SECRETARIAT OF THE PACIFIC REGIONAL ENVIRONMENT PROGRAMME

Report of Solid Waste Management Mission to Tonga
9th – 16th July 2013

Prepared by: *Esther Richards, Solid Waste Management Adviser, July 2013*

Submitted to: *Ministry of Lands, Environment, Climate Change and Natural Resources*

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Contents

Acronyms

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
CEO	Chief Executive Officer
EU	European Union
E-waste	Electrical and electronic waste
GEF	Global Environment Facility
IBC	Industrial Bulk Containers
JICA	Japan International Cooperation Agency
J-PRISM	Japanese Technical Cooperation Project for the Promotion of Regional Initiative in Solid Waste Management in Pacific Island Countries
MLECCNR	Ministry of Lands, Environment, Climate Change and Natural Resources
NGO	Non Governmental Organization
NZAID	New Zealand Agency for International Development (now New Zealand Aid Programme)
PacWaste	Pacific Hazardous Waste Management Project
SAICM	Strategic Approach to International Chemicals Management
SPREP	Secretariat of the Pacific Regional Environment Programme
UNEP/GEF	United Nations Environment Programme/Global Environment Facility
WAL	Waste Authority Limited

Acknowledgements

I gratefully acknowledge the hospitality and assistance of Mr 'Asipeli Palaki and Ms Mafile'o Masi during this mission. A note of thanks also to those who were interviewed and provided information that helped to establish the current situation of waste management in Tonga.

Executive Summary

This mission was prompted by a request for Solid Waste Management Assistance from the Ministry of Lands, Environment, Climate Change and Natural Resources (MLECCNR). The goals of the mission were to: (i) establish a basic understanding of the waste management activities in Tonga; (ii) provide a general update of SPREP waste management initiatives; (iii) identify waste management areas for future SPREP assistance; and (iv) provide immediate technical advice on relevant matters as necessary. The key mission findings are summarized below.

Solid Waste Management

The Tapuhia (anaerobic) Landfill on Tongatapu services the main island of Tongatapu and is operated by WAL. It was constructed in 2006 with AusAID assistance with a 50-year lifespan, and replaced the Popua Dump, which was rehabilitated and closed with NZAID assistance. The development and maintenance of the Tapuhia Landfill has not progressed as planned/designed, with the result that some of the equipment and the leachate treatment system are now in disrepair.

The ADB-funded Nuku'Alofa Urban Development Sector Project (2012-2014) aims to get the Tapuhia Landfill back on track and aims to establish sustainable solid waste services. The specific activities detailed in the project document are: installation of an impervious liner to cell no. 2 of the Tapuhia landfill; new landfill loader procured, delivered, and entered into service; groundwater water quality monitoring program reactivated; WAL updates and implements its asset management plan for Tapuhia Landfill and solid waste handling and processing equipment; Community-led, village-level waste collection service piloted in five peri-urban villages; financial management and billing software and associated hardware platforms procured and commissioned, and financial management and asset management capacity of WAL developed.

E-waste Management

An NGO called E-waste Tonga, was established to address the e-waste issue in Tonga, and they successfully applied for funding of US$48,000 from the GEF Small Grants Programme to support an island-wide collection programme that resulted in a first round of collection of over 30 tonnes of e-waste. There was a second round of collection, however the quantities of e-waste were not recorded. A small incentive was initially offered to encourage e-waste surrender, but this has since been discontinued.

The e-waste collected was transferred to a warehouse rented by Gio recycling, where they are currently being dismantled. A market has not yet been identified for the e-waste, and the small grants funding cannot be used to subsidize exportation of the commodity. Gio Recycling has indicated that it will be exploring the feasibility of establishing a processing facility in Tonga to recover precious metals from e-waste.

Tonga has been identified as a beneficiary for the EU/SPREP PacWaste Project (2013-2017), which will focus on improved management of e-waste, medical waste, and asbestos.

Used Oil Management

Tonga Power Limited is the main generator of used oil and currently has 9,000 litres of used oil stored at the Popua Power Station, with evidence of spillage and ground contamination. Tonga Power needs to accumulate 18,000 litres (full container load) before it can be collected and exported for recycling by Gio Recycling.

