

- Empty infectious waste bins with fresh blood evident stored in an open insecure area, close to school grounds
- Incinerator itself was secure, but the area around it was untidy, un-paved and litter was present
- A small ground-stockpile of waste separated from the hospital waste stream during the day's incineration was noted – this may have infectious properties
- Access to the facility is very poor, and from the new hospital it is tortuous
- Flue stack still leaking at roof joint
- Flue stack height obviously inadequate.

The detailed findings and technical background to the upgrading of the incinerator in 2002, as set out in TWMP medical waste incinerator report are not repeated here. However, in summary medical waste from the Princess Margaret Hospital completed in 2003, is disposed of at a medical waste incinerator located in the southwest corner of the hospital grounds, adjacent to the lagoon. To the south (some 20m away) is the southern hospital site boundary and a 2-storey primary School. The height of the school buildings is higher than the stack exit height from the incinerator. There are frequent complaints about smoke and odour from the incinerator.

Total waste throughput is unknown, but the incinerator has a load capacity limit of 25kg/hr. WMU provides a trained operator to run the incinerator.

Assessment of Medical Waste System

While the incinerator has technical shortcomings, it is currently coping with the waste throughput. Discussions with DOH indicated that WHO has given commitment in principle to donating a new medical waste incinerator for Funafuti. DOH hopes to have this by around the end of 2005 (8 other smaller incinerators have already been provided by WHO – 1 for each of the outer islands). So DOH is planning to de-commission the existing incinerator and re-locate to a new incinerator at the southern tip of the island by early 2005.

However, in the interim a number of housekeeping issues are evident that warrant attention and support from DOH in terms of their implementation. These should form the basis for the immediate medical waste plan (as part of the Solid Waste Strategy to be developed). Priorities and issues are summarised below:

Incinerator

- Adjacent coconut trees to be removed. The reasons for this are to:
 - reduce fire risk
 - eliminate the risk of a palm blowing or falling onto the facility (this could destroy it)
 - improve air circulation and the dispersion of the exhaust gases.

Medical Waste Storage and Housekeeping

There are significant issues to be addressed in this regard. It appears the 200 l yellow infectious waste wheelie bins are now "parked" at the incinerator and that cleaners now bring infectious wastes to the bins in buckets. This situation has arisen because

of the distance to the new hospital and the lack of any footpath. This situation is unacceptable and gives rise to:

- Significant risk to the cleaning staff handling and transporting such wastes
- Storage of wastes during the day at the hospital that is likely unsafe and that requires immediate investigation and discussion with hospital management
- Failure to clean and sterilise the infectious waste bins

The bins observed at the incinerator were noxious, had fresh blood on the outside and were standing in an area where children or other persons could readily gain access and come into contact with them. This arrangement, in effect, negates much of the care taken elsewhere and needs to be addressed immediately by:

- Taking the issue up with hospital management
- Returning the bins to the hospital for cleaning, disinfection and re-use
- Establishing a concrete pathway between the hospital and the incinerator, or some other safe way of getting the bins to the incinerator
- Providing a proper security fence around the incinerator facility and concreting an additional area to form a secure compound where both full and empty infectious waste and sharps containers can be stored
- Eliminating handling and transport of medical waste by cleaning staff
- Providing a separate container (covered 200 litre wheelie bin), marked "Possible Infectious Risk". This is for waste separated from the infectious waste bins that is not combustible. Such waste is possibly infectious as it will have contacted other infectious waste in the bins and so should be handled accordingly. Examples include drink cans – these should NOT BE RECYCLED, but should be securely buried at the landfill, along with other materials separated before incineration, preferably with liquid spray disinfection in the container first.

Medical Waste handling (Hospital Staff)

Clearly initiatives related to medical waste handling and disposal at the hospital end have broken down to a large extent. The issues need to be taken up urgently with hospital management and actions initiated to:

- Establish a clear line of responsibility at the hospital so WMU has a point of contact and liaison person
- Reinforce earlier training and awareness in relation to medical waste handling, storage and disposal issues
- Brief cleaners and issue clear instructions that they are not to handle and transport medical waste
- Establish a bin "cycle" that involves cleaning, disinfection and storage
- Establish a method for getting bins to the secure storage area at the incinerator and a security protocol.

