

REPORT OF THE DIRECTOR OF AUDIT

THE EFFICIENCY AND EFFECTIVENESS OF MANAGING AND OPERATING THE SOLID WASTE TRANSFER STATIONS

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EXECUTIVE SUMMARY

This report examines the efficiency and effectiveness of managing and operating Solid Waste Transfer Stations (TS) at the Ministry of Local Government and Outer Islands (MOLG).

The MOLG coordinates the Local Authorities, consisting of five Municipalities, four District Councils and 124 Village Councils. The Local Authorities are the implementing bodies responsible for collection and transportation of waste to TS. Wastes are then transported from the TS to the Landfill. There are five TS throughout the island and the only landfill is located in the south of Mauritius. The operation and maintenance as well as the transportation of wastes from the TS to the landfill are carried out by private contractors.

Key Findings

- There was little community involvement in the construction of TS to mitigate future problems. The construction of TS at Parc-Aux-Cerf and Riche-Terre, which were initially planned, had to be cancelled because of objection from the public living in the vicinity. The TS at La Brasserie and Roche Bois have been upgraded instead because of public outcry.
- The need for risk assessment is to assess any likelihood of an uncertain situation and the means to control those risks wherever possible. Risk assessment has not been carried out before undertaking any project and they have not been analysed and elaborated in the strategic plan.
- Proper records are not available to ascertain whether maintenance was carried out or not. According to the contract, the contractor needs to carry out routine and preventive maintenance of the electromechanical equipment. This includes maintenance of all equipment, container bins, all offices and site infrastructures, including weighbridges and associated computer system.
- The penalty clauses for non-performance of contract conditions are not clear to enable the Ministry to charge penalties when there are shortcomings.
- Officers in solid waste management had limited training in contract management and environment management. The training was limited only to those made available by external bodies.
- There is no evidence that five per cent of incoming waste is inspected as required by contract. It is also not clear whether the five per cent of the incoming waste is based on a daily or monthly amount of waste entering the TS.

Conclusion

Waste generated by households and industries is undergoing a rapid increase. The cost of handling solid waste is also on an increasing trend. It is therefore necessary to operate and

manage the solid waste disposal throughout the island in an efficient and effective manner as a means to make judicious use of public fund.

In one instance it was noted that two project had to be shifted to another location because of lack of community involvement. Public are more concerned about their health and they will not hesitate to take mitigating measures to retaliate unsolicited measures. It is therefore imperative that general public is involved on projects undertaken by Government.

Risk assessment and proper contract management was not carried out by the MOLG. We recommended that risk assessment exercise be carried out at the inception of each project and that contract clauses should cater for all instances of penalty to be charged to contractor whenever there is a default.

I observed that training provided to staff is not adequate, and hence proposed for more training and adherence to international institution to benefit from relevant technical assistance, receive magazines and information about technical updates and to exchange of ideas for capacity building.

Maintenance records kept at the TS and at the MOLG are not sufficient for proper management. The asset registers should be updated and an operating manual should be introduced by the Ministry.

Key Recommendations

The Ministry may consider the following possible solutions for the better management of the TS:

- The need to implement a solid waste management option taking into consideration the 3R principle (Reduce, Reuse and Recycle) and disposal by appropriate means which will minimise the risk to the environment and the public health.
- Aggressive community source reduction programme and awareness campaign at the household and industrial level so as to reduce waste at source.
- By promoting recycling activities that will recover materials and resources from wastes. This will result in the reduction in the volume of wastes to be disposed of at the landfill.
- All the programmes relating to TS in the strategic plan should be implemented.
- The MOLG needs to prepare the Waste Management Bill as soon as possible in order to regulate institutional responsibilities and accountability of all Government Actors with regards to solid waste management. The time schedule for all the programmes have to be more specific so that all the objectives set in the strategic plan are achieved and corrective actions taken where necessary.
- The five TS and the landfill are managed by the private sector. The effectiveness of solid waste management is constrained by inadequate finance, expertise and coordination. The knowledge and experience of staff of the Solid Waste Management Unit can be improved through training and capacity building in areas of project management,

contract management, budgeting, awareness creation and communication for effective waste management.

- The penalty clauses in the contracts should be more clearly spelt out so that it can be easily applied in cases of default by contractors.
- A standard operation manual should be prepared for the operation of all TS. This manual should include a detailed contingency plan with contact numbers and details of response team.

CHAPTER ONE

INTRODUCTION

1.1 Introduction of Performance Audit in Mauritius

Performance Auditing is being introduced by Governments worldwide as taxpayers, donors and the public demand more accountability in the use of their resources. Governments are compelled to give information on how resources have been used and whether they have been used economically, efficiently and effectively. As Performance Auditing is a relatively new concept in Mauritius, this chapter aims at briefly orientating the reader about its history, mandate, scope, and methodological approach.

Performance auditing was adopted and incorporated into Government auditing at the Twelfth International Congress of Supreme Audit Institutions (INCOSAI) held in Australia in 1986. The National Audit Office started to conduct Performance Audits in 2009 following the amendment to the Finance and Audit Act in 2008 giving the Director of Audit the mandate to conduct Performance Audit in Mauritius.

1.2 What is performance auditing?

Most people associate auditing with the checking and verification of accounts to ascertain whether they show a true and fair view. The aim of financial auditing is to ensure compliance with existing regulations and detect errors, fraud and mismanagement of resources. It has a major effect on the information that forms a basis for decision-making, but it provides limited information on the extent to which a Government's programme fulfils its objectives and goals. Financial auditing should therefore be supplemented and complemented by an audit that examines how well public operations have been performed, that is, to what extent they have produced the intended results and effects. This is the function of Performance auditing. As well, it goes without saying that, Performance Auditing, aims at promoting economy, efficiency, and effectiveness in the management of public resources, has a wider scope and goes further than the physical inspections to verify that money spent according to the accounting books is manifested on site in terms of physical, observable investments.

