam
Roberto Cabreza	Environmental Scientist	US Navy Works Centre, Guam

Kiribati

Name	Position	Organisation
Captain Mitete Abete	Director of Marine	
Baranika Etuati	Acting Director	Environment and Conservation Division
Taulehia Pulefou	Pollution Control Officer	Ministry of Environmental and Social Development
Captain Tom Murdoch	Manager	Kiribati Ports Authority
Mark Kuzer	Consultant	PPK, Sydney
Tanguraem Teree	Quarantine Inspector	Agriculture and Fishery Department

Marshall Islands

Name	Position	Organisation
Danny Wase	Director	MIMRA
Danny Jack	Deputy Director	MIMRA
Captain Bani	Chief Fishery Officer	MIMRA
Captain Joseph Tiobech	Director	Marshall Islands Port Authority
Captain Linrnj Abon	Operations Manager	Marshall Islands Port Authority
Captain Frank Peter	Assistant Operations Manager	Marshall Islands Port Authority
Sal Sumalabe	Finance Officer	Marshall Islands Port Authority
Abraham Hicking	Acting Director	RMI-EPA
Risen Tarbilin	Environment Specialist	RMI-EPA

Nauru

Name	Position	Organisation
Joseph Cain	Secretary	Department of Industry and Economic Development
Joe Hiram	General Manager	Nauru Phosphate Company
Patrick Goodfellow		Nauru Rehabilitation Corporation
Vincent Scotty		Quarantine Department, Ministry of Health
Peter Jacob	Acting Chief Executive	Fisheries
Andrew Kareray		Department of Industry and Economic Development
Captain Bill Johnson	Harbour Master	
Anthony Garabwan	Acting Secretary	Works and Community Services

New Caledonia

Name	Position	Organisation
Joel Lauvary	Assistant Harbour Master	Port Authority
Mr LaForest	Manager Noumea	ONYX
Thierry Chaverot	Directeur	Resources Naturelles de Sud

Niue

Name	Position	Organisation
C. Fatanaiki	Senior Quarantine Officer	DAFF
B. Tauati	Quarantine Officer	DAFF
G. Wolf	AusAID Waste Management Advisor	Department of Health
S. Hetutu	Environmental Health Officer	Department of Health
C. Pasisi	Environmental Planner	Lands & Survey
P. Talagi	Crown Counsel	Attorney-General's Office
O. Viliko	Supervisor - Outside Services & Port Operations	Public Works Department
H. Head	Manager	Customs
L. Liufalani	Customs Officer	Customs
K. Singh	Manager	Bulk Fuel

Northern Mariana Islands

Name	Position	Organisation
Carlos Salas	Executive Director	Commonwealth Ports Authority
Antonio Cabrera	Port Manager	Commonwealth Ports Authority
John Gourley	Director	Micronesian Environmental Services

Palau

Name	Position	Organisation
Arvin Raymond	Chief	Division of Transport. Palau National Government
Marhence Madranchar	Executive Officer	Environment Quality Protection Board
Emil Edesomel	Pollution Coordinator	Environment Quality Protection Board
Not recorded	Secretary	Belau Transfer & Terminal

Papua New Guinea

Name	Position	Organisation
Ilo Ila Koko	Director Engineering and Technical Services	PNG Harbours Board
William Kalit	Assistant Port Manager (Operations), Port Moresby	PNG Harbours Board
Pius Kulol	Regional Port Manager, Port Moresby	PNG Harbours Board
Stanley Tavul	Corporate Planning Manager	PNG Harbours Board
Joshua Taruna	Regional Port Manager, Lae	PNG Harbours Board
Sakeus Gem	Assistant Port Manager, Lae	PNG Harbours Board
Gregory Fae	Training Centre	PNG Harbours Board
Gunther Joku	1st Assistant Director (Environment Division)	Environment Department
Godfrey Aingi	International Treaties Officer	Environment Department
Dr Williamson	General Manager, Technical Advisory Services	NAQIA
Sidney Suma	Import Program Manager	NAQIA
Veravu Piala	Southern Region	NAQIA
William Suwang	Assistant Manager	NAQIA
Keith Wabis	Technical Officer	NAQIA
Neil Whiting	Managing Director	M & E Partnership Limited
Michael Pidi	Assistant Director Marine Safety	Maritime Division Department of Transport and Civil Aviation

Samoa

Name	Position	Organisation
Ululalautea Papalii John Ryan	General Manager	Samoa Ports Authority
T. Laavasa Malua	Chief Environment Planning Officer	Department of Lands, Surveys and Environment
Faumuina Sailimalo Pati Liu	Assistant Director, Environment and Conservation	Department of Lands, Surveys and Environment
Tepatasi	Port Master	Samoa Ports Authority
Not recorded	Maintenance Adviser, Samoa	Pacific Patrol Boat Program, Royal Australian Navy

Solomon Islands

Name	Position	Organisation
Ngenoma Buaeda Kabui	Chief Executive	Solomon Islands Ports Authority (SIPA)
Glyn Joshua	Training Manager	SIPA
Judah Kulabuie	Harbour Master	SIPA
Jeoffery Fefera	Operations Manager	SIPA
Bill Barile	Director, Engineering	SIPA
Steve Goodhew	Pacific Patrol Boat Maintenance Advisor	Royal Australian Navy
Annie Hemmer	Accountant	Mobil, Gizo
Danny Kennedy	Manager	Gizo Adventure Sports