Other Issues

- Encourage DoH follow-up and action on establishing both interim measures and a new medical waste incinerator
- Review institutional and funding arrangements. Operations costs related to the incinerator should be a cost to the DoH, not DoE (WMU).



Draft National Solid Waste Management Strategy

The Vision:

“A clean and healthy Kiribati where the negative impacts of waste materials are minimized and the economic opportunities are maximized”

Nei Akoako



Ngkoa, Ngkai ao n Taaainako

Prepared by:
Environment and Conservation Division (ECD)
Ministry of Environment, Lands and Agriculture Development (MELAD)
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1 Introduction

Waste management is both a threat and an opportunity. Poor waste management can degrade our environment and erode our economy. Just as importantly, it can reduce the communities' desire to be involved in creating a better Kiribati for our next generation. As we have seen from our recycling program, good waste management can also generate employment and economic activity while cleaning up the islands. Waste is truly a sustainable development issue involving environment, economy and social issues.

While Kiribati has made enormous gains in solid waste management over the last decade, it has become necessary to communicate our strategic direction more precisely to aid in departmental planning, budgeting, donor liaison and private sector investment. By detailing our planned activities, all parties will have a far better knowledge of where Kiribati is heading and how best to assist in getting us there.

2 Aim

- To help ensure a safe and healthy living environment for all people of Kiribati
- To assign tasks for this work to specific institutions and to provide those institutions with the necessary administrative support.
- To plan for future solid waste management activities in a manner that raises public awareness of the issues and allows for public input into the process

3 Format

The issues of Solid Waste can be divided in many ways to make them more manageable. This strategy follows through from generation or import, consumption, collection and disposal. Many issues impact on a number of different levels as do the solutions and management options.

4 Scope

This strategy will cover all solid waste issues including medical wastes, industrial wastes, electronic wastes, and disaster residues as well as domestic wastes.

Because of the increasing urbanization of Tarawa, much of the waste problems will be felt more there but solutions must also reduce the issues for the outer islands, Line and Phoenix Islands. The Strategy will not only lay out the general direction but also contain specific actions to advance the situation over the next 4 years. These will be reviewed on a "rolling" basis to ensure they stay current and relevant.



5 Principles

Kiribati has used the globally accepted *Waste Hierarchy* as its starting point and also its guiding philosophy of importance. As we know, avoidance and minimization is the most cost-effective place to attack waste, particularly on fragile atolls and islands like ours with no really safe disposal options as yet.

As well, Kiribati will use the widely accepted principle of the *Polluter Pays* – that those who create the problems should be the ones who contribute to its solution.

The Strategy is timely to put into action the recent Environment Act 1999 (amended in 2007) in terms of implementation. Specifically, the Act has now provisions on pollution minimization and prevention, amongst others, the need to control littering, dumping and a duty to clean-up any discharge of waste or other substances, as practiced under the “Polluter Pay Principle”.

Finally, Kiribati recognises the value of *sustainable development* and the need to involve all sectors of government, non-governmental organizations and society in the solutions to issues like waste. By choosing economically efficient, environmentally clean and socially acceptable solutions, Kiribati can continue to improve on its excellent progress in solid waste management.

6 Timeframe

The Strategy covers the period from 2008 until 2011 with biennial reviews to ensure all emerging issues are included and addressed.

7 Responsibilities

Currently, the lead agency for waste in Kiribati is MELAD but other agencies such as the Ministry of Health & Medical Services, Ministry of Finance and Economic Development and both BTC and TUC Councils will need to be involved in solving the problems that waste creates. Also, there is a strong role for the private sector, non-governmental organizations and the general community in participating in all aspects of this strategy.

It is therefore important that a national waste management committee need to be established immediately with MELAD as a leading agency. A term of reference (TOR) for the Committee is attached as Attachment A. Members to this committee should be selected from relevant key stakeholders as proposed in Annex B.

