


MINA'BENTE OCHO NA LIHESLATURAN GUÅHAN
2006 (SECOND) Regular Session

Bill No. ^{LS}283(EE)

Introduced by:

J. M.S. Brown 

AN ACT TO APPROVE OR DISAPPROVE THE
GUAM 2005 INTEGRATED SOLID WASTE
MANAGEMENT PLAN FOR THE GUAM
ENVIRONMENTAL PROTECTION AGENCY.

1 BE IT ENACTED BY THE PEOPLE OF GUAM:

2 Section 1. Approval of the Guam 2005 Integrated Solid Waste
3 Management Plan. The Guam 2005 Integrated Solid Waste Management
4 Plan for the Guam Environmental Protection Agency ("GEPA"), that were
5 adopted by the GEPA Board of Directors on January 26, 2006, are hereby
6 approved. These rules and regulations are attached, labeled as Exhibit A, and
7 incorporated herein.



GUAM ENVIRONMENTAL PROTECTION AGENCY



AHENSIAN PRUTEKSION LINA'LA GUAHAN

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JAN 31 2006

Honorable Edward J.B. Calvo
Senator and Legislative Secretary
Twenty-Eighth Guam Legislature
155 Hessler Place
Hagatna, Guam 96910

SUBJECT: Transmittal of the Guam 2005 Integrated Solid Waste Management Plan (ISWMP)

Buenas yan Saluda! The Guam Environmental Protection Agency (Guam EPA) hereby transmits the subject Plan for the Legislature's information.

This document updates and revises Guam's Integrated Solid Waste Management Plan, as mandated by Section 51103 of Title 10, Guam Code Annotated. The Guam EPA Board of Directors, under the Chairmanship of Mr. John Jocson, adopted the 2005 ISWMP at its January 26, 2006 meeting.

Should you have any questions, please contact Mr. Betwin Alokoa at 475-1607/1658. Dangkolo na Si Yu'os Ma'ase.

Randel L. Sablan
Acting Administrator

Enclosures

CC: Governor of Guam
Director, Department of Public Works



GUAM ENVIRONMENTAL PROTECTION AGENCY



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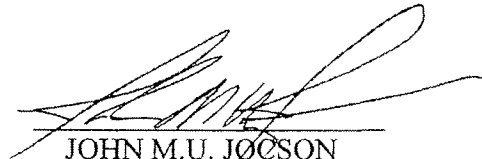
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GUAM 2005 INTEGRATED SOLID WASTE MANAGEMENT PLAN

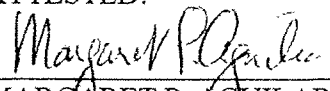
PLAN ADOPTED: DECEMBER 15, 1999
(Guam EPA Board)

APPROVED AND AMENDED: DECEMBER 12, 2000
(25th Guam Legislature)

UPDATED PLAN ADOPTED: JANUARY 26, 2006
(Guam EPA Board)


JOHN M.U. JOOSON
BOARD CHAIRMAN

ATTESTED:


MARGARET P. AGUILAR
BOARD SECRETARY

DATE 1-31-06

"ALL LIVING THINGS OF THE EARTH ARE ONE"



Guam 2005 Integrated Solid Waste Management Plan

January 2006

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EXECUTIVE SUMMARY

By this document, the Guam Environmental Protection Agency (Guam EPA), with assistance from the Guam Department of Public Works (DPW), updates and revises Guam's Integrated Solid Waste Management Plan, as mandated by Section 51103 of Title 10 of the Guam Code Annotated.

Guam's first Integrated Solid Waste Management Plan was developed for the Guam Environmental Protection Agency and approved by the Guam EPA Board in 1999. It was modified and adopted by the Guam Legislature on December 12, 2000. It called for major changes in solid waste management on Guam, including creation of a new legally conforming landfill and closing of the Ordot Dump.

This update to the Plan revises the solid waste management objectives, identifying the key elements of the integrated solid waste management system, which will be implemented during the five-year period 2006-2010 and beyond, as follows:

(1) SOLID WASTE COLLECTION AND TRANSPORT

- Fully implement user charges and tipping fees by April 1, 2006
- Establish private contracts for residential solid waste collection by November 19, 2006

(2) RECYCLING AND WASTE REDUCTION

- Reduce the annual quantity of the Guam-wide solid waste stream by a minimum of five percent through composting by July 1, 2007
- Reduce the annual quantity of Guam-wide solid waste stream by twenty percent through diversion at the source and recycling by July 1, 2009
- Reduce the annual quantity of the Guam-wide solid waste stream by thirty-five percent through diversion at the source and recycling by July 1, 2018

(3) SOLID WASTE DISPOSAL

- Final closure of the Ordot Dump by September 23, 2007
- Privatize and open the Layon Landfill by September 23, 2007

(4) PUBLIC EDUCATION

- Adopt the public education strategy recommendations from the updated ISWMP by January 31, 2006

(5) MANAGEMENT OF THE GOVERNMENT OF GUAM'S SOLID WASTE OPERATIONS

- Adopt the planning and operational recommendations from the updated ISWMP by January 31, 2006
- Implement an ongoing, comprehensive SWM data collection, analysis and planning process by July 1, 2006

- Establish Guam-wide solid waste management operations, inclusive of the military's collection, storage, processing and disposal operations by October 1, 2008

This update to the Plan reviews the accomplishments made during the time between the adoption of the Plan and November 2005, including the following

- The Guam Environmental Protection Agency amended its solid waste disposal regulations and consequently received United States Environmental Protection Agency (U.S. EPA) delegated authority to enforce the federal solid and hazardous waste laws and regulations.
- During the six and one half years between May 1999 and November 2005, the Guam Legislature enacted more than 15 solid waste laws, as summarized in Appendix A. However, expected objectives of these laws and the Plan, including collection of sufficient tipping fees to match cost of services, financing and implementing the opening of a new landfill and the closing of Ordot Dump, composting of green waste, and administration of contracts for privatized collection and disposal were not met.
- Solid waste disposal resulted in a vertical and lateral expansion of the Ordot Dump and DPW's closure design became outdated.
- Because of the continued contamination of the Lonfit River from the Ordot Dump, the U.S. EPA had initiated negotiations for a federal court order, or Consent Decree, to resolve civil penalties and to establish a schedule for construction of a Municipal Solid Waste Landfill Facility (MSWLF) and closure of the Ordot Dump.
- During the almost four years (2000-2004) the Government of Guam (Government) took to negotiate the Consent Decree, Guam made no progress on a new landfill. The Ordot Consent Decree became effective on February 12, 2004. With its specific deadlines and stiff stipulated penalties for missed deadlines, this Consent Decree has suddenly forced the Government into modern solid waste disposal practices.
- The Consent Decree required the Government to conduct a screening process to identify the best landfill sites. Guam EPA and DPW implemented the site screening process of the 2000 Integrated Solid Waste Management Plan and selected the Layon area in the vicinity of Dandan, Inarajan, in January 2005.
- The Consent Decree also required the permitting of the closure and pre-closure operations of the Ordot Dump by December 2005.

Within the update of the Plan, a change in management methods is proposed. This calls for the formation of a Solid Waste Management Authority with its own board to manage the collection of tipping fees or other financing resources and implement

the privatization of Government operations as mandated by the Guam Legislature. Such an Authority had been included in the Guam EPA Board approved Plan of 1999; however, in 2000 the Legislature rejected the formation of the Solid Waste Authority. Since then, the Government's solid waste practices and other circumstances justify the creation of the Guam Solid Waste Authority with financial management consolidated under the services of its chief financial officer.

The Plan update revises Guam's solid waste load projections to the year 2037 (which approximates the conservative life-span of the new landfill) and includes future federal facilities waste in the island-wide management system and alternative levels of waste reduction.

It calls for mandatory source separation with curbside collection of all waste streams, and drop-off/collection capability at regional transfer stations. Recycling, composting, proper disposal of special waste, as well as the special considerations of waste reduction opportunities and curtailing of illegal dumping, are all components of the 2005 ISWMP. Special wastes, such as white goods, household hazardous waste, automotive batteries, and abandoned vehicles, are to be handled differently from recycling of other municipal solid waste recycling activities.

The approach to increasing public awareness and public involvement in waste management improvements and plan implementation calls for increased efforts by the Guam Environmental Protection Agency.

The update also provides performance standards for the components of the solid waste management system.

In December of 2005, Guam EPA issued a permit to the Guam Department of Public Works to continue operating the Ordot Dump until the earlier of either (1) the opening of a Municipal Solid Waste Landfill Facility or (2) September 23, 2007, the date mandated by the Consent Decree; and for closure construction and post-closure monitoring and maintenance. Closure construction must begin no later than April 21, 2006. Post-closure care will ensue for 30 years or more. Therefore, with the issuance of the permit, Guam has embarked upon modern solid waste management operations, which will be privatized as required by law. In 2006, Guam EPA will implement its regulations on landfill design and construction, and in 2007, those for post-closure care.