Following this shipment of stockpiled oil, the contract provisions for removal of used oil to New Zealand at no extra costs by the new oil supplier will be enforced.

Presently, used oil is sold by Tonga Power to farmers at US$20 (37 Pa'anga) for 200 litres, for use in lubricating tractors and other farm equipment. This is also the primary means of disposal of used oil on the outer islands. During this mission, evidence of used oil applied to line mark a playing field was seen on Tongatapu.

Medical Waste Management

The main medical waste generators in the Kingdom of Tonga are the Vaiola Hospital (200 beds), 7 Health Centres, and 6 Health Clinics. Data sighted during the mission indicated that for June 2013, 450 kg of sharps and 4,262 kg of clinical waste were generated and disposed of on Tongatapu. This suggests that approximately 56 tonnes of medical waste must be managed annually. In the absence of an incinerator, this waste is transported directly to the Tapuhia Landfill in an enclosed truck. On the outer islands, waste from health centres and clinics are buried or burnt on the compound or taken to a hole elsewhere for burial.

Tonga has been identified as a beneficiary for the EU/SPREP PacWaste Project (2013-2017), which will focus on improved management of e-waste, medical waste, and asbestos.

Recommendations

Based on these findings, the following key recommendations are made:

1. In view of the current solid waste management assistance provided by the Nuku'Alofa Urban Development Sector Project, SPREP assistance over the next 2 years should complement this work through training and capacity building under its current and planned projects such as the AFD Regional Solid Waste Management Initiative, and the UNEP/GEF POPs Release Reduction Project. To this end, SPREP will ensure that all relevant call for nominations for upcoming training events are circulated to the management of WAL. SPREP will also raise the issue of training of WAL staff with the JICA J-PRISM project to identify possible future regional training opportunities.

2. It is strongly recommended that any future SPREP assistance to Tonga be directed to the outer islands (Ha'apai, Eua, Niuas), drawing as much as possible on the national capacity that will be built up through current national projects including the Nuku'Alofa Urban Sector Development Project, and through regional capacity building projects (J-PRISM, AFD Regional solid Waste Management Initiative, UNEP/GEFP POPs Release Reduction Project, etc).

3. WAL should consider the benefits of implementing the semi-aerobic landfill method at the Tapuhia Landfill during the construction of cell 2. The benefits of this method, when implemented and operated correctly, has been demonstrated in Vava'u under the JICA/SPREP J-PRISM Project. SPREP can coordinate with JICA to provide technical advice in this area.

4. SPREP can provide technical support, if requested, to finalize the National Solid Waste Management Strategy.

5. MLECCNR, WAL, Tonga Power, and Gio Recycling should join outreach efforts to discourage the practice of applying used oil on playing fields. Used oil is a carcinogen and has other negative health and environmental impacts. Appendix 1 contains some guidance from the Queensland (Australia) Government on potential replacements. The awareness campaign can be done as part of current outreach programmes by DLECCNR and WAL.

6. The current means of storage and transfer of used oil has caused and may continue to cause oil spillage and ground contamination. This can be improved upon by increasing the height (capacity) of the bunded area holding the tanktainer and conducting all used oil transfer operations in this bunded area. Alternatively, the empty tanktainer should be moved to another location thus freeing the bunded area for IBC storage and used oil transfer.

7. MLECCNR should be acknowledged for ensuring the completion of Basel Convention procedures prior to the movement of hazardous waste. The next step is for MLECCNR to complete its annual national reporting to the SPREP Secretariat as it will enable the Secretariat to meet its obligations and also help to build a database of movement of hazardous substances across the region. The template for annual reporting is available at: http://www.basel.int/Procedures/NationalReporting/Blankquestionnaire/tabid/2297/Default.aspx.

1 Introduction

1. This mission was prompted by a request for Solid Waste Management Assistance from the Ministry of Lands, Environment, Climate Change and Natural Resources (MLECCNR). This request was made during the 23rd SPREP Meeting in New Caledonia in September 2012.

2. The goals of the mission were to:

- Establish a basic understanding of the waste management activities in Tonga;
- Provide a brief update of SPREP initiatives;
- Identify waste management areas for future SPREP assistance; and
- Provide immediate technical advice on relevant matters as necessary.