7.1 Establishment of National Waste Management Committee

Actions	By Whom?	By When ?	How Much?
1 Establishment of National Waste Management Committee (NWMC)	ECD	Jan 2008	\$5K/yr
2 Development of TOR and Structure	ECD & NWMC	Jan-Feb 2008	\$0
3 Recognition and approval of NWMC by Cabinet	ECD/ MELAD	Mar 2008	\$0
4 Implementation of National Solid Waste Management Strategy	NWMC	April 2008 onwards	Refer to action plans provided below
5 Monitoring and performance evaluation	ECD	May 2008 onwards	\$40K

8 Consultation

Modern waste management requires the active co-operation of citizens, local government, other departments, private sectors, non-governmental organizations and businesses of Kiribati. The public can reduce the environmental impacts by their voluntary efforts in a way that regulation can never deliver. The private sector needs to know what waste issues it must address or opportunities it can grasp to grow employment and development. Other Departments need information to ensure that their efforts do not cut across the waste management imperatives. For that reason, open and on-going public consultation is an integral part of this Strategy. This will ensure that the waste system is cheaper and more cost-effective.

This draft has benefited from consultation including a JICA-funded SPREP facilitated workshop for many stakeholders. The workshop identified a number of environment issues of general concern. The highest priorities identified were;

1. increasing recycling;
2. public awareness and school education campaigns.

Also of major importance are;

3. the waste collection system
4. legislation and enforcement
5. organic waste and composting
6. electronic waste
7. hospital waste
8. waste oil
9. litter
10. landfill
11. bulky wastes

Many of these issues overlap and will be incorporated into the strategy.

The issues relating to the pollution and health impacts of human and pig wastes were of significant concern to participants but beyond the scope of this strategy. The reasons being of its cultural related nature and its sensitiveness to the public. This may take some time that well beyond the timeframe of this strategy.

The draft strategy was also discussed by a number of private sector organizations, NGO's and Government Departments for comments and suggestions.

9 Waste generation

Most of Kiribati waste problem arrives from overseas as packaging for essential items. The materials produced here are largely biodegradable and can be managed at the household level with little effort and consequence. The major biodegradable wastes are food scraps and garden waste and these will be covered later.

9.1 Imports

Almost all imports have a layer of packaging or the items themselves have end of life issues such as appliances, cars, and plastics. Only some of these are recyclable. The recyclable items can be recovered in South Tarawa through the successful deposit /

refund scheme that are driving the collection and export of car batteries, plastic bottles and aluminum cans. Kiribati intends to maintain this system, and gradually widen its scope to include other imports as the opportunities or problems arise. The obvious next phase might include cars, trucks, electronic waste and glass bottles.

This deposit / refund mechanism has less relevance outside of Tarawa and other actions may be necessary to improve the situation elsewhere. For example, disposable nappies or diapers save a lot of water but can spread disease and cause pollution if they are not collected and disposed of well. It may be necessary to levy an import tax on such items to fund government for the extra costs of collection and disposal.

Also, some new packaging is causing problems in Kiribati. Composite plastic and aluminium juice cans are not recyclable and only add to collection and disposal costs. Kiribati will consider banning such products outright or taxing them highly as they can easily be imported in more suitable and sustainable packaging.

Similarly, the impacts from plastic shopping bags can be significantly reduced by either banning them unless they are bio-degradable like the green bags (as Samoa has done) or taxing them to reduce the numbers as Ireland and others have done.

Some imports are necessary but highly damaging to our natural environment and to the health of the public if disposed of improperly. Materials such as pharmaceuticals (drugs), pesticides, anti-fouling paints and industrial materials all require very expensive disposal. In all cases, the best remedy is to ensure that only the required amount is imported so there are no residuals remaining for disposal. At the least, such materials should be a notifiable import so the government can keep track of the quantities coming into the country and identify the importer if problems arise and disposal needs to be funded.

10 Priority Issues

The most important issue is disposable nappies and car bodies. Both need an integrated plan of action with significant consultation as they both impact on large numbers of the community and private sector.

10.1 Plastic Bag

The Government needs to decide whether to ban non-biodegradable plastic shopping bags or to tax them to reduce their use. To make that decision, a Briefing Paper on the pluses and minuses of the two options will be required.

The other major plastic issue is the discarded packaging from children's frozen iceblocks. This is a litter issue and best addressed through a school-based education campaign or an introduction of a biodegradable iceblock and plastic bags.

10.2 Disposal Nappies

For the diapers, issues such as collection services from squatter settlements and appropriate disposal both in South Tarawa and other islands, will need some definition and then the costs calculated. A public education campaign on the impacts of safe disposal and alternatives to reduce usage to essential will be very useful in reducing the overall costs of the project.