The Consent Decree mandates that the Municipal Solid Waste Landfill Facility (MSWLF) open on or before September 23, 2007. Therefore, 2006 and 2007 will be pivotal years for Guam's solid waste management as DPW designs and constructs solid waste facilities and Guam EPA develops permit conditions that are protective of the environment.

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CHAPTER ONE: INTRODUCTION

1.1 Plan Purpose

This first update of the 2000 *Integrated Solid Waste Management Plan for the Island of Guam* is written in compliance with Section 51103 of Title 10 of Guam Code Annotated, which states that the "*Guam Environmental Protection Agency shall revise the Solid Waste Management Plan at least every five years, or sooner as needed.*" It identifies and describes the key elements of the integrated solid waste management system that will be implemented on Guam during the five-year period 2006-2010 and beyond.

1.2 Planning Approach

Based on review of the contents, data, and recommendations of the 2000 *Integrated Solid Waste Management Plan for the Island of Guam* (PL 25-175), a team of technical reviewers from within the Guam Environmental Protection Agency (Guam EPA) and the Solid Waste Division of Guam Department of Public Works (DPW) drafted this 2005 *Guam Integrated Solid Waste Management Plan* (2005 ISWMP or the Plan) update. They assessed the progress in solid waste management since 1999, proposed revised goals and objectives for the ISWMP, and updated data and projections of waste generation to 2037. They formulated a solid waste management system incorporating the components of a management authority, waste diversion and disposal, collection and transport, and public education. Included are performance standards that define measures of plan implementation. These components were assigned to chapters, each addressing (1) the current status ("where we are"), (2) desired objectives ("where we want to be"), (3) recommended actions ("how to get there"), and (4) the performance measures ("how we know whether we have succeeded").

All parts of this update were developed with a view to accommodate legal concerns expressed in the numerous local solid waste laws (Appendix A) and the District Court of Guam's imposed Consent Decree. In 2004, the Government of Guam entered into a Consent Decree with the United States (U.S. District Court of Guam, 2004) establishing specific deadlines for (1) opening a legally permitted landfill, (2) closing of the Ordot Dump, (3) institutionalization of a household hazardous waste (HHW) collection program, including construction of a facility, and (4) producing a financial plan to achieve the first three tasks (Consent Decree tasks). Therefore, the Consent Decree requirements heavily influence this 2005 ISWMP document.

1.3 Background

Guam has seen many changes since it became a Territory of the United States in 1898. It has become westernized, but has not lost all of its cultural and social traditions. As is the case with any westernized society, the influence of capitalist economics and social trends have created in Guam's population the inevitable social patterns that can only be described as "commercialism" and "consumerism." As a result of these patterns, residents' buying habits, methods of consumption, and general lifestyle are characterized by an attitude that emphasizes the "disposable" nature of modern consumer products. Traditionally, Guam, like any other island in the Pacific, did not have this paying and consumption lifestyle that requires proper disposal and

management of its solid waste. Everything was part of the earth and biodegradable – no plastics, glass, metal, or chemical contaminants. The islanders never actually had to worry about the negative impacts that result from the disposal of their wastes. Needless to say, both the islanders' disposal habits and westerners' commercialism and consumerism do not lend themselves well to the effective and efficient management of solid waste on Guam.

Another aspect of solid waste management on Guam is the government's historic approach to government utilities and services. In the fairly recent past, government's management of other critical utility services, such as power and water, revealed a pattern of insufficient planning and management, under-prioritized maintenance of facilities and equipment, insecure funding for operations, political controversy involving the Legislative and Executive Branches, and the eventual emergence of utility crises (load-shedding and water shortages) leading to, among other problems, a federal court stipulated order. Recently, the privatization of the Guam Telephone Authority has demonstrated that much of the government's services can be operated more efficiently and more economically by a private firm. The value of properly planned and controlled privatization of solid waste management operations is therefore emphasized in this plan.

Following use of the Ordot Dump as the official municipal solid waste disposal site for all residents and businesses on Guam, including some disposal of military wastes a half-century ago, its valley site has become a mountain. It has far outlived its acceptability, causing health and environmental risks that should not be tolerated. It not only affects neighboring residents with health, odor, noise, and animal vector problems, but has also caused fires generating toxic fumes that have required residents' repeated evacuations from their homes. It has polluted surface waters from its leachate, which has led to a federally forced Consent Decree (U.S. District Court of Guam, 2004) that requires the Government of Guam to close the dump. This Consent Decree imposes a strict schedule of related actions that must be taken, backed by the imposition of financial penalties for missed deadlines. This dump has been the primary reason for the development of solid waste management plans on Guam.

In 1999, the Guam EPA's first Guam Integrated Solid Waste Management Plan was drafted by a local consulting firm, Dueñas and Associates, Inc., with the coordination of a steering committee, under the guidance of the Guam EPA (Guam EPA, 1999). This was subsequently approved by the Guam EPA Board of Directors and submitted through the Guam Planning Council and the Governor of Guam to the Guam Legislature. It was modified and adopted by the Guam Legislature through Public Law 25-175 on December 12, 2000, as the *Integrated Solid Waste Management Plan for the Island of Guam* (2000 ISWMP). It assessed solid waste generation and disposal volume requirements and evaluated disposal and volume reduction options and management. Waste collection and transport methods were then presented. These selected components were then examined to see how they would be best managed in order to yield a functional, efficient, and effective Integrated Solid Waste Management (ISWM) system. The desired performance levels for components were specified to complete the 2000 ISWMP. The requirements to establish a non-political Solid Waste Management Authority and the option of waste reduction by incineration were removed from the Guam EPA Plan by the 25th Guam Legislature. Consequences of not having this proposed Authority appear very significant.

Before and after this Plan development, numerous local laws were passed to address the problems with the Ordot Dump and related solid waste concerns. These are summarized in Appendix A. Most of those laws enacted before 1999 (before the 25th Guam Legislature took office) were considered in the development of the 2000 ISWMP.

There have been many legislative attempts since the 2000 ISWMP to make the government solid waste activities operate more efficiently. In fact, during the six-and-a-half years between May 1999 and November 2005, the Guam legislature enacted more than 20 laws influencing solid waste management.

Regarding privatization, Public Laws 24-06, 24-139, and 24-272 mandate DPW to contract out all operations. Public Law 26-99 again mandates DPW to privatize collection and mandated the separation of Guam into three residential collection zones. Public-private partnerships have the potential to provide great advancements for solid waste management in terms of the improvement of operations and implementation of new technologies. However, it is imperative that careful consideration be given to all aspects of privatization. Viable options must be examined, including those that may not, at first glance, appear to be the most technologically advanced. Environmental and social goals also may counter the use of private business decisions on waste management.

Recycling efforts on Guam must be expanded and improved. The Asian market for both metal and waste paper is booming. Thousands of junk cars have been removed and shipped to recyclers since the 2000 ISWMP. The Guam Public School System has started environmental clubs to address the collection of aluminum cans. Ambros, Inc., of Guam, in collaboration with other local businesses and in coordination with Guam EPA, is currently sponsoring a project to place aluminum can recycling bins in most of the public schools and some private schools by early 2006, and ultimately in all the schools on Guam. Although there appears to be a significant increase in recycling activities on Guam, the Government of Guam must ensure that plans support the integration of increasing recycling business opportunities within all solid waste management activities.

The 2000 ISWMP set performance criteria that can be used to measure whether tasks of the plan were accomplished. These criteria were developed for each of the components of the ISWM system and were based on functional, operational, and legal requirements. Table 1.1 includes key components and general guidance on steps to be taken from the existing solid waste management system in 2000 to a fully implemented integrated system. In general, very few of the proposed activities were accomplished within the transition period. It is therefore critical that this Plan update set guidelines and identify a Solid Waste Authority that is committed to the implementation of all the components of this Plan. The Consent Decree was not a component of the 2000 ISWMP nor is it a local mandate to enforce the implementation of the 2000 ISWMP. But it is a driving force that enabled the implementation of the two key factors of the Plan: the closure of Ordot Dump and the opening of the new landfill.