1.3 Benefits of Performance Auditing

- Performance auditing has important functions to fulfill, both in relation to the general public, parliament, the government and the entities that are audited.
- Performance auditing plays an important role in keeping parliament well informed about the government's actions, and the outcome of its own decisions.
- The public needs information on how public resources are spent and how public services perform. By providing objective and reliable information on these issues, performance auditing contributes to transparency and accountability.

- Performance auditing may be of value for Government to get an independent evaluation of the outcome of its decisions and the performance of public services.
- Performance auditing provides incentives for learning and change in the public sector, by providing new information and drawing attention to various challenges. It contributes to improvement and reform in public administration and government. In this way performance auditing adds value far beyond that of a control mechanism

1.4 Audit Motivation

The volume of waste generated in the country has been increasing over the years. For example in the year 2009, around 420,000 tons of wastes were sent to the landfill and with the average yearly increase of one per cent, the only landfill site at Mare-Chicose is expected to reach saturation level by 2012.

The operation and maintenance cost of TS and transportation cost of waste to landfill have known constant increases over the last five years. For example in 2004-05 total expenditure was to the tune of Rs 90 million and that increased to Rs 118 million in 2008-09.

MOLG has developed programmes in view of reducing waste at source, reused wherever possible and recycled as far as possible. But, these programmes have not been implemented. Also, there are lots of concerns over contracts clauses for management and operations of TS as these are not clear.

In such a scenario the management of TS becomes a very important national issue. In that context the Mauritius National Audit Office has sought to carry out a performance on efficiency and effectiveness of managing and operating the Solid Waste TS.

1.5 Scope of Audit

The audit scope has been defined by the following questions:

- Are there effective strategies or operational plans covering all levels of management and oversight of TS?
- Are the TS performing satisfactorily?
- Is the MOLG managing the external contracts effectively?

We carried out a review of expenditure incurred on repairs and maintenance and transportation cost for the years 2005 to 2009. Management of Landfill has been excluded from this study.

CHAPTER TWO

AUDIT OBJECTIVE AND METHODOLOGY

2.1 Audit Objective

This performance audit focuses on the MOLG's management and operation of TS. We examined whether the solid waste TS are being managed and operated efficiently and effectively.

2.2 Methodology

The following methodology has been adopted to this assignment:

- Interviews were carried out with senior staff including Director and Senior Project Officers of the Solid Waste Management Unit of the MOLG.
- Internal and External audit reports were reviewed. The audit team also reviewed the reports of two consultants, namely the Carl Bro report on Solid Waste Management and the Gibbs and Partners report on an audit of TS.
- Site visits were carried out to three of the five TS. The purpose of the visit was to examine document kept at the TS and to inspect physical asset on site and to interview operators about nature of work performed.
- Files relating to TS were reviewed. These files were reviewed to gather information about survey carried out by enforcement officers, award of contracts and problems encountered at the TS.
- The audit has been undertaken in accordance with International Standards of Supreme Audit Institutions (ISSAIs).

Information gathering also involved review of the following documents:

- Review of performance specifications & reports
- Examination of contract documents.
- Review of Public Procurement Office guidance on procurement and contract management.
- Review of contract performance reports

2.3 Method of collecting information

Data was collected mainly through interviews, site visits, observations and study of written documents. Interviews were carried out with senior staff, including Director and Senior Project Officers of the MOLG and operators of TS. The Public Procurement Office guidelines, The Occupational Safety and Health Act 2005 (OSAH Act 2005) were also reviewed. Other sources of information are as follows:

- Contract documents and contract performance reports.
- Records kept at the TS.
- Performance specifications and performance related reports

CHAPTER THREE

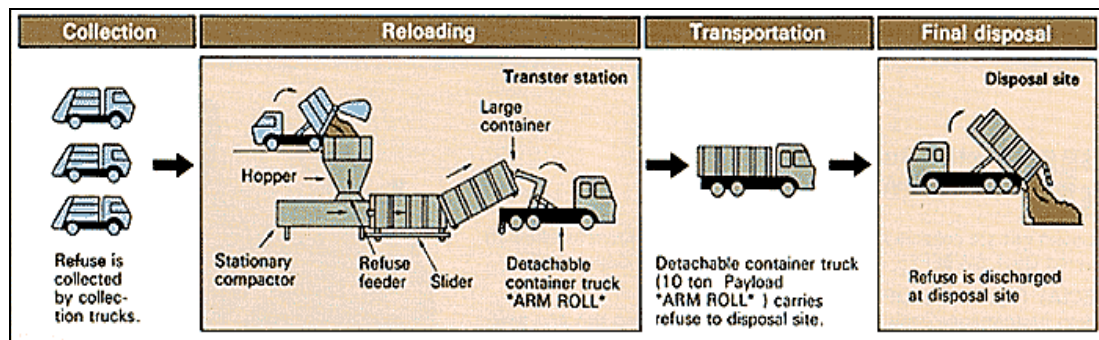
BACKGROUND INFORMATION

This chapter provides a background on the reasons of construction of TS and on the role and responsibility of the MOLG in handling solid waste.

3.1 Purpose of Transfer Stations

The diagram below shows the process of solid waste management from collection to disposal at landfill. Transfer station is an important component of this process.

Figure 1 The whole process of Solid Waste Management



A TS is a facility with a designated receiving area where wastes collected using small Lorries are transited before they are disposed at the landfill using long trucks. It helps to reduce both transportation cost and time as the wastes collected are disposed at the landfill in larger volumes. TS are constructed where wastes are generated whereas landfills are located far from inhabited areas because of the reasons given below.

Public opposition frequently makes construction of new landfills near population centers difficult. Gaining public and political approval for constructing new disposal capacity near population centers is challenging. Also, adequate land is often not available near densely populated or urban areas. These social, political, and geographical factors have further stimulated the rise in construction of large, remote, regional landfills.