3. The meetings and activities listed in the table below were undertaken in order to achieve the goals.

Date	Activities	People Involved
TU 9th July 2013	Arrive in the Kingdom of Tonga Check in to Hotel	
WE 10th July 2013	Meetings with: Head of Pollution Section, MLECCNR CEO of MLECCNR CEO Waste Authority Limited E-waste Tonga Gio Recycling	 Ms Mafile'o Masi Mr Asipeli Palaki Ms Kalolaine Fifita Rev Samiu Fonua Mr Filimone and 'Ofa Tu'ikolovatu
TH 11th July 2013	Meet with Tonga Power Limited Meet with Public Health	Mr Michael Lani 'Ahokava Mr Niu Fakakovikaetau
FR 12th July 2013	Site visit to Tapuhia Landfill Site Visit to Popua Rehabilitated (closed) dump	Ms Mafile'o Masi Ms Mafile'o Masi
SA 13th July 2013	----	
SU 14th July 2013	----	
MO 15th July 2013	Meet with Marine and Ports, Ministry of Infrastructure Debrief with MLECCNR	Ms Kelela Tonga Mr 'Asipeli Palaki, Ms Mafile'o Masi
TU 16th July 2013	Depart the Kingdom of Tonga @ 2:45am	

4. This mission report provides a summary of the findings, and outlines a few recommendations for improvements to waste management in the Kingdom of Tonga, including areas for future assistance from SPREP.

2 Findings

2.1 Solid Waste Management in Tonga

Institutional arrangements

5. There are three (3) key institutions involved in solid waste management in Tonga, specifically:

- The Ministry of Lands, Environment, Climate Change, and Natural Resources -Pollution Division, is the regulatory body;
- The Waste Authority Limited (WAL) is a public company with the mandate for solid waste collection and disposal on Tongatapu only; and
- The Ministry of Health has responsibility for waste management on the outer islands, and medical waste management.

Policy

6. A draft National Solid Waste Management Strategy has been prepared from the time of the International Waters Project (which ended in 2006), but has not since been finalized.

Cost of waste management

7. The operating costs (collection, disposal, awareness) are estimated at between $60,000 - $70,000 per month, of which 28% are for wages for 28 staff to carry out waste collection, disposal, and awareness activities.

Waste generation

8. In the absence of a weighbridge at the Tapuhia Landfill, manual records on the waste disposal amount are kept. The CEO has promised to email the monthly/annual data to SPREP.

Waste collection service (Tongatapu)

9. The current waste collection service is carried out using in-house capacity. Waste collection coverage is reported to have increased from 13% just 2 years ago, to about 50% (48% urban, 2% rural) at present, with target of 75% by end of 2013 financial year.

10. Household collection is provided once per week for a monthly fee of US$ 5.40 (10 Pa'anga) per household, which is billed jointly with the water bill. However, water meters are only installed in the urban areas.

11. In the rural areas (with no water meter), joint billing with Tonga Power has been considered but deemed too expensive, hence consultations are ongoing to seek community support in requesting a government allocation for providing service to rural areas.

12. Commercial collection service is provided to businesses in the urban centre. The fee for this service could not be verified during the mission.

Waste collection service - outer islands

13. The Ministry of Health is responsible for waste collection/disposal on the outer islands. There is currently no waste collection service with the exception of Vava'u .

Equipment in use

14. The current equipment used by WAL includes 2 operational waste compactor trucks (Photo 1), 1 non-operational compactor truck, and 1 loader with wheels (Photo 2). Additional equipment will be procured under the Nuku'Alofa Urban Sector Development Project (discussed below).

15. WAL requested further assistance from SPREP to secure a landfill compactor.

Waste disposal sites

16. The Tapuhia (anaerobic) Landfill on Tongatapu (21°11'4.49"S 175°11'14.42"W) services the main island of Tongatapu (Photos 3 & 4). It was constructed in 2006 with AusAID assistance with a 50-year lifespan. It replaced the Popua Dump (21° 8'31.74"S 175° 9'41.16"W) which was rehabilitated and closed with NZAID assistance. The development and maintenance of the Tapuhia Landfill has not progressed as planned/designed, with the result that some of the equipment and the leachate treatment system are now in disrepair.