Table 1.1 Summary of Solid Waste Management Plan Tasks of 2000 ISWMP

Tasks	Description of Activities	Implementation	Present Status	Future Application
Operation at Ordot	Shredder Volume Reduction	DPW	Not done	Carry forward
	Coordination with Closure Design	DPW	Permitted Dec. 2005	Ongoing
New Landfill	Opening Date 2001	DPW	Not done; new opening date by Sept. 27, 2007	Ongoing
Billing and Collection System	Interim Volume Base Fee Determination	DPW	Done	PUC to set fees
	Scales and Related Equipment Used	DPW	Not done; permit requirement	Carry forward
Data Collection	Interim Data Collection Facilities and Strategy	DPW	Not done	Carry forward
	Data Collection Personnel	DPW	Not done	Carry forward
Collection and Transport	Development of Container Standard	DPW	Done	Revise for source separation
	Development of Collection Standards, Rules and Regulations	DPW	Done	Revise for source separation
	Assessment of Fleet Service	DPW	Not done	Carry forward
	Develop Scope of Contract Services	DPW	Not done	Carry forward
	Assign Small Collection Contracts for Organized Subdivisions	DPW	Not done	Carry forward
	Coordinate with DLM to Identify Sites for New Regional Solid Waste Transfer Stations	DPW	Not done	Carry forward; use existing stations where practical
Recycling	Establish Recycling Program	Guam EPA	Not done	Carry forward
	Waiver at Port	Guam EPA, Legislature, Port Authority	Done	Ongoing
	Qualifying Certificate	Guam Economic Development and Commerce Authority	Done	Ongoing
	Recycling Collection Centers at Existing Transfer Stations and Community Centers	DPW, Mayor's office	Not done at transfer stations, and mayors' offices have informal recycling programs	Carry forward
	Grants for Recycling	Guam EPA, University of Guam	Not done	Carry forward
Composting	Establish Chipping/Shredding at Existing Transfer Stations	DPW	Not done	Carry forward
	Develop Interim Rules and Regulations for Composting	Guam EPA	Not done	Carry forward
	Legislation Requiring Government, Landscaping and Ground Maintenance to do Composting	Guam EPA	Not done	Carry forward

The Solid Waste Management Program of Guam EPA issues solid waste permits to all companies engaging in the transport and management of solid waste. Within the last five years, Guam EPA issued 367 solid waste permits as shown in Table 1.2. An increase in the number of solid waste permits shows that local companies are now more aware of the need to properly dispose of and manage wastes. In 2005, there was an increase in the number of companies doing waste processing and storage. In fact, in 2005 there were 11 companies involved with waste recycling, processing, and transfer.

The composition of solid waste has changed in Guam since 2000. However, this has not been measured and studied for more than ten years. In order to capture the current waste composition and the amount of waste going to the planned landfill, a waste composition and characterization study will be performed within the next two years.

Table 1.2 Annual Solid Waste Permits Issued

Permit Type	Collection	Processing	Storage/ Transfer	Disposal	TOTALS
Fiscal Year 2000	61	7	3	4	75
Fiscal Year 2001	65	16	7	4	92
Fiscal Year 2002	45	15	3	3	66
Fiscal Year 2003	22	8	3	2	35
Fiscal Year 2004	28	2	3	2	35
Fiscal Year 2005	38	14	10	2	64

Additional developments and changes in solid waste management on Guam since the 2000 ISWMP are discussed in the following chapters.

CHAPTER TWO: SOLID WASTE MANAGEMENT GOALS AND OBJECTIVES

The goals of this 2005 ISWMP are the following:

- Protect Guam's public health and environment during every aspect of Guam-wide solid waste storage, collection, processing, transfer, and disposal;
- Reduce Guam's waste stream through source reduction, recycling, public education, and other means;
- Privatize DPW's solid waste operations as mandated by Public Laws 24-06, 24-272, and 26-99; and
- Achieve the most appropriate balance of efficient and overall cost-effective integrated solid waste collection, reduction, and disposal systems.

The objectives are organized into four general categories: (1) collection/transport, (2) waste stream reduction, (3) disposal, and (4) management. The objectives are further categorized into five time frames: (1) overdue-range (1998-2003); (2) Ordot Consent Decree range (2004-2007); (3) short-range (years 2005-2009); (4) mid-range (years 2010-2014); and (5) long-range (years 2015-2035). These objectives form the framework of Guam's integrated solid waste management system. They are guidelines by which solid waste management will achieve mandated goals. These objectives do not manifest the level of detail required for implementation, but rather draw upon the performance criteria developed in the evaluation of various component alternatives to outline what should be expected from the ISWM system.

2.1 Collection/Transport

2.1.1 Fully Implement User Charges and Tipping Fees by April 1, 2006 (Overdue-Range)

The implementation of this objective was mandated by Public Law 24-272. Tipping and user fees are deposited into the Solid Waste Operations Fund (SWO Fund) and must be used for solid waste management practices. DPW implemented user charges and tipping fees on December 24, 1998; however, DPW has not been successful in billing and collecting. Between February 1, 2000, and March 2001, DPW fell behind in billing, so the Guam Legislature intervened. With Public Law 26-17, it limited to four months DPW's ability to backbill (billing for a number of prior months), and it required DPW to prorate collection of the fees backbilled before May 2001. Since 2001, DPW has been largely unsuccessful in billing and collecting from an acceptable number of customers. Both DPW and the Department of Administration have encountered difficulties in collecting from some commercial haulers.

Effective fee collection must occur in order to support the cost of service and ensure favorable interest rates on capital debt (e.g., new landfill, HHW facility, transfer

stations, etc.). Moreover, the fees collected during 2000-2005 were not sufficient to pay for the Consent Decree mandated tasks because the SWO Fund did not have a reserve account for such projects. So, in October 2005, the Public Utilities Commission (PUC) approved an interim tipping fee rate adjustment to cover service costs and to create a reserve account for some of the Consent Decree project costs. For a detailed analysis of this fee adjustment and methods and basis for future incremental adjustments to meet Consent Decree mandates, please refer to the PUC Rate Report of September 2005.

2.1.2 Private Contracts for Residential Solid Waste Collection by November 19, 2006 (Overdue-Range and Short-Range)

Privatization of residential collection was mandated in early 1998 by Public Law 24-139. It was further mandated by Public Law 24-272. Four years later, because privatization had not occurred, the Guam Legislature intervened. On June 3, 2002, with Public Law 26-99, it mandated DPW to divide Guam into three solid waste management districts by July 3, 2002, and to contract for collection services in two of the districts by September 2002. DPW has reported progress in structuring a privatization bid offering. DPW has informed Guam EPA that it will issue a request for proposals in March 2006 and a private residential collection contract would be in place by November 19, 2006.

Other financial considerations would be to impose a franchise fee on commercial collections. This element is critical to the smooth and efficient operation of the system and is likely to be subject to public scrutiny and public complaint if mismanaged. Short-term franchises would ensure performance standards and customer service standards are met consistently. Currently, DPW regulations require collection contracts to be short-term (five years or less).

2.2 Waste Stream Reduction

2.2.1 Reduce the Annual Quantity of the Guam-wide Solid Waste Stream by a Minimum of Five Percent through Composting by July 1, 2007 (Overdue- and Short-Range)

Reduction of Guam's solid waste stream was mandated by Public Law 24-272. In fact, the public law specifically sets the minimum reduction at twenty percent through reuse, recycling, and composting of solid waste generated on Guam. The 2000 ISWMP adopted the twenty percent reduction mandate, which was re-affirmed through passage of Public Law 25-175. Moreover, the use of these source reduction and waste minimization methods is discussed as a continuing means of promoting land conservation and diminishing our dependence on landfills.

The 2000 ISWMP estimated that composting could account for a five percent minimum reduction in the generated waste stream by the year 2003. The implementation of this objective will require taking the concept from the drawing board to complete construction and implementation, as there are currently no civilian facilities available for the manufacture of compost from organic wastes. The development of attendant programs and systems, such as public education programs, will be discussed in subsequent sections.

2.2.2 Reduce the Annual Quantity of Guam-wide Solid Waste Stream by Twenty Percent through Diversion at the Source and Recycling at a Material Resource Recovery Facilities (MRRFs) by July 1, 2009 (Overdue- and Short-Range)

It is estimated that recycling can account for at least a thirty percent reduction in the generated waste stream by the year 2009 through the implementation of source separation, separating at transfer stations, MRRFs, and recycling collection centers. Historically and currently Guam recycles less than ten percent of the total solid waste stream generated. This is due in large part to the fact that collection services for recyclables are limited, as are collection/drop-off centers, and that recycling is currently entirely voluntary and without adequate supporting public education programs. Implementation of this component of the 2005 ISWMP will require the construction of one or more MRRFs, more aggressive policies and laws, intensive public education efforts, and increased facilities for collection and processing of recyclable commodities. Details of the alternatives to achieve implementation are included in subsequent sections of this document.

2.2.3 Reduce the Annual Quantity of Guam-wide Solid Waste Stream by Thirty-five Percent through Diversion at the Source and Recycling by July 1, 2018 (Long-Range)

The implementation of this component will be achieved through increased recycling of generated solid waste prior to disposal into the municipal solid waste stream. This increase should be a product of the change in the public's attitude and waste disposal practices resulting from the recommended legislation and enhanced public education efforts initiated for the short range recycling objective. It requires no additional needs beyond minor upgrades to those facilities and systems implemented for the short-range objective.

2.3 Disposal

2.3.1 Final Closure of the Ordot Dump September 23, 2007 (Consent Decree and Overdue-Range)

Public Law 22-115 mandated that the Ordot Dump be closed by April 25, 1997. Public Law 24-139 mandated the Ordot Dump be closed by September 11, 1998, but that date was extended by Public Law 24-272 to April 8, 1999. These aggressive deadlines were not based on a realistic analysis of the tasks required to actually achieve this objective. Based on DPW's realistic assessment of tasks required to meet federal and Territorial requirements, the 2000 ISWMP identified July 1, 2001, as a best case for completing closure. However, the Government of Guam equivocated, and engaged in four years of negotiation with U.S. EPA for a Consent Decree to settle claims for polluting the Lonfit River, and to mandate a schedule for closing the Ordot Dump and opening a Municipal Solid Waste Landfill Facility (MSWLF).