10.3 Expired Vehicles:

The Japanese International Co-operation Agency has indicated that they will assist with setting up a pilot project to be used as a good practice example for the rest of the Pacific. This system is only appropriate for South Tarawa but that constitutes the majority of the problem. Expired vehicles in other islands are best disposed in the deep sea (after draining all oils and removing batteries etc) or used for sea walls. Caution should be exercised as some evidence is linking rusting vehicles with ciguatera fish poisoning.

The preliminary data required is the number of vehicles being imported each year and expected life span of those vehicles.

Recycling the car bodies involves getting the cars back to a central yard before they can no longer be driven or towed as the costs of collection will increase significantly if the vehicles lose their mobility and need to be gathered by crane and flat bed truck. The very effective deposit/ refund scheme will be used to encourage end of use vehicles to be returned and also to fund any subsidy the system requires to remain commercially viable. Like the Kaoki Mange system, it is sensible for Government to keep close control to assess costs and potential profits before tendering the entire system out to the private sector. MELAD will determine how much deposit is required to encourage residents to return the expired vehicles to a de-construction yard where they can be cut down or crushed for cheaper shipping overseas.

The yard can store usable parts off the vehicles for re-use and sale to residents. The most viable method of consolidation (gas cutting or crushing) will be determined by the number of vehicles available each year. A training course will need to be held to skill operators in distinguishing between types of metals to maximize recycling value.

10.4 Disposable Nappies Action Plan

Actions	By Whom?	By When ?	How Much?
1. Determine how best to manage disposable nappies – brief Minister	MELAD/NWMC	November 2007	\$0
2. Determine costs and liaise with Minister whether tax is required to fund management – (impose higher tax on non-biodegradable nappies while less on biodegradable nappies – 70-100%), or totally ban nonbiodegradable nappies	MELAD/NWMC/ MCIC/NEPO/Chamber of Commerce/Women organizations (eg.AMAK etc)	Dec-June 2007	\$0
3. (a) Hold public education program to	MELAD/NWMC/Women Organisation/private	June 2008 onwards	\$6K (one off)

inform residents about impacts of disposable nappies and alternatives (degradable nappies)	sector		
(b) Consult with suppliers and retailers about options for tax if necessary or total ban of non-biodegradable nappies	MELAD/NWMC/private sector/MFED-Tax	June 2008 onwards	\$2K (one off)
4. Implementation and monitoring of either options mentioned in 3.	MELAD/NWMC	November 2008 onwards	\$5K/yr

11 Household waste

11.1 Organics

The major waste stream that households generate and can manage themselves is organics (leaves, food, paper, cardboard). This represents over half the material going to landfill but its impact is more than consuming this valuable asset. Collection costs are the major component of any waste system so any reduction in householder waste saves significant money. Also, organics in the landfill are the major source of climate-changing methane gas and leachate, a high nitrogen and carbon solution that can contaminate the groundwater and lagoon with excessive biochemical oxygen demand or causing excessive algal growth from the nutrients. Just as importantly, those organics should be seen as a valuable resource that can increase the fertility of Kiribati's coral sands.

Thus, if we can reduce the organics leaving the house, we can reduce collection costs, prolong the life of the landfill and reduce the environmental impacts of disposal. By retaining the organics for composting and increasing vegetable and fruit yields, Kiribati will need less food imports, have healthier diets and require less fertilizer. This must be one of Kiribati's highest priorities for cost-effective waste management.

12 Priorities Issues

12.1 Household composting

The banana circles and garden compost programs can make a significant improvement to every life on Kiribati. Co-operation with the Health Department and the Taiwanese garden project can provide the synergy needed to convince residents to retain their organics.

12.2 Discouraging disposal

The "user pays" system of the bio-degradable Green Bags has the potential to save hundreds of thousands of dollars each year through reduced collection costs and landfill consumption. Just as importantly, it encourages householders to keep their organics at home to use as a resource. The risk is that they will burn them mixed with plastics and other wastes which can be offensive and unhealthy in a crowded

environment like Tarawa. A strong public education campaign is necessary to convince people of the high value of compost in growing food and to reduce any burning.

12.3 Institutional Composting

Some householders do not have the time or space or desire to compost their organics. Also, there is organic material generated by businesses and government that will need to be shredded and composted. A "user pays" system with a different coloured biodegradable bag could be used to fund the collection of this material. Even better would be a self-delivered system where clean organics are accepted for shredding cheaper than the price charged for disposal. This saves money on running a collection system and provides an incentive for those delivering waste to the landfill to separate their organics from the materials that need disposal. The same system can be used for recyclables as well.