17. Soil cover at Tapuhia Landfill is on a monthly to quarterly basis.

18. On Vava'u Island, a semi-aerobic landfill (converted from a dump with J-PRISM assistance) caters to waste disposal for that island.

19. On other island groups (Ha'apai, Eua, Niuas) residents are responsible for their own disposal which is typically through backyard burial or burning.

Recycling

20. Gio Recycling is a local waste recycling company with offices on Tongatapu and Vava'u, that currently recycles e-waste, lead acid batteries, used oil, ferrous and non-ferrous scrap metals, and glass.

21. Papers and plastics were previously collected and exported. Two (2) 40-ft containers of paper have been sent to Brisbane in the past, however the shipment of these commodities is not cost effective and they are no longer handled.

22. The payment to customers for bringing in recyclable commodities are (in local currency):

Commodity	Pa'anaga/kg	USD/kg
Tin	$0.05	$0.03
Aluminium	$0.50	$0.27
Brass	$0.70	$0.38
Copper	$5.00	$2.71

Hazardous waste management

23. At the landfill there is a disused area with a galvanized roof covering, which was intended to be used for hazardous waste storage/disposal, but it appeared to have never been used and is currently overgrown (Photo 5). Hazardous waste, consisting mostly of paints and medical waste, is said to be wrapped with Bentofix (a geosynthetic clay liner) and buried in the landfill.

24. Gio Recycling has secured an agreement with a South Korean company (Aimhigh Korea inc) for recycling of wet lead acid batteries. At the time of the mission, an internal request (sighted by E. Richards) had already been made to initiate the Basel Convention notification procedure for the movement of 1,000 tonnes of wet lead acid batteries (a draft unsigned notification form and contracts were also sighted).

Environmental monitoring

25. There are about 11 ground water monitoring points at Tapuhia Landfill (Photo 6) and a few points at the closed Popua Dump. Some environmental monitoring data exists from the initial period of operation for Tapuhia Landfill, however, there have been no recent tests due to lack of financing. This is expected to recommence under the Nuku'Alofa Urban Development Sector project.

Training and capacity building

26. The CEO of WAL indicated that they have had several opportunities for solid waste management training in Japan through JICA, but the key people who need this training lacked the educational background stipulated in the nominating guidelines. She stressed that these guidelines need to be relaxed.

Future plans/assistance

27. The ADB-funded Nuku'Alofa Urban Development Sector Project (2012-2014) aims to get the Tapuhia Landfill back on track and aims to establish sustainable solid waste services. The specific activities detailed in the project document are:

- Installation of an impervious liner to cell no. 2 of the Tapuhia landfill.
- New landfill loader procured, delivered, and entered into service at Tapuhia landfill.
- Groundwater water quality monitoring program at Tapuhia landfill reactivated.
- WAL updates and implements its asset management plan for Tapuhia Landfill and solid waste handling and processing equipment.
- Community-led, village-level waste collection service piloted in five peri-urban villages.
- Financial management and billing software and associated hardware platforms procured and commissioned, and financial management and asset management capacity of WAL developed.

Photos

Photo 1: Waste compactor truck

Photo 2: Loader

Photo 3: Bing Map image of Tapuhia Landfill

Photo 4: Tapuhia Landfill: view of cell 1 (with rubbish), and cell 2 (under preparation)

Photo 5: Disused hazardous waste storage/disposal area

Photo 6: Ground water monitoring well

Recommendations

28. In view of the current solid waste management assistance provided by the Nuku'Alofa Urban Development Sector Project, SPREP assistance over the next 2 years should complement this work through training and capacity building under its current and planned projects such as the AFD Regional Solid Waste Management Initiative, and the UNEP/GEF POPs Release Reduction Project. To this end, SPREP will ensure that all relevant call for nominations for upcoming training events are circulated to the management of WAL. SPREP will also raise the issue of training of WAL staff with the JICA J-PRISM project to identify possible future regional training opportunities.