Under the Ordot Consent Decree, closure construction must be completed by October 23, 2007, and the dump must stop receiving waste by the earlier of either the opening of the Layon Landfill or by September 23, 2007. This requires that steps be taken immediately to open a new landfill by committing to pick up the pace of development to make up for lost time and to complete the closure process as scheduled by the

Consent Decree. This component of the 2005 ISWMP will entail implementing the closure design plans, which are complete, and making any necessary modifications resulting from value engineering analysis, which is to be completed by January 2006.

2.3.2 Privatize and Open the Layon Landfill by September 23, 2007 (Overdue- and Consent Decree Range)

Phase I of the 2000 ISWMP (Guam EPA, 1999), which was completed in August 1998, contained three alternative detailed fast-track schedules of planning and construction of the MSWLF. These schedules contemplated a start date of August 1998 and a completion date before the end of 2000. But because no progress was made between 1998 and 2004, the Consent Decree mandated a schedule for site selection and landfill construction. As indicated previously, this crucial solid waste management issue depends greatly on the Government of Guam's determination to take all necessary steps to open the landfill on or before September 23, 2007. This component of the 2005 ISWMP will include at a minimum a new RCRA Subtitle D compliant MSWLF, access road and supporting infrastructure, and waste receiving facilities. It will also include recycling collection facilities and other solid waste management facilities as determined in the rest of this planning document. Specific issues associated with the new landfill facility are addressed in subsequent sections of this document and in the environmental impact statement and supporting design plans and specifications developed over the past two years for the landfill facility.

2.4 Management

2.4.1 Adopt the Planning and Operational Recommendations from the Updated ISWMP by January 31, 2006 (Short-Range)

This objective is the prerequisite for effective continued implementation of the ISWMP. As mentioned previously, several components of the 2005 ISWMP require that immediate action be taken in order to meet the stated target and Consent Decree mandated dates.

2.4.2 Implement an Ongoing, Comprehensive SWM Data Collection, Analysis and Planning Process by July 1, 2006 (Short-Range)

The planning process for solid waste management is dependent on the collection and analysis of data. Facilities and systems that handle solid waste can vary greatly in capacity and effectiveness. The use of improperly sized equipment or systems or poorly planned facilities will only serve to greatly magnify problems associated with the handling and disposal of solid waste. Guam is in critical need of actual data on solid waste generation, collection, storage, diversion, and disposal in order to practice active solid waste management. For these reasons, the implementation of this objective requires short-range execution through the effective and full compliance with permits and operational plans and procedures for all critical facilities, especially those operated by DPW pending privatization. The Consent Decree requires interim or continuing operational permits for this very reason, reinforcing the objectives contained in the 2000 ISWMP.

2.4.3 Establish Guam-wide Solid Waste Management Operations, inclusive of the Military's Collection, Storage, Processing and Disposal Operations by October 1, 2008 (Short-Range)

In order for the solid waste management system to be truly integrated, it should include the consolidation of all solid waste operations on Guam, both civilian and military. The locations of military facilities on Guam with respect to existing Government of Guam solid waste facilities lend themselves to assimilation into an integrated system, providing convenient service points in the northern and southern areas. The 2006-2008 time frame is ideal for consolidation because of the anticipated growth in recycling, the requirement that the permit in 2008. Subsequent sections will detail the plan of implementation for this element of the 2005 ISWMP.

CHAPTER 3: MANAGEMENT OF SOLID WASTE OPERATIONS AND THE FORMATION OF A PUBLIC UTILITY: THE GUAM SOLID WASTE AUTHORITY

This Plan update calls for the transfer of DPW's solid waste duties to a newly formed public utility, the Guam Solid Waste Authority (GSWA or Authority). It reviews the history of Guam EPA's 1999 adoption of a public utility, and DPW's financial and program management. It concludes that the GSWA, with a general manager and a chief financial officer, is the only viable management entity by which Guam can achieve effective solid waste operations.

3.1 Background: 1998-2000

In 1999, after several public meetings, the Guam EPA Board of Directors adopted an Integrated Solid Waste Management Plan (1999 Plan). The 1999 Plan included as Chapter Five "Management Options Analysis," which began with this statement:

The deteriorating effectiveness of the DPW-operated public solid waste collection and disposal systems, coupled with the [outsourcing and tipping fee] mandates of PL 24-272 demand ... a radical change ... to the existing organizational and functional structure [of DPW's solid waste responsibilities]. This [radical change] must be the first step in assuring the efficient and effective implementation of the solid waste management strategy adopted in this plan.

It identified five organizational responsibilities for successful implementation of Guam laws and the ISWMP:

1. **Tipping Fee Management:** Implement and manage the collection, accounting, budgeting and expenditures of the solid waste tipping fees;
1. **Debt Management:** Pursue the financing for capital improvements, operation and maintenance of solid waste facilities;
2. **Outsource Operations:** Contract all solid waste operations as mandated by PL 24-272 (and privatize the new landfill through a finance/design/build/lease agreement as mandated by PL 24-06);
3. **Contract Administration:** Effectively manage contracts with private companies for collection, transfer stations and disposal; and
4. **Environmental Compliance:** Ensure that operations during transition to outsourcing and contractors meet environmental and health laws.

The 1999 Plan reviewed environmental, economic, political and social challenges to implementing the laws and the ISWMP, and compared advantages and disadvantages of: (1) a public utility, the "Solid Waste Management Authority," (2) a "Solid Waste Agency," similar in organization to the former Public Utility Agency of Guam; or (3) DPW management. The 1999 Plan adopted the public utility as the organizational option, and listed the advantages of it to include:

1. **Long Term Debt:** An autonomous public utility would have greater success in borrowing money because the tipping fee revenues would not be subject to transfer by elected or appointed officials;
2. **Regulation by the Public Utilities Commission:** PUC would regulate both the cost of service and standard of service;
3. **Focused Mission:** The public utility would be focused on service to rate payers and not be distracted by other DPW responsibilities;
4. **Privatization:** The utility would not be limited to service contracts, but could enter into agreements for franchises, concessions, joint ventures, etc.; and
5. **Stability:** Policy and operational decisions would be de-politicized.

It also included draft legislation. On December 12, 2000, the Legislature disapproved of the public utility, and removed the Chapter from the final 2000 ISWMP. Public Law 25-275 adopting the 2000 ISWMP stated:

The Plan calls for the creation of a separate government agency to deal with waste management, a function which is adequately performed by the Department of Public Works and *I Liheslaturan Guahan* believes the creation of such an agency would result in unnecessary expense and duplication of effort within the Executive Branch of government.

Consequently, implementation of the ISWMP has been through continued management by DPW. DPW management has been without the benefits of an experienced general manager and chief financial officer, and without autonomous control of revenues, expenses, and financing.

3.2 DPW Fiscal Management of Solid Waste Operations

Between 1999 and late 2005, Guam achieved only a few small steps towards effective fiscal management to support solid waste capital improvements, operations, and environmental compliance. These small steps were driven by (1) U.S. EPA, through the Ordot Consent Decree, and (2) the PUC. The Ordot Consent Decree mandated DPW to prepare and implement a financial plan. The Consent Decree Financial Plan was required to include funding sources and a schedule to secure funds for the design, construction, and operating costs for Ordot Dump closure and landfill development. It also set a schedule that propelled DPW into the PUC rulemaking process. That process resulted in a cost of service analysis (PUC Rate Report), which the PUC's consultant completed in September 2005. The findings and recommendations of these two reports are incorporated into the following review of DPW's management of the tipping fee system, financing and debt, contract administration, rate making, and environmental compliance.

3.2.1 Tipping Fee Management

Although DPW had authority to assess commercial tipping fees starting in 1994 with PL 22-115, it never did so. The first tipping fees were initial commercial and residential rates established in 1998 by PL 24-139. They went into effect on January 1, 1999, the month after the Guam Legislature approved the tipping fee regulations. The regulations require monthly billing and payment within 60 days.

In 1999 irregularities in the law emerged. The commercial haulers complained that their costs of complying were excessive, as they believed that the law required them to convert their billing systems from being based on volume to being based on weight. The village Mayors claimed lack of funds to pay the commercial tipping fees. Also, there was no charge for residential customers who did self-drops at the transfer stations and the Ordot Dump. By the end of 1999, the Guam Legislature had passed two more laws. In PL 25-70, it changed the commercial tipping fee to be volume-based. In PL 25-93, it created: (1) a self-drop fee, (2) a one-year fee exemption for mayors when performing official duties, (3) a "good citizen" exemption for volunteer litter collection events, and (4) authority for the Governor to suspend fees for up to 60 days following a *force majeure*.

In 2000, DPW fell significantly behind in billing customers. In 2001, it met with public resistance when it billed customers for up to fourteen months of prior service. Customers claimed a credit for payments made but not billed, and for DPW's lack of consistent residential pick-up services. Consequently, the Guam Legislature passed PL 26-17 in May 2001. This law (1) limited collection of arrearages between February 2000 and March 2001 to seven months, (2) required DPW to prorate the arrearages into 12 equal payments, and (3) suspended future after-the-fact billing, or "backbilling," for residential service until the reconciliation and prorating had been completed. Further, for residential services after June 2001, the law limited DPW's ability to backbill to no more than four months. Also in 2001, the fiscal year 2002 budget law, PL 26-35, made permanent the Mayors' tipping fee exemption when performing official duties.