Tonga

Name	Position	Organisation
Uiluo Samani	Acting Secretary	Ministry of Lands, Survey and Natural Resources
Paula Taufu	Acting Principal, Ecology and Environment	Ministry of Lands, Survey and Natural Resources
Sione Tukia Lepa	Acting Conservation Officer	Ministry of Lands, Survey and Natural Resources
Asipeli Paloki	Marine Conservation Officer	Ministry of Lands, Survey and Natural Resources
Lelea Tupou	Senior Health Inspector	Ministry of Health
Mr Tu'itupou	Secretary	Marine and Ports
Mosese Lavemai	Operations Manager	Ports Authority of Tonga
Poasi M. Tei	Chief Financial Officer	Ports Authority of Tonga
Mr Akau'ola	Secretary for Fisheries	
Mr Tuifua	Quarantine Section	Ministry of Forestry and Fishery
Isikeli Pulini	Deputy Director	Ministry of Works
Lieutenant Siaosa Fifita		Tonga Defence Force (Navy)

Tuvalu

Name	Position	Organisation
Mataio Tekinene	Environment Officer	Environment Unit, Tuvalu Government
Kelesoiua Sakoa	Waste Management Plan Coordinator	Waste Management Project, Tuvalu Government
Loto Pasefika	Marine Manager	Marine & Ports Department
Uale Sinapati	Acting Director	Marine & Ports Department
Vete Sakaio	Manager – Tuvalu	BP
Not recorded	Maintenance Adviser, Tuvalu	Pacific Patrol Boat Program, Royal Australian Navy
Semu Taafaki	Shipping Agent	Tuvalu Travel and Shipping Services
Captain Fernando Soriano	Master, MV *CEC Thrust*	Pyrsos Group

Vanuatu

Name	Position	Organisation
Firiam Yvon	Corporate Services Officer	Vanuatu Maritime Authority
John Roosen	Chief Executive Officer	Vanuatu Maritime Authority
Daniel Phan	Manager, Santo	Shell Vanuatu
Tony Naliupis	Officer	Santo Meat Packers (SMP)
Godfrey Daruhi	Officer (Projects)	Luganville Municipal Council
Captain Kevin Barnett	Chief Executive Officer	Vanuatu Maritime College
Manwah Leong	Owner	Unity Store Shipping
Gerardo Safo	Safety Officer, *Sky Princess*	P & O
Not recorded	Master, *Sky Princess*	P & O
Maurice Horry	Quarantine Officer	Vanuatu Quarantine and Inspection Service (VQIS)
Selei Bob	Assistant Quarantine Officer	VQIS
Michael Toa	Harbour Master	Ports
Sam Ned	Office (Supervisor)	NISCOL
Donald Hosea	Marine Inspector	Vanuatu Maritime Authority
Kevin Green	Owner/Manager	Aquamarine Diving
Kristen Reeve		Vanuatu National Workers Union (National Fisheries Council)
Rodney Aru	Forest Manager	Melcofe Sawmill Ltd.
Ginette Morris	Secretary	Unity Store (local shipping owner)
Lamara Abel	Office Manager	Yachting World Vanuatu
Ernest Bani	Head	Environment Unit, Government of Vanuatu
Viran Tovu	Environmental Health Officer	Public Health Department
Albert Williams	Waste Project Officer	Environment Unit
Fatani Sope	Deputy Town Clerk	Port Vila Municipality
Paul Fred	2nd Personal Assistant	MIPU
Malcolm Dalesa	Assistant Environmental Health Officer	Port Vila Municipality
Maurice Bollen	Engineer-in-Charge, *Tuo Roimato*	Ports and Harbours
Not recorded	Maritime Surveillance Advisor, Vanuatu	Royal Australian Navy
Patrick Pedica	Manager	Shell Vanuatu
Niowenmal Glenn	SHE/Commercial	Mobil
Tony Ata	Head	Environmental Health Unit
Jack San	PME	Ports and Harbours
Paul Peter	Harbour Master, Port Vila	Ports and Harbours

Miscellaneous

Name	Position	Organisation
Bo Samuelssson	National Operations Manager	Columbus Line New Zealand Ltd.
Ron Bird	Director, Training and Operations	Waterfront Training & Consultancy Services (South Pacific) Ltd
Craig Harris	Managing Director	McKay Shipping Ltd.
John McLennan	Chief Executive Officer	Pacific Forum Line
R. Seamer	Group Operations Manager	Pacific Forum Line
Mr Webb	Operations Manager	Dilmun Navigation
Paul Nelson	Principal Policy Adviser, Environment Protection Standards	Australian Maritime Safety Authority
Annaliesé Caston	Adviser – Policy and Regulatory, Environment Protection Standards	Australian Maritime Safety Authority
Adrienne Waterman	Marine Group	Environment Australia
Valerie Cheer	Maritime Safety Division	International Maritime Organization
Geraldine Gibson	Legal Office	International Maritime Organization
Des Fontain	Pacific Patrol Boat Program	Australian Department of Defence
Andrew Wright	Project Manager, Strategic Action Programme for International Waters	South Pacific Regional Environment Programme
Edward Anderson		Consultant to South Pacific Regional Environment Programme
Ngenoma Buaeda Kabui	Chief Executive Officer	Solomon Islands Ports Authority
Patrick Keane	Senior Consultant	IMO - Regional Marine Pollution Emergency, Information and Training Center for the Wider Caribbean Region
Robert Baldock		Perth Petroleum Services
Andrew Richards	Manager, Monitoring, Control and Surveillance	Forum Fisheries Agency
Karl Staisch	Co-ordinator, Observer and Monitoring Programme	Forum Fisheries Agency