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30. WAL should consider the benefits of implementing the semi-aerobic landfill method at the Tapuhia Landfill during the construction of cell 2. The benefits of this method, when implemented and operated correctly, has been demonstrated in Vava'u under the JICA/SPREP J-PRISM Project. SPREP can coordinate with JICA to provide technical advice in this area.

31. SPREP can provide technical support, if requested, to finalize the National Solid Waste Management Strategy.

2.2 E-waste Management in Tonga

Current practices

32. An NGO called E-waste Tonga, was established to address the e-waste issue in Tonga. In 2010, this group successfully applied for funding of US$48,000 from the GEF Small Grants Programme to implement an e-waste collection and awareness programme over 2 years (2010-2012). The project has been extended to July 2013, with further extensions to 2014 likely.

33. The funding supported an island-wide collection programme that resulted in a first round of collection of over 30 tonnes of e-waste. There was a second round of collection, however the quantities of e-waste were not recorded. A small incentive was initially offered to encourage e-waste surrender, but this has since been discontinued.

34. The e-waste collected was transferred to a warehouse rented by Gio recycling, where they are currently being dismantled (Photo 7). A market has not yet been identified for the e-waste, and the small grants funding cannot be used to subsidize exportation of the commodity. Potential recyclers in Australia, New Zealand, and Asia, will soon be identified as a component of a SPREP-implemented E-waste project funded by the SAICM Secretariat.

35. A component of the Tonga e-waste project included an e-waste poster competition. The winning entries are shown in Photos 8-11.

36. One of the remaining activities under the project is to establish a levy on imported electronic goods which would support their end-of-life management. In this respect, the SAICM project will provide model legislation to guide the implementation of a model e-waste management framework (including levy), which would be applicable to Tonga.

37. E-waste is currently part of the Form 7 Computing Science curriculum, and plans are underway to include e-waste in the curricula for Forms 4-6.

Future plans/projects

38. Tonga has been identified as a beneficiary for the EU/SPREP PacWaste Project (2013-2017), which will focus on improved management of e-waste, medical waste, and asbestos.

39. Gio Recycling has indicated that it will be exploring the feasibility of establishing a processing facility in Tonga to recover precious metals from e-waste.

Photos

Photo 7: E-waste dismantling at Gio Recycling

Photo 8: E-waste Poster Competition Winner

Photo 9: E-waste Poster Competition Winner

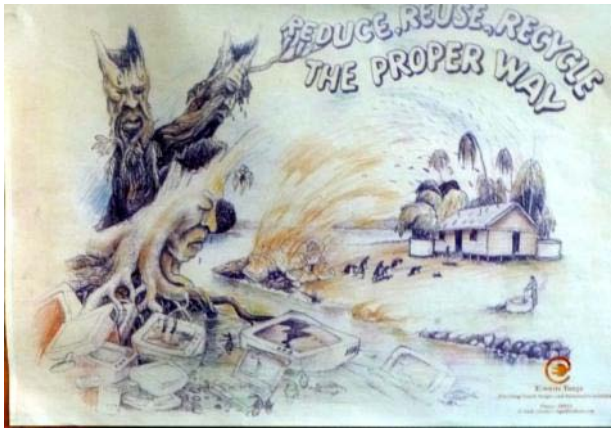

Photo 10: E-waste Poster Competition Winner

Photo 11: E-waste Poster Competition Winner

2.3 Used Oil Management

Used oil generation

40. Tonga Power Limited is the main used oil generator. The main importers include BP Oil Vava'u, and BP (SWP) Limited.

41. Tonga Power estimates its used oil generation rate for Tongatapu at 30,000 litres per year (or 50% of new oil consumed).No data was available for other used oil generators.

Storage

42. Tonga Power currently has 9,000 litres of used oil stored in 9 IBCs at the Popua Power Station (Photo 12), with evidence of spillage and ground contamination (Photo 13). Used oil from one of the generators is also drained directly to a storage tank, from which the IBCs are filled (Photo 14).

43. The Popua Power Station also has a 24,000 litre capacity tanktainer (currently empty), which was used previously to export used oil to New Zealand (Photo 15).