DPW's collection of fees continued to be inconsistent. At some point, the Department of Administration (DOA) began administering the billing and collection of the residential fees in addition to the commercial fees. In 2004, the Consent Decree Financial Plan found an anticipated shortfall of \$ 2.2 million in uncollected fees. This finding prompted DPW and DOA to take corrective action. Also by 2004, the billing system needed an overhaul because it had not been purged of inactive accounts.

In September 2005, the PUC Rate Report found that having both DPW and DOA involved in billing and collection was inefficient and would not give much comfort to investors in the bond offering for capital improvements. It also found that DPW had not fully reviewed and purged the customer database of inactive accounts. It recommended that the 2006 management audit evaluate outsourcing billing and fee collection activities.

In 2005, DPW increased the percentage of fees collected from about 25% to over 50%. However, it continues to have difficulty using the fees for solid waste operating expenses. DPW claimed lack of funds to pay for (1) additional solid waste collections after government holidays, (2) equipment repairs, (3) safety equipment and supplies, and (4) environmental permit application fee.

Recommendation: Solid waste operations and the GSWA should retain a general manager and a chief financial officer in early 2006.

3.2.2 Debt Management

The tipping fees were to provide an income source to help pay for the capital improvements needed to close the Ordot Dump and open the landfill. However, it was clear that significant financing would be needed for these and other facilities in composting, recycling, household hazardous wastes, and for transfer stations.

Between December 2000 and 2005, DPW made little progress on financing any facilities. The PUC Rate Report found no reserve account within the Solid Waste Operations Fund. Between 1999 and 2005, when tipping fees had exceeded expenses, the funds were used for other purposes without long-range financial guidelines. It found that significant increases in the tipping fees would be needed to cover the debt service of the bonds or other loans needed to close Ordot and build the landfill. It recommended phasing in tipping fee increases over time. Further, DPW agreed to a PUC requirement that revenues from the rate increase would be held in reserve for Consent Decree tasks.

The Consent Decree Financial Plan provided the first small steps of financial management needed just to support the financing of closure of the Ordot Dump and the construction of the Layon Landfill. It found, however, that tipping fee revenues barely covered operating expenses (truck and equipment purchase, rental and maintenance, salaries and benefits for DPW employees who collected garbage, operated the transfer stations and dump, did billing, etc.). It established a strategy and a schedule for financing Ordot closure and landfill construction. The financing strategy for construction of Ordot closure was revenue-based, private activity bonds, including using any available federal grants and loans to reduce the amount of the bond financing. For the landfill, the strategy was private financing through a design/build/operate/transfer agreement.

The Consent Decree Financial Plan included an implementation schedule. The U.S. EPA's oversight of the Consent Decree prompted DPW into implementing the Consent Decree Financial Plan, and DPW's implementation has been partially successful. However, in February 2005, with a new politically appointed Director, DPW changed course. It abandoned the Financial Plan's schedule for landfill financing to pursue either revenue-based bonds or an asset sale. This change increased the amount of bond debt and the schedule for the Ordot construction bonds. Hence, the bond issuance may not be completed before the April 21, 2006, Consent Decree deadline to award the closure construction contract.

Recommendation: Solid waste operations and the GSWA should retain a general manager and a chief financial officer in early 2006.

3.2.3 Contract Administration

Public Law 17-87 (1985) had authorized DPW to contract out solid waste collection and disposal. By 2002, DPW had not contracted out any solid waste collection services. In June 2002, the Guam Legislature passed PL 26-99, which directed DPW to divide the residential collection system into three geographical districts and then to contract out the collection of two of the three districts within 4 months, by October 2002. It did not.

Customer complaints of inconsistent waste collection services continue to present billing disputes. Hence, the PUC Rate Report recommended that the focused management audit, which will take place in 2006, evaluate whether to outsource all of the collection services.

Administration of contracts for design, construction, and operations of solid waste facilities requires qualified staff with solid waste contracting experience. In May 2004, Governor Camacho received \$309,000 from the U.S. Department of Interior to fund and train three engineers through September 2007 so that DPW would have qualified staff to administer the contracts and oversee the design and construction.

The Consent Decree Financial Plan included staffing with an Engineer Supervisor, an Engineer III, and an Engineer II. However, DPW has never hired the engineering supervisor. It hired two engineers on limited-term appointments, but not in the Solid Waste Management Division. One of the engineers left in August 2005 and has not been replaced; the other has limited work experience.

Instead, DPW has assigned other engineers and non-engineers to work part-time on the Consent Decree tasks. The result has been less than ideal for the island's solid waste management, for other DPW projects, and for Guam EPA. DPW has not provided the staff with professional landfill training. Staff participation has been fragmented between the solid waste tasks and other DPW duties, resulting in tasks being delayed and issues taking longer to resolve. To help make up for the shortfall, Guam EPA has invested an inordinate amount of staff effort addressing issues relating to engineering design, contractor performance, the operations plan in the permit application, public information, proposed legislation, and a lawsuit.

In 2004, Guam EPA and U.S. EPA recommended that DPW retain a solid waste expert to assist it in implementing the Consent Decree tasks, including contract management. After a few inquiries, DPW declined because the costs would exceed \$200,000. In May 2005, during discussions of selling solid waste operations to a private entity(ies), U.S. EPA renewed its recommendation that DPW hire a solid waste expert.

Instead, DPW will contract out for a procurement advisor in early 2006. DPW intends to have the procurement advisor prepare a privatization plan in 2006. The Procurement Advisor is also to assist in the procurement process of contracts for construction and operations of the landfill, Ordot closure and post-closure, and waste collection services. Because Guam EPA has experience in contracting household hazardous waste collection, Guam EPA will continue contract administration of this solid waste component until the Household Hazardous Waste Collection Facility is constructed.

DPW is also responsible for contract administration of abandoned vehicle removal under Article III of the Solid Waste Management and Litter Control Act and recycling under Public Law 27-37 and Public Law 27-148. In 2005, DPW Division of Highways contracted for abandoned vehicle removal through a bid process. However, due to DPW's inexperience in solid waste contracting, DPW awarded a bid to a contractor who did not have a solid waste facility permit.

In addition, in 1998, Public Law 24-246 required DPW to contract out to the highest bidder for a company to purchase recyclable paper from the public. DPW was also to

subsidize the company \$150,000 each year under two-year contracts with funds from the Solid Waste Operations Fund. DPW has never taken action on this requirement. Also, Public Law 24-272 created an Office of Recycling within the Solid Waste Management Division of DPW, with duties to establish recycling demonstration projects, and develop technical expertise in recycling operations. However, DPW has not created the office, in part because of lack of funds to carry out these duties. The Solid Waste Management Division needs permanent full-time employees that are trained in administration of solid waste contracts.

Recommendation: All of DPW's solid waste responsibilities should be transferred to the GSWA in early 2006 and the GSWA should be required to have permanent full-time employees that are trained in administration of solid waste contracts.

3.2.4 PUC Rate Making

The initial tipping fee rates were to last until January 2001, after which the PUC would set rates based on a cost of service analysis and a focused management audit of existing operations. However, PL 25-70 extended the time frame for the initial rates to July 2002, but the PUC did not act to change the rates until October 2005.

The PUC did not set rates until 2005 in part because DPW did not change its organizational structure. DPW lacked experience in rate making before the PUC, and did not plan or implement the actions needed for rate making. It did not budget the funds for the cost of service analysis, and without it, DPW and the PUC had no revenue and expense data upon which to base the rates. In 2003, because DPW had no funds for the analysis, the PUC sent proposed legislation to the Guam Legislature that would ensure the studies would be funded by the tipping fees.

U.S. EPA's oversight of the Consent Decree Financial Plan prompted DPW to contact the PUC in January 2005 regarding rulemaking. As a result, in February 2005 the PUC sent the Guam Legislature its 2003 proposed legislation to fund the cost of service analysis and focused management audit from the tipping fees. The Guam Legislature adopted the changes in PL 28-56. A cost of service analysis was completed in September 2005 (PUC Rate Report) by the PUC's experts.

The PUC set an interim 25% rate increase in October 2005, effective November 1, 2005. The PUC required that the amounts collected for the increase be held in a reserve account to help pay for Consent Decree tasks.

The PUC's expert noted that even with the 2005 rate increase, the rates for all customers are "lifeline" rates. Such rate should apply only to very low-income residential customers. In order to pay for landfill construction and operations and for Ordot Dump closure and post closure care, improve collection services, etc., the expert predicted that the rates for residential customers rates would likely rise to \$27 to \$34 per month by 2007. Some people have claimed that the public will not tolerate such high solid waste fees. They have suggested a new tax, such as a beautification tax similar to the one instituted on Saipan, would be a better method. However, \$27 to \$34 per month residential rates are not uncommon for communities that have to borrow money to build new landfills and close dumps in the past few years, where there were little or no

funds that had been held in a reserve account over time to pay for the capital investments.