The possibility of screening incoming wastes prior to disposal at TS also exists. Waste screening has two components: separating recyclables from the waste stream and identifying any wastes that might be inappropriate for disposal like, whole tyres, auto batteries, or infectious waste. Identifying and removing recyclables reduces the weight and volume of waste sent for disposal to landfill and, depending on local recycling markets, might generate revenue. Screening of wastes is more appropriate at the TS than the landfill as less waste will be left for transportation to Landfill.

3.2 History

Some 20 years ago solid wastes were disposed in open dumping grounds. However these had to be closed down due to public outcry, negative impact on environment, uncontrolled burning of solid waste resulting in significant levels of hazardous emissions to the environment and the proliferation of rodents, rats and other disease vectors.

MOLG thereafter embarked in the construction of a series of TS over the island. Today, solid wastes are collected and disposed at Mare Chicose landfill, the only landfill in Mauritius, before transitting through TS. The existence of TS is important as it helps to reduce both transportation cost and time as the wastes collected are disposed at the landfill in larger volumes. There are, presently, five TS as follows.

Table 1 Transfer Stations and their start date of operation

Transfer Station	Operation started in
La Brasserie	1991
Roche Bois	1992
St Martin	1995
Poudre D'Or	2000
La Laura	2005

Source: Ministry of Local Government records

Some five years ago, wastes were compacted at the TS to reduce their volume before they were transported to the landfill. Compaction of wastes has now stopped and has been replaced by direct discharge to long trunks. The landfill began its operations in November 1997 and has since been accepting waste from all the TS and from the southern region of the island.

At present, it is estimated that the amount of solid waste generated is about 1200 tons per day. Each Mauritian generates around 1 kg of solid waste daily. The increase in the economic development has changed the life style and the consumption pattern of the population. This has led to an increase of the amount of solid waste generated. Around 420,000 tons of solid waste was disposed at Mare Chicose in 2009.

The Mare Chicose landfill site is fast filling-up and is expected to last until 2012. The landfill consists of seven cells, which are reaching their optimum capacity to absorb additional wastes. As a result, the Ministry has already initiated actions to lease an additional 10 hectares of land from a private owner. Another site for the construction of a new landfill has already been identified but due to public outcry, the project is yet to be implemented.

3.3 Roles of the MOLG

MOLG administers and coordinates the Local Authorities (LA), consisting of five Municipalities, four District Councils and one hundred and twenty four Village Councils. The LA are the responsible body for the collection and removal of household and industrial wastes as well as cleansing of public places whilst MOLG is responsible for the setting up and operation of TS and the landfill.

MOLG contracts out the operation and management of TS as well as the transportation of waste from the TS to the landfill.

Responsibility for Solid waste Management

The technical department of MOLG is responsible for Solid Waste Management. It is headed by a director who is supported by two technical managers and eight other staff. The director is responsible for the policy making, planning and implementation of recycling policies. The two technical managers are responsible for contract management, supervision of works and initiation of procurement and new projects. All other staff provides support services including enforcement duties.

3.4 MOLG strategic plan 2005-2010

MOLG has prepared a strategic plan 2005-10 based on the recommendation of the National Environment Strategy (NES) and National Environment Policy (NEP) 2007 and measures proposed in the Carl Bro Report. The main recommendations of the NES and NEP are as follows:

- *Minimization of waste production:* Prevention and avoidance of waste production at industrial and domestic level
- *Maximization of value derived from waste:* Recovery of materials and resources from waste by means of action of recycling and composting
- *Environmental waste treatment and disposal:* Sound production from best practice for best possible waste disposal method for a particular type of waste having the minimum impact on the environment would be adopted for.

Measures proposed in the Carl Bro Report 2005 are as follows:

- Construction of additional TS and upgrading of existing ones
- Construction of additional waste disposal facilities; and
- Setting up of a compost plant as domestic waste in Mauritius consists of 60–70 per cent of biodegradable matter. Composting these materials would convert organic material into compost that can be applied to land to increase soil fertility. Composting is part of the national strategy for waste minimization. Also, Government wants to encourage waste recycling by encouraging recycling industries and by changing consumption behavior.

CHAPTER FOUR

MANAGEMENT AND OVERSIGHT OF TRANSFER STATIONS

This chapter examines whether MOLG has an effective strategy and plan covering all levels of management and oversight of TS.

4.1 Programmes

The strategic plan on Solid Waste Management developed by MOLG includes seventeen programmes of which the following three directly relate to TS.

Table 2 Programmes Relating to TS

Goal 1	Additional Infrastructure and services
Programme 2	Construction of two new transfer station
Programme 5	Construction of nine civic amenity centre
Programme 6	Construction of two composting plant

Source: Solid Waste Management Strategic Plan

4.1.1 Programme 2: Construction of New TS

MOLG planned to construct three TS at Parc aux Cerfs, Riche Terre and La Chaumiere. The one at Parc aux Cerfs would replace the existing La Brasserie TS and would handle waste more efficiently in improved environmental and sanitary conditions. The TS at Riche Terre would relocate the existing TS at Roche Bois away from the inhabited region and would also improve waste handling and compaction.

MOLG did not implement the construction of TS at Parc aux Cerfs and Riche Terre as there was objection from inhabitants of the regions. Instead both existing TS were upgraded.

The TS at La Chaumiere would replace the St Martin TS as the lease at St Martin was reaching expiry. The construction was scheduled to be completed in 2007-08 but was finally completed in November 2009. Also, the operation of the TS was delayed as the construction of access road to the TS had to be rescheduled as a result of delay in retrieval of leased land.