44. The power generating stations on the outer islands are said to have very little used oil stockpiled.

45. Tonga Power advised that they are required to accumulate 18,000 litres (full container load) before Gio Recycling will collect and export.

Disposal

46. From 1998 used oil was burnt in the power plant's diesel engines, but this ceased in 2007 due to expensive malfunctions, including blockage of fuel injectors.

47. Used oil was also previously exported to NZ using the tanktainer, however at US$10,800 (20,000 Pa'anga) per shipment, it was deemed too costly to continue. The cost included shipment to NZ and return of a cleaned tanktainer to Tonga. From this, the unit cost for the shipment was US$0.45/litre or 8.3% of the average cost of new lubricant.

48. Disposing of used oil through Total in Fiji was also reportedly explored but deemed too costly because of the indirect shipping route (Tonga-New Zealand-Fiji).

49. Presently, used oil is sold by Tonga Power to farmers at US$20 (37 Pa'anga) for 200 litres, for use in lubricating tractors and other farm equipment. This is also the primary means of disposal of used oil on the outer islands. During this mission, evidence of used oil applied to line mark a playing field was seen on Tongatapu (Photo 16).

50. For comparison, the bulk cost of new oil is about US$1,080 (2,000 Pa'anga) per 200 litres. Unit cost of new lubricant ranges from US$3.78 - $6.48 per litre ($7 - $12 Pa'anga per litre).

51. In the recent past, Gio Recycling has sold and exported two (2) 20-ft containers of used oil (21 tonnes) to a company in India reportedly in compliance with Basel Convention requirements.

52. Gio Recycling indicated that Tongan oil companies were previously approached to assist with equipment to support collection/disposal, but there was no interest.

53. Tonga Power has recently awarded a new contract for oil supply which includes provision for the removal of the used oil to New Zealand (Salters Cartage) at no extra costs. Once a total of 18,000 litres of used oil has been accumulated by Tonga Power and exported by Gio Recycling, then Tonga Power plans to enforce this contract provision.

Future plans/projects

54. Tonga has already been identified as one of the beneficiaries for used oil management assistance under the UNEP/GEF POPs Release Reduction Project (2013-2018).

Other issues

55. There are no standards on lubricant quality in Tonga, with the result that a number of poor quality brands are being imported. To reduce this problem, Mr Michael Lani 'Ahokava with Tonga Power suggested that the lubricant standards developed by the Society of Automotive Engineers could be adopted for Tonga.

Photos

Photo 12: 9,000 litres of used oil stored in IBCs

Photo 13: Used oil spillage and ground contamination

Photo 14: Used oil storage tank connected to the generator waste pit

Photo 15: Tonga Power's 24,000 litre tanktainer in a bunded area

Photo 16: Used oil applied to a playing field

Recommendations

56. MLECCNR, WAL, Tonga Power, and Gio Recycling should join outreach efforts to discourage the practice of applying used oil on playing fields. Used oil is a carcinogen and has other negative health and environmental impacts. Appendix 1 contains some guidance from the Queensland (Australia) Government on potential replacements. The awareness campaign can be done as part of current outreach programmes by DLECCNR and WAL.

57. The current means of storage and transfer of used oil has caused and may continue to cause oil spillage and ground contamination. This can be improved upon by increasing the height (capacity) of the bunded area holding the tanktainer and conducting all used oil transfer operations in this bunded area. Alternatively, the empty tanktainer should be moved to another location thus freeing the bunded area for IBC storage and used oil transfer.

58. MLECCNR should be acknowledged for ensuring the completion of Basel Convention procedures prior to the movement of hazardous waste. The next step is for DLECCNR to complete its annual national reporting to the SPREP Secretariat as it will enable the Secretariat to meet its obligations and also help to build a database of movement of hazardous substances across the region. The template for annual reporting can be downloaded from http://www.basel.int/Procedures/NationalReporting/Blankquestionnaire/tabid/2297/Default.aspx.

2.4 Medical Waste Management

Policy

59. There is no medical waste management policy or plan. However, an Infection Committee has been established, which typically issues reminders about proper waste segregation practices.