The PUC ratemaking process forced DPW to take another small, but important financial management step. The PUC Rate Report recommended that the PUC require routine financial and operational reports from DOA and DPW staff to DPW management. Consequently, DPW agreed to provide the PUC with quarterly revenue and expense reports beginning October 1, 2005.

Recommendation: Solid waste operations and the GSWA should retain a general manager and a chief financial officer in early 2006.

3.2.5 Environmental Compliance

Between December 2000 and 2005, DPW did not outsource solid waste operations, as mandated by laws, to firms with expertise and experience with environmental compliance of solid waste operations. At the same time, it did not hire a solid waste expert or train employees in modern landfill operating procedures and solid waste collection/transport to ensure compliance with environmental and health laws. For example, it did not supply the dump with the requirement of daily cover material. As a result, the dump experienced frequent fires. To pay for the response to the fires, the Guam Legislature appropriated to the Office of Civil Defense over \$200,000 for the May 14, 2001, fire (PL 26-35), and \$250,000 for the October 25, 2002, fire (PL 26-153). The Governor has also issued executive orders declaring an emergency to respond to Ordot fires so that emergency funds could be used to pay the costs to control the fires [e.g., EO 98-07 (May 1998) and EO 98-34 (December 1998)].

As part of the Consent Decree settlement of unlawful leachate discharges to the Lonfit River, DPW paid \$200,000 in civil penalties to the U.S. Treasury in 2004-2005, and by 2008 Guam must expend \$1 million in local funds to conduct regular interim household hazardous waste collection events and to construct and operate a household hazardous waste collection facility. It is likely that Guam will have to pay additional civil penalties for the leachate discharges between the date of the Consent Decree, February 11, 2004, and the date the leachate control and treatment system eliminates the discharges to the Lonfit River.

In November 2005, DPW relocated equipment from the dump to the Dededo quarry. At the same time DPW did not supply the dump with adequate cover material for over two weeks. Consequently, the uncovered waste caused odor and leachate problems and increased the risks of fire. Further, Guam EPA fined DPW \$11,050 for failure to maintain adequate cover material and adequate safety equipment for dump employees.

DPW claimed lack of funds to pay for (1) additional solid waste collections after government holidays, (2) equipment repairs, (3) safety equipment and supplies, and (4) the environmental permit application fee. That is, DPW has not budgeted for the costs of environmental compliance. However, the noncompliance with environmental laws has led to environmental hazards and ultimately to additional costs upon the Government. These monetary penalties and hazard response costs are not budgeted or supported by the tipping fee revenues.

Recommendation: Solid waste operations should be outsourced in early 2006 as required by the Solid Waste Operations Permit. The contractors should be required to have trained management in environmental compliance, including related costs. The contractors should be required to have policies and procedure that include the maintenance of equipment, proper operations and site maintenance and adequate cover material, and trained employees.

3.3 The CCU, Solid Waste Operations and the Guam Solid Waste Authority

By April 2006, DPW must raise and/or borrow over \$10 million, and by November 2006, another \$30 million or more for the capital improvement projects of Ordof closure and the landfill construction. The PUC Report stated:

... a certain level of comfort is achieved for both the [PUC] and [the] investor[s] if interim financial statements for [DPW] are provided and can be assumed reasonably accurate. Further, GEDCA believes that due to the government of Guam's poor bond rating, segregating the revenue pledged for repayment of the special revenue bond as far as possible from the General Fund will make the bond offering more attractive to investors.

DPW faces similar financial management challenges that GWA and GPA faced in 2002. The result was the formation of the Combined Commission on Utilities (CCU) to oversee management of these agencies. The CCU did not exist in 2000 when the Guam Legislature found that creating a Board of Directors to oversee the Solid Waste Management Authority would be duplicative. The CCU has demonstrated success in overseeing contracting and financial management of the Guam Power Authority and Guam Waterworks Authority. Therefore, extending the CCU's powers to the solid waste operations can be achieved without unnecessary expense and without expanding government.

In addition, experience has shown that demands placed upon DPW management regarding roads, buildings, school buses, and assisting Mayors have impeded adequate implementation of its solid waste duties under the Solid Waste and Litter Control Act and recycling laws. The necessary comprehensive and radical management changes have also been impeded by the frequent changes in the politically appointed Director, and the Government's resources dedicated to litigating with the United States about Ordof's pollution, to siting a landfill at Layon, and to the design of both the landfill and Ordof Closure. Consequently, Guam has fallen significantly behind the standards of solid waste management for developed communities that are comparable to Guam in terms of population, solid waste composition, and solid waste volume. Therefore, extraordinary changes are needed to Guam's solid waste operations in 2006 and continuing into 2007.

The extraordinary changes extend well beyond tipping fee billing and collection. In order to obtain favorable bond rating or other financing, the revenue stream needs to be independent and not subject to reallocation. That can only be accomplished through an autonomous agency and its revenue. Significant management changes are needed for contract administration, not just for landfill operations and closure, but also for solid waste collection, solid waste separation, recycling, household hazardous waste

operations, and transfer stations. Therefore, the GSWA should have a general manager who can effectively transition solid waste operations into an integrated and well-managed system of contract administration, billing and fee collection, and recycling activities.

Finally, experience has shown that GPA and GWA have benefited from the expertise of a chief financial officer. Therefore, because of the significant funds needed for capital improvements, and the complexity of financial management, the GSWA should have an experienced chief financial officer.

Recommendation: In early 2006, the Guam Legislature should pass legislation creating the Guam Solid Waste Authority, a public utility overseen by the CCU. The legislation should: (1) transfer all DPW solid waste responsibilities and duties to the GSWA, (2) require the CCU to hire a general manager and a financial manager for the GSWA as soon as possible, (3) require the GSWA to have full-time staff trained in managing solid waste contracts, (4) require that all solid waste contractors have trained management in environmental compliance, including related costs, (5) require all solid waste contractors to have policies and procedures that include the maintenance of equipment, proper operations and site maintenance and adequate cover material, and trained technical employees, and (6) require data collection, analysis, and synthesis by the GSWA and all solid waste contractors.

3.4 Data Collection Needs

Management of the solid waste operations will depend heavily upon the data produced for collection, transport, disposal, recycling, special waste, and public education. Thus, the need in this category is not so much data collection as it is data analysis and synthesis. For example, waste composition data not only would help set recycling priorities, it also helps define the scope and magnitude of the recycling that is achievable. This information will be helpful in contract negotiations and contract administration.

3.5 Performance Standards

3.5.1 Billing and Fee Collection

- A. The billing and fee collection system shall be designed and operated to accommodate the efficient coordination of various private contracted operators.

Basis: PL 24-06, PL 26-99 and 2005 ISWMP.

- B. The billing and fee collection system shall be designed and operated to work in conjunction with a data collection system to optimize coordination and efficiency.

Basis: Billing and collection operations will involve activities similar to those conducted as part of the data collection operations.

- C. The billing and fee collection system shall be expandable to include rate increases, any processing fees or payouts, or any subsidies associated with other components of this 2005 ISWMP.

Basis: A flexible system can incorporate subsidies such as grants or beautification tax, and other new revenue sources, as well as payouts for cancelled service or recycling refunds.

- D. The billing and fee collection system shall be maintained by Government employees or through a contract separate from the contracts for solid waste collection and disposal.

Basis Collection, disposal, and other contractors should focus on performance, not fee billing and collection. Accountability for collection and for performance is easier with separate contracts.

- E. Funds generated through the collection of tipping fees and user charges must be used for the closure of Ordot, opening of the new landfill and for other solid waste management practices (operations), the PUC's regulatory costs and expenses, and the recyclable paper contract.

Basis: Public Laws 24-246 and 28-56.

- F. Regulations regarding payment due date and fines for failure to pay should be revised.

Basis: Under regulations adopted by PL 24-313, fees are due 60 days after billed, which is supposed to be billed at the first of the month for the previous month. DPW does not follow this rule. It sends out booklets with coupons for 12 months and requires payment each month. Also, many communities require prepayment for solid waste services. Also, there are no provisions for interest or penalties for late payments.

3.5.2 Debt Management

- A. GSWA's general manager and chief financial officer provide accountability through monthly reporting to CCU on debt management.

Basis: New legislation amending 12 GCA Chapter 79, CCU order or resolution.

- B. GSWA's general manager and chief financial officer provide proof of timely payments of interest on bonds, loans, etc., through monthly financial reports to the CCU and quarterly financial reports to the PUC.

Basis: New legislation amending 12 GCA Chapter 79, and PUC orders.

3.5.3 Contract Administration

- A. CCU review and approval of all contracts.

Basis: New legislation amending 12 GCA Chapter 79.

- B. GSWA obtains general manager with solid waste contracting experience.

Basis: New legislation amending 12 GCA Chapter 79.

- C. Training plans for the GSWA staff shall be developed and budgeted by GSWA general manager and approved by CCU.

Basis: New legislation amending 12 GCA Chapter 79.