4.1.2 Programme 5: construction of nine civic amenity centres

These facilities would provide householders the possibility to dispose of unwanted domestic and household wastes free of charge, which in turn would be reused and recycled. These

facilities would also reduce the quantity of waste transiting TS. Sites would be identified for the construction of these facilities. The time frame for the implementation of this project was 2006-2010. This programme is in line with the National Environment Strategy (NES) which states that the management of waste should include the 3R Principle that is, Reduction, Reuse and Recycle.

At the time of audit, the construction had not started due to lack of commitment from MOLG. All the households wastes collected are still being transited through the TS.

In view of promoting Reuse and Recycling of waste, two Municipal Councils even attempted to segregate waste at source. The projects were, however, unsuccessful as the TS are not equipped with the necessary infrastructure to receive segregated wastes.

Government is also in presence of a proposal from a private promoter to produce energy from waste generated throughout the country. The project will only be feasible if 900 tons of waste is made available daily for this purpose. It would reduce waste handling at TS and MOLG would save in operation and transportation costs.

Both the construction of the civic amenity centres and the waste to energy project would reduce the handling of wastes as well as the operation and transportation costs. However, at the time of audit both projects had not yet been finalized.

4.1.3 Programme 6: construction of two composting plants

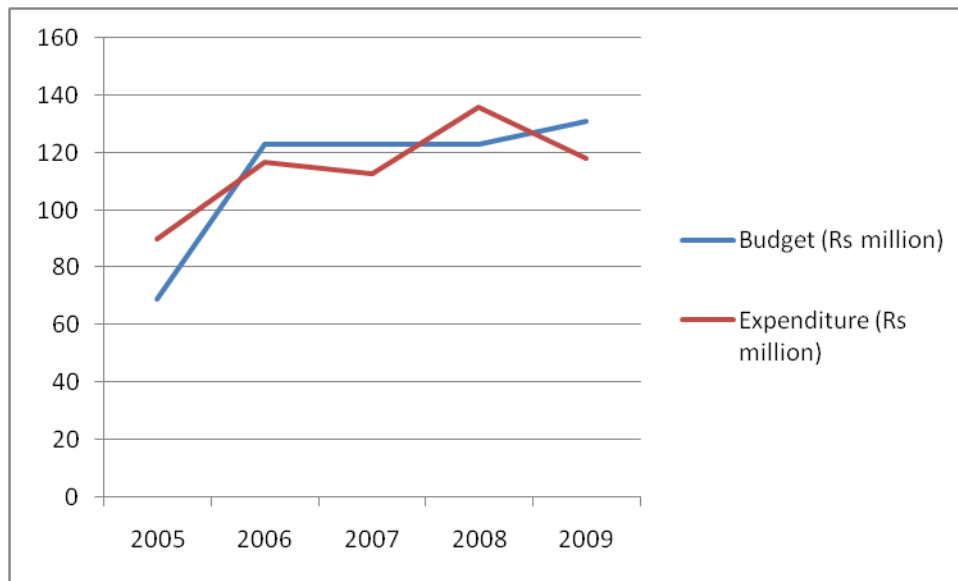
This program provides for the construction of two composting plants during the years 2005 to 2007. The operations of these plants would reduce the amount of green waste being transported to the landfill which in turn would extend the life of the Mare Chicose Landfill.

The construction of one composting plant has so far been completed and will be operated by a private company at La Chaumière, by the end of May 2011. A contract has already been signed between the two parties for a period of 20 years and it has been agreed that MOLG will supply a minimum of 300 tonnes of waste daily, free of charge. The contractor will make arrangements to segregate the wastes. The Ministry estimates to save some Rs 20 million on transport cost. However, MOLG has not yet identified a site for the construction of the second composting plant. The effect of this is that there is a slow progress.

Proper Management of Resources at the TS

Figure 2 shows the expenditure on operation and management of TS, which have known constant increases over the last five years. The total budget for solid waste management for the year 2010 amounted to some Rs 896 million. Management and operation of TS accounts for around 20 per cent of the total budget of solid waste management unit of the Ministry.

Figure2 Trend in Budgeted and actual expenditure for financial years 2005 to 2009



Source: Budget and contract books of MOLG

MOLG has spent some Rs 240 million for upgrading the Roche Bois and La Brasserie TS, yet no provision has been made to improve the existing infrastructure to segregate wastes for recycling and composting so as to reduce the burden on the landfill.

If waste minimisation is carried out through recycling at TS, it will reduce the volume of waste for disposal at landfills and hence reduce transportation cost. It will also increase the lifespan of our only sanitary landfill at Mare Chicose. Recycling activities have the added advantage that they prevent the emission of many greenhouse gases and water pollutants; saves energy; supplies valuable raw materials to industry; creates jobs; stimulates the development of more environmentally-friendly technologies; conserves resources for our children's future; and reduces the need for new landfills and incinerators.

With the construction of one composting plant, MOLG plans to save some Rs 20 million on transport cost. With the construction of a second composting plant and other programmes related to TS, MOLG will make greater savings on transportation cost as well as management and operation of TS.

Lessons from other countries

In the USA, in 2005, recycling resulted in an annual energy savings of at least 900 trillion British Thermal Unit, which is equal to the amount of energy used in 9 million households annually.

In Singapore, the National Recycling Programme (NRP) was launched in 2001. The participation rate of households has increased from 15 per cent in 2001 to 51 per cent in 2004. In 2002, the overall recycling rate for all waste was 45 per cent, including about 60 per cent of the waste generated by industries.

Recommendation

MOLG needs to implement the programmes developed in the strategic plan in view of reducing the total cost of operation and transportation and to benefit from the expected savings. It will also help in achieving the 3R. MOLG may consider the following options for implementation:

Option 1

Public, household and industries should be provided with different coloured bins for different items. One for green waste, one for plastic and one for paper waste. These wastes will then be collected by LAs and then distributed to users of these waste for recycling. All waste that could not be recycled will reach the TS. This will help to reduce the amount of waste handled by the TS and thus reduce operation and maintenance cost and transportation cost from TS to Landfill.