Generation and Segregation

60. The main medical waste generators in the Kingdom of Tonga are the Vaiola Hospital (200 beds), 7 Health Centres, and 6 Health Clinics. Data sighted during the mission indicated that for June 2013, 450 kg of sharps and 4,262 kg of clinical waste were generated and disposed of on Tongatapu[1]. This suggests that approximately 56 tonnes of medical waste must be managed annually.

61. A three-bin system is used for waste segregation: yellow for sharps, red for other medical waste, and green for general waste. However, improper segregation remains an issue.

Storage, collection, and transportation

62. There are no storage facilities at Vailoa Hospital. Medical waste is transported directly from the main hospital to the Tapuhia Landfill daily in an enclosed truck (Photo 17). Waste is collected and transported once weekly from the health centres and clinics on Tongatapu.

[1] Mr. Fakakovikaetau, Supervising Public Health Inspector has promised to email summaries of medical waste generation data for 2013 and 2012 to SPREP.

Treatment and disposal

63. Dressings contaminated with bodily fluids are autoclaved prior to disposal as general waste.

64. Medical waste was previously incinerated in an incinerator donated by the Japanese Government. However, this has since failed. On Tongatapu and Vava'u, medical waste is now disposed of in the waste disposal sites.

65. On the outer islands, waste from health centres and clinics are buried or burnt on the compound or taken to a hole elsewhere for burial.

Funding and operational costs

66. The operational costs for the medical waste management system were not immediately known to the interviewee. However, the human resources involved in medical waste management include 1 Health Inspector and 1 Labourer at the Vaiola Hospital.

67. Small grant funding of $20,000 Pa'anga was secured in 2012 from the World Health Organization to procure medical waste management supplies (plastic bags, bins, and wheelbarrows).

Future plans/projects

68. Tonga has been identified as a beneficiary for the EU/SPREP PacWaste Project (2013-2017), which will focus on improved management of e-waste, medical waste, and asbestos.

Other issues

69. Mr Niu Fakakovikaetau with the Ministry of Health advised that assistance was needed with environmentally sound disposal of medical waste on the outer islands, in addition to technical advice and support for training and capacity building on medical waste management.

Photos

Photo 17: Medical waste collection truck

3 Summary of Recommendations

1. In view of the current solid waste management assistance provided by the Nuku'Alofa Urban Development Sector Project, SPREP assistance over the next 2 years should complement this work through training and capacity building under its current and planned projects such as the AFD Regional Solid Waste Management Initiative, and the UNEP/GEF POPs Release Reduction Project. To this end, SPREP will ensure that all relevant call for nominations for upcoming training events are circulated to the management of WAL. SPREP will also raise the issue of training of WAL staff with the JICA J-PRISM project to identify possible future regional training opportunities.

2. It is strongly recommended that any future SPREP assistance to Tonga be directed to the outer islands (Ha'apai, Eua, Niuas), drawing as much as possible on the national capacity that will be built up through current national projects including the Nuku'Alofa Urban Sector Development Project, and through regional capacity building projects (J-PRISM, AFD Regional solid Waste Management Initiative, UNEP/GEFP POPs Release Reduction Project, etc).

3. WAL should consider the benefits of implementing the semi-aerobic landfill method at the Tapuhia Landfill during the construction of cell 2. The benefits of this method, when implemented and operated correctly, has been demonstrated in Vava'u under the JICA/SPREP J-PRISM Project. SPREP can coordinate with JICA to provide technical advice in this area.

4. SPREP can provide technical support, if requested, to finalize the National Solid Waste Management Strategy.

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4 People met / interviewed

Name	Job Title, Agency	Email Address
Mr 'Asipeli Palaki	Director, MLECCNR	ceo@lands.gov.to
Ms Mafile'o Masi	Head, Pollution Section, MLECCNR	mafileo.masi@gmail.com
Ms Kalolaine Fifita	CEO, Waste Authority Limited	klainef@yahoo.com
Mr Michael Lani 'Ahokava	Power Generation Manager, Tonga Power Ltd	ahokavaml@tongapower.to
Mr Samiu Fonua	E-waste Tonga (and Dean Academic Support at Tupou Tertiary Institute)	Samiu.fonua@tti.to
Ms 'Ofa Tu'ikolovatu	CEO, Gio Recycling	Uihanson.gio@gmail.com
Mr Filimone Tu'ikolovatu	Auto Mechanic Specialist & Owner, Uiha & Sons Ltd (Gio Recycling)	Uihanson.gio@gmail.com
Mr Niu Fakakovikaetau	Supervising Public Health Inspector, Ministry of Health	