3.5.4 PUC Rate Making

- A. GSWA's general manager and financial officer shall provide timely reports and information on costs of service, debt service needs, and other information to the PUC.

Basis: PUC orders.

3.5.5 Environmental Compliance

- A. Employee and contractors working and managing the Ordot Dump facility, including closure construction, shall be trained in environmental compliance.

Basis: Ordot Dump solid waste disposal permit for continued operations to closure, closure design and construction, and post-closure operations and maintenance, Guam solid waste regulations, and government contracts.

- B. Contractors of landfill design, construction, and operations shall be trained in environmental compliance.

Basis: 10 GCA Section 51104; PL 24-06; solid waste facility permit for Layon design, construction, and operations; Guam solid waste regulations; and government contracts.

- C. Employees and contractors for solid waste transfer stations shall be trained in environmental compliance.

Basis: 10 GCA Section 51104; solid waste facility permits for transfer stations; Layon design, construction, and operations; Guam solid waste regulations; and government contracts.

- D. Contractors for abandoned vehicle removal and other government contracts for recycling collection and/or processing of recyclable materials and compost shall be trained in environmental compliance.

Basis: 10 GCA Section 51104; solid waste facility permits; Guam solid waste regulations; and government contracts.

CHAPTER FOUR: EXTENDED SOLID WASTE PROJECTIONS

Data provided by the government and used for the 2000 *Integrated Solid Waste Management Plan for the Island of Guam* were approved by the Legislature were updated to provide the following:

- Corrected municipal solid waste (MSW) generation rates (based on *Guam Solid Waste Weight Composition and Recycling Feasibility Study* by Barrett Consulting Group [Guam EPA, 1995] and *Guam Landfill Final Site Selection Report* by Duenas and Associates, Inc. [Department of Public Works, 2005]).
- Population projections (based on U.S. Census data and projections by Department of Public Works [2005] and D.E. Consulting [2005]).
- MSW composition projections (based on Department of Public Works [2005])
- MSW source projections (based on Department of Public Works [2005])

These criteria were developed for the planning horizons of five, ten, fifteen, and twenty years. However, the key components of municipal solid waste management implementation often have life spans of greater than twenty years. Analyses of these components, especially in regard to their role in disposal and volume reduction of the waste stream, requires projections beyond the planning horizons stated. For this reason additional projections were made, arriving at the data detailed in the following Sections.

4.1 Population Projections

Solid waste load projections for this 2005 ISWMP are based on the population contributing to the waste stream. In order to make the necessary projections for the analysis and comparison of disposal and volume reduction alternatives, annual population numbers were needed to the year 2035. For determining the final numbers to be used in evaluating disposal options, the military populations are included. This is in contrast with the 2000 ISWMP, which used the sum of resident and non-resident populations, less the on-base military component.

Table 4.1: Population of Guam: 1960 to 2000 based on US Census results

Year	1960	1970	1980	1990	2000
Population	67,024	84,996	105,979	133,152	154,805
Increase	n/a	26.8%	24.7%	25.6%	16.3%

For this 2005 ISWMP, it was noted that population growth for Guam over the last sixty years, which appears to consistently increase through census periods, has not really been linear or fitting a typical formula for many reasons. It has, therefore, been unpredictable. Military build-ups in World War II, the Vietnam War, and expected increases due to Asian political tensions have been countered by military downsizings

affecting the military sector of the total population. These updated projections consider that the Department of Defense installations should not have separate landfills, as their current facilities become filled, but their populations and waste generation are included in the island-wide projections. Greatly increased immigration from the Federated States of Micronesia and the Republic of the Marshall Islands has arisen since their independence and treaty status as Freely Associated States of the U.S. in 1986 and likewise from Palau since 1994. Also flows of immigrants able to enter the U.S. are not limited as to numbers entering Guam, which is an easy and cheap entry point for nearby Asian countries. But, as the economy slowed in the last decade, there has been a major out-migration of Guam residents, often finding improved conditions elsewhere in the U.S.

Therefore, forecasts for future populations cannot be as accurate as one might desire. It is safer for these to be considered between ranges of likely numbers.

In 2000 the population was 154,805. Based on the projections of the 2005 DPW Final Site Selection Report (FSSR) that twelve percent of Guam’s population relocated off-island between 2000 and 2003, and factoring an annual increase of two percent since then, the population in 2005 was estimated to be 141,732. Projections to 2010 indicate the population will continue to grow to 156,484. A continued application of this annual rate of growth gives populations of 172,771 for 2015, and 190,753 for 2020. These projections are shown in Table 4.2, with the additions of estimated equivalent daily visitor populations, based on increasing visitor numbers. The annual visitor arrivals for 2010 are estimated to be 1.5 million and increases per decade after then are set at 0.5 million.

Table 4.2: Guam Population Projections for years 2010, 2015 and 2020

YEAR	2010	2015	2020
POPULATION + VISITORS	160,319	177,565	196,232

For more distant future projections, ranges are safer to use. Recognizing longer decennial trends from past censuses of 16%, 20% and 25% increase rates, and Guam’s potential to sustain growth, these rates are applied to projections in Table 4.3 for years 2025, 2030, and 2035 [Department of Public Works, 2005].

Table 4.3: Guam Population Projections for years 2025, 2030 and 2035

YEAR	16%/decade	20%/decade	25%/decade
2025	205,819	209,630	214,395
2030	221,065	228,688	238,216
2035	238,750	251,556	267,993

4.2 Solid Waste Generation Rates

Once population is known, a per capita per day (pcd) solid waste generation rate can then be applied to the population figure to develop total generation for any given period. DPW’s revised estimates of generation rates use a low value of 4.4 pounds pcd which is the national average, and a high value of 5.28 pcd, which is 20% over the national average. This 2005 ISWMP uses the high value of 5.28 pcd. The projected generation data are presented in Tables 4.4 and 4.5.

Table 4.4: Waste Generation at 5.28 pcd, diversion 2% and soil cover 20%

YEAR	Total Population	Tons/Year Waste Generated (High Rate in Tons per Yr)	Tons/Year Waste Diverted from Waste Stream	Tons/Year of Residual Waste from MRF (To Be Landfilled)	C.Y./Year Waste to MSWLF from MRF (1,100 lbs/C.Y. in MSWLF)	Landfill Volume Required C.Y./Yr (Waste + Soil)	Landfill Accumulated Volume C.Y. (Waste+Soil)
2007	150,717	145,231	2,905	142,327	285,776	323,470	323,470
2008	153,656	148,258	2,965	145,293	264,169	330,211	653,681
2009	157,058	151,342	3,027	148,315	269,663	337,079	990,759
2010	160,319	154,483	3,090	151,393	275,261	344,076	1,334,835
2011	163,640	157,684	3,154	154,530	280,964	351,205	1,686,040
2012	167,024	160,945	3,219	157,726	286,774	359,468	2,044,508
2013	170,472	164,267	3,285	160,982	292,694	365,868	2,410,376
2014	173,986	167,652	3,353	164,299	298,726	373,408	2,783,783
2015	177,565	171,102	3,422	167,680	304,872	381,090	3,164,873
2016	181,157	174,563	3,491	171,072	311,040	388,800	3,553,674
2017	184,819	178,092	3,562	174,530	317,327	396,658	3,950,332
2018	188,551	181,688	3,634	178,054	323,734	404,668	4,355,000
2019	192,355	185,353	3,707	181,646	330,266	412,832	4,767,832
2020	196,232	189,089	3,782	185,307	336,923	421,153	5,188,986
2021	200,880	193,568	3,871	189,696	344,903	431,128	5,620,114
2022	205,634	198,149	3,963	194,186	353,066	441,332	6,061,446
2023	210,498	202,836	4,057	198,779	361,416	451,770	6,513,216
2024	215,473	207,630	4,153	203,477	369,959	462,448	6,975,665
2025	220,563	212,534	4,251	208,284	378,698	473,372	7,449,037
2026	225,267	217,067	4,341	212,725	386,774	483,467	7,932,504
2027	230,067	221,693	4,434	217,259	395,017	493,771	8,426,274
2028	234,968	226,415	4,528	221,887	403,430	504,288	8,930,562
2029	239,969	231,235	4,625	226,610	412,018	515,023	9,445,585
2030	245,075	236,154	4,723	231,431	420,784	525,980	9,971,564
2031	250,882	241,750	4,835	236,915	430,754	538,442	10,510,006
2032	256,823	247,475	4,949	242,525	440,955	551,194	11,061,201
2033	262,903	253,333	5,067	248,267	451,394	564,243	11,626,443
2034	269,124	259,328	5,187	254,142	462,076	577,595	12,203,038
2035	275,491	265,463	5,309	260,153	473,006	591,258	12,794,296
2036	282,005	271,740	5,435	266,305	484,191	605,239	13,399,535
2037	288,671	278,163	5,563	272,600	495,637	619,546	14,019,081