The following benefits may be achieved with segregation of waste at source:

- This can induce household composting which is normally undertaken to enhance garden soil or simply to complement gardening as a hobby.
- Cost on heavy mechanization is not needed as bulk segregation will not be done.
- This will reduce private collection and disposal costs as volume of waste will be reduce.
- Negative environmental impacts is reduced from the extraction of natural resources if some of the waste is used by household for composting and at the time reduced volume of waste will be transported to the Landfill.

Problems associated with segregation of waste at source are:

- Appropriate legislation has to be brought to compel household to segregate waste at source.
- Sensitisation campaigns need to be carried out.
- Acquisition of coloured bins will entail additional cost.
- Households may be reluctant to segregate waste for sanitary reasons and because of time constraint which impact in the busy life of household in today's world.

Option 2

TS should be built with facility for segregation of waste. Waste can either be segregated manually or by making use of conveyor system. The segregated waste can be sold depending on the existence of local market. This can generate additional revenue and at the same time reduce transportation cost and volume of waste at landfill.

Sorting of waste at TS will give additional benefits such as:

- It can reduce the costs involved in transfer of waste to sanitary landfill by 20 per cent, as it is the case in India.
- Enables one to separate organic, inorganic and recyclables from the municipal solid waste so that each fraction can be directed to their designated site.
- Decrease the operational expenses involved in a Processing Facility; thus, enable it to improve its economics.
- Deodorisation and sanitisation of waste is done in the facility, so that transportation becomes more hygienic.
- Increases in the shelf life of the Sanitary Landfill.
- Employment for Rag pickers.
- No Source segregation is required hence no additional cost need to be incurred on coloured bins.

4.2 Roles, Responsibility and Accountability

As far as waste collection and disposal are concerned, the roles, responsibility and accountability are defined in the Local Government Act 2003. Further several programmes relating to TS have been set by the Ministry in its Strategic Plan 2005-2010 where role and responsibility to implement the programmes have been defined. However, as regards reduce; reuse and recycle of waste in view of reducing the burden on the TS, the roles and responsibility are not clearly defined in the strategic plan. It is not clear as to whose responsibility is to segregate waste, whether this is to be done at household level, by the Local Authorities or at the TS.

In line with the concept of achieving 3R, the Municipal Council of Quatre Bornes attempted to collect paper waste for paper recycling companies but these companies refused to collect the paper because the papers did not meet their requirements. Furthermore, the Municipal Council of Curepipe collected different types of waste in different containers but as the TS are not designed to receive segregated wastes and, in the absence of compost and recycle plants, they had to be disposed in the same way at the landfill.

It is understood that MOLG plan to prepare a new Waste Management Bill that would regulate the essential elements of solid waste management, including all aspects of TS. The bill would in particular regulate institutional responsibilities of all stakeholders. It would also set institutional framework in the management of waste like the waste management commission. The Bill has not yet been prepared.

For efficient handling of waste resulting in a proper management of TS, an integrated approach needs to be adopted. That is from generation of waste at household level to the final disposal. Each and everyone should know his/her role and responsibility in the process of

waste management. The waste management bill may include regulations relating to roles and responsibilities of each stakeholder in the process of waste management. It may set the responsibility for segregation, collection, reducing and disposal of waste. It will most probably set the powers of institutions, penalties for non compliance and opportunities for appeals. Taxes and incentives can also be provided to encourage segregation, composting and reduction of waste so that handling of waste at the TS is reduced considerably as we know that nearly 60 per cent of waste generated in Mauritius can be recycled. That is out of 450,000 tons of waste produced annually, 270,000 tons are recyclable waste. If actions are undertaken for the application of 3R, the cost of operation and management of TS could be reduced.

Recommendation

There is a vital need for legislation in order to regulate institutional responsibilities and accountability of all stakeholders with regards to solid waste management.

4.3 Objectives

Strategic planning is a very important business activity. Strategic planning and decision processes should end with objectives and a roadmap of ways to achieve them. While formulating our objectives, we need to be very cautious because they need to be realistic and within our reach. Our objectives should be specific, measurable, achievable, and relevant and they should be realisable within a given timeframe.

The goals set out in the strategic plan 2005-2010 were broken down into programmes and sub programmes. Target dates to achieve each of the programmes and sub programmes are given in the strategic plan. It was noted that out of 17 programmes only five have started although not completed by the due date. Twelve of them have not started at all.

Although all the objectives set out in the solid waste strategic plan are in line with the overall national strategy, yet most of them were not achieved. The following problems have been identified which may be the cause for non achievement:

- Government has not taken any decision as to whether it will go for waste reduction or waste be used to produce electricity
- National recycling plan not yet formulated

There are many uncertainties around the achievement of the objectives. Some programmes and the related uncertainties are highlighted in the Table 3.

Table 3 Programmes where there are uncertainties

Programmes	Uncertainties
Awareness campaign	Not clear when and how it will be done.
Formulation of National Recycling plan	Who are the target group and how it will be done
A new waste management bill	Not clear when and who should do it

Recommendation

The objectives set in the programmes by the MOLG need to be SMART (Specific, Measurable, Achievable, Relevant and which can be realized within a given Timeframe). MOLG may consider to involve all the stakeholders and to prioritise the objectives so that they are easily achieved.

4.4 Indicators, targets and performance measurement.

The strategic plan should include clear indicators and targets so that performance can be evaluated and corrective action taken where necessary. It is also important to set right indicators so that right and purposeful information is obtained for performance measurement. When defining performance indicators it is important to note that the targets are well set and they are attainable otherwise an inappropriate performance indicator may be set.