Appendix 1: Guidance on Line Marking of Sporting Fields

value wellbeing lead promote people engage active support

Health & Safety Fact Sheet

Line Marking of Sporting Fields

Most schools will need to perform line marking in grassed areas to demarcate playing areas and sporting fields for a range of activities. In the past, many schools have used sump oil or similar products as a cheap, durable and easy to apply line marking solution.

Schools should review their processes for line marking to ensure they are in line with recommendations made by the Environmental Protection Agency (EPA).

The EPA has released information that states "the use of waste oil [sump oil] for line marking on playing fields is discouraged and all reasonable and practicable measures should be used to find a more environmentally benign alternative."

The EPA also advises that "environmentally benign alternatives to using waste oil for line marking include, but are not limited to:

1) organic-based water soluble paints;
2) water-based vegetable dyes;
3) chalk; and
4) glyphosate-based weed killers".

When reviewing your procedures please be aware that it is an offence under the *Environmental Protection (Water) Policy 1997, s31(1)* for a person to deposit or release oil, paint or herbicides in a place where it could reasonably be expected to be washed into a roadside gutter, stormwater drain or a [body of] water (*Environmental Protection Act 1994,* s440ZG). The *Environmental Protection Regulation 2008, Schedule 9* lists all prescribed water contaminants.

Companies specialising in line marking products and equipment can often assist with appropriate and durable alternatives dependent on field type and conditions.

The following table provides information about some commonly used line marking products;

PRODUCT	COMMENTS
Agricultural lime **Calcite** (Whiting, Calcium Carbonate, $CaC0_3$)	"Calcite" may be used as a dry line marking material. These products are classified as Hazardous Substances and therefore Safety Data Sheets (SDS) must be obtained and risk assessments completed.
Coloured Oxides; Use Iron (Red) or Zinc (White) Oxides only.	Note that the SDS for oxides warn about eye damage and potential for oxides to mark the clothes of players. Classified Hazardous Substance; SDS and risk assessment required
Water Based Plastic Paint	If the grass cover is good, remarking may not be necessary for up to 4 weeks. The addition of a wetting agent, i.e. white oil, will also assist in ensuring longer "life" of fluid.

Vegetable Dye	These are completely harmless. Cost is the greatest deterrent. Players clothing can be subject to soiling upon contact.
Pressure Pack Spray Applications e.g. Berger, Mini Striper, Speedy Striper	This method utilises "safe" aerosol paint which proves very costly. The average quantity used to mark a football field varies but ranges from 2 to 3 cans per week based on the efficiency of the operator and the cutting of grass. It is estimated that initially at least 6 cans would be required to mark a rugby field. The advantages of this method are ease of application and no preparation or clean up is necessary.
Glyphosate-based Weed Killers ("Round-Up, Zero")	Frequent use of glyphosate-based weed killers to mark sporting fields may cause divots or depressions. Classified Hazardous Substance; SDS and risk assessment required
Hydrated Lime (Slaked lime, Calcium Hydroxide, $Ca[OH]_2$)	**Quick lime must not be used.** **Hydrated Lime in its dry form must not be used.** Due to the alkali content of lime there are risks to the persons who have the responsibility of preparing and applying the mixture (even in wet form) and extreme care is necessary at all times. If Hydrated Lime is applied wet in the form of a spray rather than in its dry form, the chance of injury to players is reduced considerably. Classified Hazardous Substance; SDS and risk assessment required

Other resources:

Environmental Protection Act 1994 (reprint 10G 2012)
http://www.legislation.qld.gov.au/legisltn/current/e/envprota94.pdf

Environmental Protection Regulation 2008 (reprint 2E 2012)
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/E/EnvProtR08.pdf

Recycle used oil
http://www.derm.qld.gov.au/environmental_management/waste/waste_minimisation/recycle_used_oil/index.html