Shredding and windrow composting is a relatively high operating cost process so some sort of on-going funding will be necessary, even if the capital equipment is provided by donors. Also, a site with secure storage for the shredder and end loader is necessary. It needs to be remembered that every regular turning to aerate the piles is necessary or else you create the same anaerobic conditions and leachate and gas impacts that you are trying to avoid in the landfill.

12.4 Household Composting Action Plan

Actions	By Whom?	By When?	How Much?
1 National consultation with local farmers on South Tarawa	Councils (BTC and TUC) & MELAD, Taiwanese Organic Project, NWMC	April 2008	\$2K
2 Development of a number of Pilot Project Proposals on organic compost - collection and sorting	NWMC, BTC/TUC and Local Farmers	May 2008	\$5K
3 Brief Minister on development of various pilot project on organics	MELAD and NWMC	May 2008	\$0
4 Public education and environment awareness program on making compost and making home gardens	MELAD	June 2008 - Dec 2011	\$4K
5 Implementation of Pilot Project activities	Councils & MELAD & local farmers	July 2008 - Dec 2011	\$80K
6 Monitoring and performance evaluation	Councils & MELAD & local farmers	July 2008 onwards	\$10K

13 Collection

Waste collection is expensive but necessary. The "rule of thumb" is that collection is around 75% (3/4) of the total waste costs but the costs are carried by Local Governments. It is important that the costs are kept as low as possible as waste collection is a major drain on the economic resources of the country. That said, a regular and predictable system is essential to ensure the public and commerce are fully supportive of the waste system. This will, in turn, guarantee political support for waste management in general.

A good service once a week is better for residents and cheaper than a poor one twice a week. The traffic issues on South Tarawa add to the costs of the collection service and so Local Governments need to ensure that the service is as efficient as possible. Local businesses will usually pay for specific services and this should be part of the pricing structure.

14 Green Bag System

The Green Bag programme has been a major innovation in reducing the costs of collection and is now seen as Pacific's "best practice". Waste is quick to pick up and volumes are greatly reduced which minimizes the time spent in going to the landfills. Given that the Green bags save government so much money, there is a strong argument for subsidizing the costs of the bags so that the disincentive for garden waste is maintained but there is minimal incentive to illegal dumping. Also, a program like the Green bags needs to be maintained to keep it functioning smoothly. Given its success, it should not be forgotten in the rush to take on other issues.

Collection of garden waste should be considered carefully. It is a high cost service and, while a useful way to provide material for composting, will also reduce the funds for other issues of high priority such as hazardous waste management or waste management on the outer islands.

15 Priority Issues

15.1 Time and Motion Study

All the waste collection practices should be examined to ensure that the frequency, routes, work practices and equipment are the most cost-effective and appropriate for the customers. Because collection is such a high proportion of the overall waste costs, any efficiency can deliver significant savings.

15.2 Expand and maintain the Green bag system

A study is now needed to see if the price of green bags is set at the correct level. The study should review

- Illegally dumped rubbish to see if the cost of Green bags is encouraging illegal dumping.
- The savings to collection costs through efficiencies.
- The types of waste material being placed in the bags to make sure they are still discouraging garden waste disposal.

Once these results are found, Government can decide whether the costs of the bags should be subsidized or not.

15.3 "User Pays" garden waste collection system

A survey of customers could be used to determine how much they would pay, how often they would want a service and how much material they would put out. This will allow for a design and costing of the service to see if it's viable through "user pays". At the same time, people could be asked about the amount they would pay for compost to see if there is a market for the material. It should be remembered that mulching and composting costs around \$20 per tonne as well as the collection.

15.4 Sustaining the Green Bag System and expanding the use of biodegradable packaging

Actions	By Whom?	By When ?	How Much?
1. Brief MELAD Minister on details of green bag landing cost, purpose of use and other benefits – on subsidy if possible	MELAD/PPU	August 2008	\$0
2. Seek if government subsidy could be granted on current price	MELAD/PPU	Aug-Sept 2008	\$0
3. Public awareness education program on green bag use and other biodegradable plastic bags (iceblock bags, bread bags, shopping bags – all plastics) – these have alternatives (biodegradable)	MELAD	Oct 2008	\$5K/yr
4. Importation of Green bags from supplier and other biodegradable plastic bags	MELAD/ private sector	Nov 2008 onwards	\$50K/yr
5. Identification and arrangement of outlet shops for green bags to be sold from	MELAD	Dec 2008	\$0

16 Recycling

Kiribati has led the Pacific with its approach to recycling. The deposit refund scheme has delivered significant benefits at a minimal cost to the Government. The system has a true sustainable outcome in that its outcomes fall into social, environmental and economic benefits.