The Solid Waste Management Strategic Plan 2005-2010 includes well defined targets. But no performance indicators have been set. The only indicator set is found in the Programme Based Budgeting (PBB) estimates which are the reduction in waiting time of transport at the TS from 45mins to 15mins. Indicators may be used to assess the performance of TS. The performance of one TS may be compared with another for decision making purposes.

Recommendation

The strategic plan needs to have indicators which can be used to assess the performance of the TS and to compare one TS with another. There are some indicators which might be relevant to TS which the ministry may consider to apply. These are:

- *Operation cost per ton.* This can give an indication of where resources are properly applied.
- *Number of site visits effected by enforcement officers.* More site visits may imply that particular TS are a problematic case.
- *Number of fixed assets breakdown.* Frequent breakdown may infer that asset is not well maintained or wrong type of asset is being used.

- *Number of complaints received.* Complaints received at one transfer station may be compared to complaints received at other TS. This will help to concentrate resources where it is more needed for investigation and to take corrective action.

4.5 Risks assessment and Prioritisation

The need for risk assessment is to assess any likelihood of an uncertain situation and the means to control those risks wherever possible. A formal risk assessment process is required to identify, analyse and treat risk. Risk assessment should be carried out at all levels, that is, at strategic level, design stage and at operation stage. For example, it is important to identify the risk of health hazard and risk from security measures so as to protect the employees and public. Risks identified need be documented and communicated to everyone concerned.

At strategic level, risk assessment is carried out with reference to a longer time horizon than at operational level, ranging between three to five years and hence there are more uncertainties. Risk assessment and strategic planning are linked together. It is only after a risk assessment exercise that a risk management policy can be designed and also a contingency plan set up. Decision-makers who understand how the enterprise could fail can then decide whether to accept the risk of failure and figure out how best to prevent it, more readily detect it, and possibly correct it. A capacity to imagine and then prevent failure must be built into the strategic planning process. It is also a requirement of the Occupational Safety and Health and Act 2005 (OSAH Act 2005) for employers to carry out a risk assessment exercise at least every 2 years.

MOLG did not carry a risk assessment exercise before preparing its strategic plan 2005-10. Instead a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was carried out by management hence most of the risks associated with TS are known to management although not included in the Strategic Plan 2005-10.

Relating to TS it was observed that a number of problems cropped out, such as operation of La Chaumiere TS which was delayed because of delay in retrieval of lease land, construction of two new TS namely at Park Aux Cerf and Riche Terre had to be cancelled because of public outcry, employees were injured at La Brasserie TS and weighbridges at St Martin and La Brasserie were out of order for quite a long period of time. Other constraints identified are unavailability of funding for the sector as TS are non revenue generating units and the absence of a comprehensive legislation like the Waste Management Bill and lack of trained staff to deal with hazardous wastes.

It might not be apparent at the start of a project to reasonably identify all problems but nonetheless a list of possible problems facing the TS could be elaborated and possible course of action taken could be enumerated. Risk management is important as a counter measure for loss of time, prevent injury and health hazard, and deal with environment issues and so on.

Recommendation

A risk assessment exercise should be carried out at strategic planning stage and a strategy developed to manage those risks. Risks should be prioritized and a plan should be elaborated to treat those risks. All these risks and the way to mitigate them should be documented and communicated to all parties concerned.

4.6 Technical Expertise

Relevant technical expertise is important to identify and deal with technical issues such as contract management, environment management and waste management among others.

While dealing with solid waste, employees may come across hazardous waste. They need to know how to deal with this type of waste. They are required to be trained by appropriate persons, expert on this field, for this purpose. Management very often has to deal with issues relating to contract management like drafting of specific conditions like penalty clauses, relationship management and to resolve conflict with contractors, therefore a good knowledge of contract management is needed. Other area where specific knowledge is needed is operations management and reengineering of processes to adapt TS with actual requirements when new and up to date equipment, which may be environment friendly, come into the market.

The International Solid Waste Association (ISWA) supports the collection of solid waste by methods and systems that are economically and environmentally sound. In this respect it recommends that collection services for residential, commercial and industrial solid waste should be provided by automated and mechanical technologies and systems, when these systems are feasible, practical and the most cost effective. Hence, technical expertise is needed to appraise such issues.

We came across two cases during the audit where contract clauses were not clear and correction could be made. In one case it was noted that contract conditions was not clear; it is mentioned in the contract that five per cent of incoming waste should be verified by the contractor, but mention is not made as to the frequency of inspection. Whether, it should be on a daily or on a monthly basis. In another case it was noted that contractors failed to maintain weighbridges but penalty was not charged because of lack of appropriate penalty clause. These are important issues.

Recommendation

It is recommended that MOLG should have access to technical expertise to deal with technical issues such as solid waste management, environment management, drafting of contract and handling of hazardous waste by providing regular training to employees at all levels so as to enhance their knowledge in these fields. The MOLG may also consider subscribing with ISWA so as to obtain assistance and updates in technical field as these institutions regularly publish papers on technical policy. Seminars and working group programmes are organized on a regular basis by this association where staff of the solid waste unit can participate. Provision for such trainings should be provided within the budget.

4.7 Management Information System

The need for a good Management Information System (MIS) is to produce right information at the right time so as to be communicated to the right person so that timely action is undertaken. MIS is important to ensure effective management and oversight of the TS.

The terms of the Operation and Management contracts of TS actually do not sufficiently elaborate on the types of reports to be submitted for proper management and oversight of TS. Submission of one type of report is specified. Emphasis is only made on the presentation of vehicle maintenance report which should be produced at the end of each month. Submission of monthly reports to MOLG could have been extended to other pertinent aspects like maintenance of plant including weighbridge, sorting of waste, entry of hazardous waste to the TS, number and types of vehicle working at the TS and the quantity of incoming wastes during the month.