16.1 Economic

- Minimized collection costs for recyclables;
- Viable recycling business employing over 10 people
- Tourism attractiveness enhanced

16.2 Social

- Provided an income source for un-waged people

- Involves public in waste management and minimization issues directly

16.3 Environmental

- Less impacts from targeted materials (car batteries, plastic bottles and cans)
- Less truck exhaust as recyclables are self-delivered.

The Kiribati system can be used simply to include other materials that the Government decides to collect for recycling. For example, the export of car bodies currently is not viable from the returns alone. Vehicles could be included in the system to encourage end of life vehicles to be returned for a refund to avoid the high costs of recovering immobile vehicles. Those vehicles could then foster a spare parts business as well as facilitating consolidation for export. The difference between the deposit and refund can fund the costs of administration and the necessary subsidy as has occurred with the other materials.

Other materials that could be considered for inclusion, could be tyres, white goods and household appliances and electronic wastes.

16.4 Use of Economic Instruments (eg. Waste Material Recovery Act 2004) to

Actions	By Whom?	By When ?	How Much?
Seek Cabinet endorsement for inclusion of the following waste items under the Waste Material Recovery Act 2004	National Waste Management Committee/MELAD/AGs Office, MFEP/MCIC/BTC & TUC Councils/MISA	March 2007	\$0
Glass bottles	Kaoki Maange	Nov 2007	\$0
Steel cans	Kaoki Maange	Jan 2008	\$0
Car bodies	Lagoon Motors	July 2008	\$0

17 Priority Issues

17.1 Car bodies

See "Imports" section.

17.2 Tyres

The low mileage needed in Kiribati reduces the volumes of vehicle tyres needing disposal compared to the number of vehicles. Used tyres are largely inert and so could be used for land reclamation if shredded enough to not contain significant air pockets. They have also been used as artificial reefs overseas though the securing the tyres over a long period has proved difficult. There is a disposal option in the Fiji cement kiln as a fuel if that plant has the capacity and inclination to accept more tyres for fuel. Including them on the deposit refund scheme could fund these options but a preliminary survey is necessary to establish how many spent tyres are generated to see whether the problem is sufficient to warrant a focused response.

17.3 White Goods and Large Appliances

These items take up a disproportionate amount of landfill space and would complement the car body recycling. However, a preliminary survey of volumes needs to be carried out to establish how significant an opportunity and problem this is. Once those volumes have been established, the viability of including them in deposit refund arrangements will be clearer.

17.4 Electronic waste

E-waste as it is known is an emerging problem in the developed world. The presence of small amounts of toxic components can make these items dangerous if the volumes get to be significant. Fortunately, it is unlikely that Kiribati has reached this level of disposal as yet. The recycling of these goods remains problematic with either high costs or very poor workplace conditions for the recyclers. In the absence of a safe recycling system, Kiribati will have to be sure that recycling is a sensible option to spend money on.

Fortunately, the Basel Secretariat has funded a scoping exercise to establish how significant the issue is in the Pacific and the results of that survey will inform a decision about whether e-waste needs to be included in the deposit refund scheme.

17.5 Recycling of Electronic/Electrical Wastes (e-wastes)

Actions	By Whom?	By When ?	How Much?
1 National stocktaking and assessment of electronic wastes	NWMC/ MELAD	Feb-Mar 2008	\$1.5K
2 Brief Minister of danger posed by electronic wastes poor disposal	MELAD	May 2008	\$0
3 Consultation with Kaoki Maange and local computer dealers to identify computer parts that could be recycled and sent offshore through Kaoki Maange	MELAD	June 2008	\$1K
4 Public education and awareness programs	MELAD	May 2008	\$2K
5 Identification of temporary storage site for electronic wastes	MELAD/ NWMC	May 2008	\$3K

18 Disposal

The current landfills are an expensive luxury for an atoll nation. Kiribati just cannot afford to dedicate more land and money to such sites. Just as importantly, there is not yet any environmentally acceptable way to landfill on an atoll. The possibilities of storm surges washing the wastes into the lagoons and the absence of any soil to cover the wastes mean that all efforts must go to minimization of landfill consumption. Previous sections have discussed ways to reduce the quantities going to landfill but consideration needs to be given to minimizing the space consumed to ensure the landfill lasts as long as possible.