Timely and appropriate submission of reports is an essential part of the MIS for decision making. If reports are not submitted to management at the right time, action can be delayed or no action can be initiated to remedy a problem. In one particular case, it was noted that due to shortcoming in the MIS, right decision was not taken to remedy the situation. The weighbridges at La Brasserie TS have to undergo a complete overhaul at an estimated cost Rs 1.2 million. Defects were noted and notified by enforcement officers for remedial action by contractor on seven occasions from the period 13 March 2009 to 31 July 2009. But the weighbridge has not been repaired and no reports submitted by the contractor.

The enforcement officers carry out site visits at least once per week. Shortcomings found during their visits are recorded and they are communicated to the contractor for remedial action. On the other hand reports are not sent to MOLG by the contractor to inform whether any actions have been initiated and the date work was carried out.

Recommendation

The contract document should include the type of communication to be used on site and between site manager and representatives of the Ministry. It should also be clear from the contract, which types of report the contractor should submit to the Ministry and on what interval of time. Submission of monthly reports to MOLG could have been extended to other pertinent aspects like maintenance of plant including weighbridge, sorting of waste, entry of hazardous waste to the TS, number and types of vehicle working at the TS and quantity of incoming wastes during the month.

CHAPTER FIVE

OPERATIONS AND CONTRACT MANAGEMENT OF TRANSFER STATIONS

This chapter examines whether the TS are operating satisfactorily and whether the MOLG is managing the external contracts effectively.

5.1 Operation manual

An operation manual describes the way the TS should be operated. It includes detail procedure in case of accidents and fire, maintenance and emergency health care services and contact persons at the Ministry. Operational and management procedures should be documented and made available to staff. All procedures should be elaborated in this manual. Guidelines from countries like New Zealand, America, Australia and U.K favours maintaining an operation manual.

The contents of an operation manual include:

- an organisational chart and an outline of site staff roles and responsibilities
- risk assessments of the site, including environmental and section four of OSAH Act 2005
- procedures for the induction and on-going training of all employees and contractors
- emergency response procedures
- crisis management procedures for any mishap which may occur and present an occupational health and safety hazard
- safe operating procedures for all aspects of the site operation, including waste received, user supervision, traffic management, dealing with hazardous waste, and use and maintenance of plant and equipment
- procedures for environmental management and control covering litter, odour, noise, water and energy efficiency, dust, vermin and aesthetics
- procedures for collecting and maintaining relevant workplace records such as workplace inspection records, training records, hazard report forms, operational health and safety committee records and action plan
- procedures for complaint response and customer service
- procedures for monitoring and reporting
- a strategy for improving environmental, operational health and operational performance safety

- a timetable for regular review of the manual and all procedures (at least three years)

It was noted that the TS do not have an operation manual. The operation manual will set the procedure for the operation and maintenance of TS, thus bringing consistency in the operation and management of TS over time and also among TS. It will assist in the process of decision making on pertinent issues like breakdown of equipment, in case of accident and during calamities. It will also act as a communication tool as lots of information, procedure and contact details will be available from this manual.

Recommendation

It is recommended to prepare an operation manual with details of operation procedures, precautionary measures to be taken, and troubleshooting. Moreover, the manual should include a detailed contingency plan with contact numbers and details of response team. The preparation and maintenance of this manual need to be included as a clause of the contract documents.

5.2 Contingency Arrangements

A contingency plan is a plan which elaborates which course of action to be taken if things go wrong in the normal course of business. It describes the actual process, its purpose and objectives, describes in details the alternative course of actions and gives details of contact teams. The plan also specifies how and at what interval of time it should be tested.

The Operations and Maintenance contracts of TS include provisions for contingency arrangements relating to health and safety matters, operations and power failure. But it is not sufficiently elaborated; mentioned are made to what should be done, but how the contingency plan should be applied are not specified. For example vehicles and bins should be sheltered, but not stated where and how they will be sheltered

In one specific situation, the contingency plan states that in case of power cut the standby generator will be started and selected equipment will be kept running. In the event of complete failure from all sources, the station will make arrangements for the diversion of waste, the loading of waste into open top containers or bulk road vehicles or the hire of emergency generators. However this arrangement and other arrangements of the contingency plan have never been tested. For a contingency plan to be effected, it should be tested at regular intervals

Recommendation

It is recommended that the MOLG prepares an elaborated contingency plan. This plan should be tested at least once every year. The following points should form part of the plan:

- *Objectives of the Contingency Plan.* What need to be achieved, what are the risk associated with TS and what processes need particular attention?

- *Resource Requirements.* In terms of cost and time
- *Implementation of the Plan.* Describe the basic criteria for implementing the plan. What will be the situation that prompts the decision to implement?
- *Assigned Roles and Responsibilities.* Provide details on who will do what under the plan.
- *Recovery Process Requirements.* Describe the process and requirements for returning to normal operations. What steps must be taken to bring processes back to normal.
- *Key Contact Information.* List key personnel with contact details that have responsibility for the system or process.

5.3 Maintenance Arrangements

The contractor has an obligation to carry maintenance on the plant and equipment at the TS. We noted that maintenance records were only kept for trailers and vehicles. As regards other plant and equipment such as weighbridge and stand by generators, the contractor did not keep any maintenance records. For example, at La Brasserie TS, the Ministry requested the Contractor to submit all information on maintenance that had been performed on the weighbridges since the start of the contract but he did not do so. In the absence of such records, it cannot be ascertained that maintenance has been carried out on the due dates.

Recommendation

It is recommended that maintenance records are kept for all the maintenance works carried. According to best practice records on maintenance of all plant and equipment should be kept and the Ministry must ensure that it gets value for money for the services paid.

5.4 Performance Indicators and Targets

In order to measure the performance and management of the TS, indicators and targets should be set and performance measured to ascertain that they have been met or if any corrective action is required. In the contracts a few indicators and targets have been mentioned but it is difficult to evaluate whether they are being achieved and respected.