The regular compaction of the sites with a large bulldozer is the most practical way to reduce the space the waste is using. A landfill compacter would do a far superior job but they are extremely expensive to purchase and operate and have no other uses to amortise the costs on.

Recent developments in low temperature gasification may hold some hope for the medium future and the recent installation of a system in the Republic of the Marshall Islands will give some indication of the appropriateness of this technology to a semi-marine environment with little technical support. If suitable, there is the possibility of recovering the energy from unrecyclable discarded plastics and other combustibles and possibly generating power from it as well as reducing volumes significantly. While not an immediate solution, a "watching brief" will be held on this first installation over the next few years.

19 Priority Issues

19.1 Landfills

The airspace (remaining capacity) of the landfills needs to be monitored to ensure that this asset is efficiently utilised and that sufficient time is allowed for closure and location of a new site or technology. Any materials that are consuming inordinate amounts of the landfill also need to be flagged with policy makers to ensure a quick response to the threat. Regular compaction with a bulldozer must also be budgeted for and scheduled to prolong the lives of these precious assets.

19.2 Incineration

SPREP should be asked to monitor emerging gasification technologies and report back to Kiribati of any relevant developments to ensure that policy makers are aware of all alternatives to landfill. The possibility of power generation also makes this technology particularly appealing for Kiribati.

SPREP should also be asked to assist with establishing the possibility and costs of sending used tyres to Fiji for use as fuel in their cement kiln.

19.3 Management of Landfills

Actions	By Whom?	By When ?	How Much?
1. Development of Landfill Management Plan in accordance with conditions prescribed in the Environment License	Councils and MELAD	Jan 2008	\$0
2. Procurement and maintenance of bulldozer to compact waste in landfill to prolong landfill life	MELAD and Councils	June 2008	\$200K
3. Public education and awareness programs	MELAD	Feb 2008	\$2K
4. Monitoring and evaluation of landfill operations	MELAD/ Councils	Jan 2008 onwards	\$5K

20 Medical Wastes

Medical wastes are the primary responsibility of the health care institutions. They are responsible for minimizing the volumes needing disposal through judicious purchasing and also strict segregation of infectious and non-infectious material. The use of on-site incineration remains the most appropriate technology for infectious wastes and the growing threat of HIV/AIDS should ensure that this aspect of disease prevention has high priority from health care staff. There are a number of very cheap and simple incinerators fuelled by wood wastes such as coconut husks that are now available. JICA has a simple stainless steel model and the De Montford designs have wide application to developing countries as they can be constructed and maintained from local materials. While they may be only single chamber, sensible operation to avoid the smoke plume impacting on residents will minimize any possible health impacts.

Appropriate training in the use of these incinerators is the most important aspect of safe handling and the recent un-necessary stockpiling of out-dated pharmaceutical supplies an illustration of the need for a better understanding within the medical professionals of the options available.

21 Priority Issues

21.1 Training

WHO and SPREP should be approached to assist with training of medical staff in both waste minimization and incinerator operation and management. This needs to be an on-going program at least every five years.

21.2 Health Care Waste Management

Actions	By Whom?	By When ?	How Much?
1 Establishment of Health Care Waste Management Committee (could be a subcommittee under NWMC)	MHMS/ MELAD/ WHO		\$0
2 Development of health care waste management plan for Kiribati	MHMS/ MELAD/ WHO	Dec-Jan 2008	\$1K
3 Submission of health care waste management plan to Cabinet for approval	MHMS/ WHO	Feb 2008	\$0
4 Identification and installation of the most appropriate incinerator	MHMS & Donors - WHO	Mar-June 2008	\$500K
5 Public education and awareness programs	MHMS /MELAD/ WHO	Jan 2008 onwards	\$4K
6 Staff trainings in health care waste management and incinerator operations	MELAD/ MHMS/ WHO	Mar 2008 onwards	\$20K