The contract provides for the selection and inspection of a minimum of five per cent of incoming wastes by the contractor. However, as regards inspection of incoming wastes load, it is not clear whether it is daily or monthly. Moreover, no records are available to ascertain whether the inspection has been carried out. The PBB estimates states that the waiting time per vehicle at the TS will be reduced from 45 minutes to 15 minutes. This is not specified in the contract and so presumably it cannot be legally enforced.

Recommendation

The ministry needs to set indicators and targets and these performances have to be measured to ascertain that they have been met or if any corrective action is required. Also, the reduction in waiting time from 45 minutes to 15 minutes should be stated in the contracts.

5.5 Fees and penalties

The contract for operation and maintenance of TS provides for fees and a penalty to be charged in cases where there is a failure to meet contract performance specifications. Although the Enforcement Officers report shortcomings after each inspection no penalty has been charged because the penalty clauses are not clearly spelt out, and its application is quite difficult. The followings were noted:

5.5.1 La Laura TS

There were proven deviations from the contract such as stacking of waste, odor nuisance, waste stacked on platform, loose waste, overflowing of sump and drains were full of leachate but no penalty was applied even these shortcomings were reported by Enforcement Officers after their site visits.

5.5.2 Weighbridge

The TS are equipped with weighbridges (In) and (Out), for weighing incoming and outgoing wastes. Outgoing weight is used for payment to contractors and incoming weight is recorded to know the quantity of solid waste arriving from different Local Authorities. Statistics from record of weighbridge can also be used as baseline for decision making as it gives an idea of the volume of waste handled. Payment for transportation of waste to landfill is done on the lower of weight received from the TS and the landfill.

The contract clauses state that maintenance of weighbridges fall under the responsibility of the contractors. On several occasions, the weighbridges at St Martin were reported to be out of order and it had completely gone down since 2007 as they were not properly maintained. No penalty was charged as the contracts do not mention the quantum of penalty charges where the contractors fail to carry out the maintenance of the weighbridges.

Recommendation

It is recommended that penalty clauses be revised and clearly spelt out and to include the quantum of penalty charges where the contractor fails to carry out maintenance on the weighbridges.

5.6 Communications with Internal and External Stakeholders

The smooth running and good management of the TS requires effective communication with both internal and external stakeholders. The Enforcement Officers of the Ministry make regular visits to the TS and reports on the shortcomings observed.

The Director of the Solid Waste Management Unit holds regular meetings with his technical staff to discuss matters on the efficient management of the TS. Meetings are not held with the contractors as stipulated in the contracts but any shortcomings are communicated to them for corrective actions. It is also noted that monthly reports of operations and maintenance of the TS is submitted by only one contractor.

Recommendation

For the efficient management and oversight of the TS it is recommended that all the contractors send monthly reports on operation and maintenance, which include status of plant and machinery, number and type of vehicle in use during the month, quantity of hazardous waste arriving at the TS, action undertaken on major maintenance work carried out and any incidence which took place at the TS. These reports should be scrutinized by staff of the Ministry and appropriate action should be taken where necessary.

5.7 Effectiveness of Monitoring Contractual Obligations of Contractors by MOLG

Monitoring of works is done through regular visits by technical staff and enforcement officers of the Solid Waste Management Unit of MOLG. After each site visit, an inspection report is prepared whereby all weaknesses found are reported and communicated to the contractor for remedial action. In relation to contract management some shortcomings have been noted where improvements can be made for greater effectiveness. The following points are noted:

- Some of the contract clauses are not explicit, like five per cent of examination of waste to detect hazardous waste, whether it should be on a daily or monthly basis.
- Except for vehicle maintenance reports, the contract document does not mention the type of report to be submitted and to whom it should be addressed.
- Targets are not specified in contract. Waiting time to be reduced from 45mins to 15mins form part of PBB indicators but not included in post 2009 contract documents.

MOLG is responsible to monitor the performance of the contractor by ensuring that it is performing as per his contractual obligations. Contractor's performance is being monitored by the technical staff and the enforcement team of MOLG. There are cases where contractor's performance was not effective, for example weighbridge is not in operation, waste on the platform and loose waste around. There were no penalties charged which shows that they are not taking action to enforce penalties for poor performance, and there is an issue about clarity of penalty clause.

Recommendation

The Ministry need to closely monitor the performance of the contractor by ensuring that the maintenance schedules for weighbridges are adhered to and penalty clauses should be more explicit in the contracts for ease of application.

GLOSSARY

Collection	The process of picking up wastes from residences, businesses, or a collection point, loading them into a vehicle, and transporting them to a processing, transfer, or disposal site.
Composting	Biological decomposition of solid organic materials by bacteria, fungi, and other organisms into a soil-like product.
Disposal	The final handling of solid waste, following collection, processing, or incineration. Disposal most often means placement of wastes in a dump or a landfill.
Hazardous waste	Waste that is reactive, toxic, corrosive, or otherwise dangerous to living things and/or the environment. Many industrial by-products are hazardous.
Landfill	The final disposal of solid waste by placing it in a controlled fashion in a place intended to be permanent.
Recycling	The process of transforming materials into raw materials for manufacturing new products, which may or may not be similar to the original product.
Reuse	The use of a product more than once in its original form, for the same or a new purpose.
Sanitary landfill	An engineered method of disposing of solid waste on land, in a manner that meets most of the standard specifications, including sound siting, extensive site preparation, proper leachate and gas management and monitoring, compaction, daily and final cover, complete access control, and record-keeping.
Transfer station	A major facility at which MSW from collection vehicles is consolidated into loads that are transported by larger trucks or other means to more distant final disposal facilities, typically landfills.
Waste reduction	All means of reducing the amount of waste that is produced initially and that must be collected by solid waste authorities. This ranges from legislation and product design to local programs designed to keep recyclables and compostable out of the final waste stream.