Table 4.5: Waste Generation at 5.28 pcd, diversion 15 to 42% and soil cover 20%

YEAR	Total Population	Tons/Year	Percentage of Waste Diverted	Tons/year Diverted	Tons/Year to Landfill	C.Y./Year to Landfill	C.Y. Waste+ Soil/Year	Accum. C.Y./Year
2007	150,717	145,231	15%	21,059	127,173	225,769	282,211	282,211
2008	153,858	148,258	15%	21,497	126,761	230,474	288,092	570,303
2009	157,058	151,342	15%	21,945	129,397	235,267	294,084	864,303
2010	160,319	154,483	15%	22,400	132,083	240,151	300,189	1,164,576
2011	163,640	157,684	19%	29,960	127,724	232,225	290,182	1,454,857
2012	167,024	160,945	19%	30,579	130,365	237,028	296,285	1,751,142
2013	170,472	164,267	19%	31,211	133,056	241,921	302,401	2,053,543
2014	173,986	167,652	19%	31,854	135,798	246,906	308,633	2,362,176
2015	177,565	171,102	19%	32,509	138,592	251,986	314,983	2,677,158
2016	181,157	174,563	24%	41,022	133,541	242,802	303,502	2,980,660
2017	184,819	178,092	24%	41,852	136,240	247,709	309,636	3,290,297
2018	188,551	181,688	24%	42,697	138,991	252,711	315,889	3,606,186
2019	192,355	185,353	24%	43,558	141,795	257,809	322,262	3,928,447
2020	196,232	189,089	24%	44,436	144,653	263,006	328,757	4,257,205
2021	200,880	193,568	28%	54,199	139,369	253,398	316,747	4,573,952
2022	205,634	198,149	28%	55,482	142,667	259,395	324,244	4,898,196
2023	210,498	202,836	28%	56,794	146,042	265,530	331,913	5,230,109
2024	215,473	207,630	28%	58,136	149,494	271,806	339,758	5,569,867
2025	220,563	212,534	28%	59,510	153,025	278,227	347,783	5,917,651
2026	225,267	217,067	33%	70,547	146,520	266,400	333,000	6,250,651
2027	230,067	221,693	33%	72,050	149,643	272,078	340,097	6,590,748
2028	234,968	226,415	33%	73,585	152,830	277,873	347,341	6,938,089
2029	239,969	231,235	33%	75,151	156,083	283,788	354,735	7,292,824
2030	245,075	236,154	33%	76,750	159,404	289,826	362,282	7,655,106
2031	250,882	241,750	37%	89,447	152,302	276,913	346,141	8,001,247
2032	256,823	247,475	37%	94,566	155,909	283,471	354,339	8,355,586
2033	262,903	253,333	37%	93,733	159,600	290,182	362,727	8,718,314
2034	269,124	259,328	37%	95,951	163,377	297,049	371,311	9,089,624
2035	275,491	265,463	37%	98,221	167,241	304,075	380,094	9,469,719
2036	282,005	271,740	42%	112,772	158,968	289,032	361,291	9,831,010
2037	288,671	278,163	42%	115,438	162,726	295,865	369,831	10,200,841

4.3 Projected Landfill Capacity Requirements

4.3.1 Factors Affecting Landfill Capacity

It is the ultimate goal of solid waste management to properly dispose of waste that survives diversion, source reduction and volume reduction systems. Deposition of such waste in a sanitary landfill in compliance with Guam law is the proper means of disposal. It is therefore important to understand the magnitude of the quantity of solid waste that must be managed, a portion of which will eventually be disposed of in a sanitary landfill. This waste quantity is best expressed in terms of the projected landfill capacity or volume in cubic yards for the planned life of the landfill in years.

Projected landfill capacity / volume is determined by the following factors:

1. The quantity of municipal solid waste projected to be generated within the planning period, commonly expressed in terms of tons per year.
2. The volume of the solid waste stream, which is reduced through diversion, recycling, composting and/or incineration, expressed in terms of tons per year.
3. The density of properly compacted, landfilled solid waste, commonly expressed in terms of pounds per cubic yard. The density of compacted solid waste varies from 750 to 1,200 pounds per cubic yard, depending on the degree of compaction. Light compaction of waste will yield densities at the lower end of the range and heavy compaction at the upper end of the range. An average density of 1,100 pounds per cubic yard (0.55 tons/cy) of compacted solid waste was used to project landfill volumes [Guam DPW 2005(a)].
4. Daily soil cover volume expressed in terms of a percentage of the total compacted waste plus soil cover volume or:
$$\frac{[\text{daily soil cover (cubic yards)} \times 100]}{[\text{daily soil cover (cubic yards)} + \text{compacted waste (cubic yards)}]}$$

Twenty percent of the total volume of waste plus compacted waste will be used to determine the volume of daily soil cover.
5. The solid waste disposal planning period expressed in terms of years. A term of thirty years was used as the basis for determining required landfill capacity / volume.

4.3.2 Landfill Capacity Projections

4.3.2.1 Landfill Volume Projections

Landfill volume requirements were generated as a part of the Department of Public Works 2005 Guam Landfill Final Site Selection Report (FSSR). The FSSR's volumetric projections are for the years 2007 to 2037 located in Tables 4.4 and 4.5.

The information in Tables 4.4 and 4.5 is based on the following assumptions and industry standards:

1. Population projections by Department of Public Works (2005a).
2. For Table 4.4, a nominal two percent waste reduction through composting, recycling, etc. It is anticipated that Guam currently achieves a waste reduction rate greater than two percent. In Table 4.5, waste reduction increases over time from 15% to 42%.
3. A compacted solid waste density of 1,100 lbs/yd³ or 0.55 tons/ yd³.
4. A 20% ratio of (compacted soil cover) to (compacted soil cover + compacted waste).
5. A minimum landfill life of thirty years.
6. A waste generation rate of 5.28 lbs/capita/day (pcd). The 5.28 pcd waste generation rate is 20% above the national average.

Based on the above parameters, the landfill must have a minimum capacity of approximately 14.0 million cubic yards.

4.3.2.2 Landfill Volume and Life Expectancy

The 40% Layon Landfill Design of August 2005 (TG Engineers, 2005) provides approximately 18.1 million cubic yards of capacity assuming a compacted solid waste density of 1,200 lbs/yd³. This is a 4.1 million cubic yard increase over the minimum required capacity of 14.0 million cubic yards. This increases the projected landfill life to approximately 51 years, which is 20 years greater than the minimum 30-year life.

As the Layon Landfill Design progresses to a 100% stage, the volume and life expectancy for the landfill will be refined. In addition to this, obtaining accurate and consistent solid waste generation and composition data at the Ordot Dump in 2006 until closure in September 2007 will provide essential data for solid waste planning and management on Guam

4.3.2.3 Updated Landfill Volume Requirements

We have updated the solid waste generation projections and have determined landfill volume requirements based on the following assumptions:

1. Updated population and solid waste generation rates and volumes as presented in §§4.1 and 4.2.
2. Continuation of the minimal solid waste diversion rate of two percent of the solid waste stream. The use of a minimal diversion rate will reveal the magnitude of the volume of solid waste which Guam must dispose in a landfill if no significant volume reduction systems are implemented.

3. A density of 1,100 pounds per cubic yard of compacted solid waste.
4. A daily soil cover volume percentage of waste plus cover volume of twenty percent.
5. A landfill life or planning period of thirty years, with 2007 as the base year for the opening of the new MSW landfill at Layon.

A volume of 14.0 million cubic yards of landfill capacity is projected to be used by the year 2037.

4.4 Volume of Recyclables in Guam's Solid Waste Stream

The percentage of Guam's civilian municipal solid waste stream consisting of materials which are considered to be recyclable or compostable is substantial. Calculations based on the latest data, which depends on the old 1993 data from W.B. Flores and Associates work (Guam Environmental Protection Agency, 1995), is estimated to exceed three-fourths of the waste stream over the planning period. Among the recyclables and compostables, paper and paperboard make up between thirty-eight percent (38%) to forty percent (40%) of the total MSW stream, followed by plastics (13.5% to 15.9%) and food wastes (10% to 12%). The large percentage of recyclable/compostable material in the waste stream provides optimism that large-scale, integrated, and well-executed programs for recycling and composting will significantly reduce the volume of Guam's solid waste.

CHAPTER FIVE: COLLECTION AND TRANSPORT

5.1 Collection and Transport

In order to assure the successful implementation of this plan through waste diversion and minimization of the waste to be landfilled, the collection and transport methods must support source separation, recycling, and composting. Through the use of appropriate collection strategies, waste diversion, user fee billing and collection, data collection, and other key components should be enhanced. Final implementation of the selected collection and transport methods must be coordinated with the specific requirements of the receiving facility [Materials Resource Recovery Facility (MRRF), transfer station, and landfill] to ensure proper integration. The current plan for collection and transport requires the discussion and evaluation of three (3) categories of collection and transport: commercial, residential and government. This discussion is presented in the following sections.

5.2 Commercial Collection

Currently, commercial collection poses a multitude of options with regard to methods, as these services are provided by private, non-government haulers. However, the need for these services to support and promote recycling is crucial to the success of Guam's recycling-based ISWMP. The extent to which the commercial collection operations can be controlled or modified, to enhance recycling and composting, is limited to: (1) conditions placed upon the operations as part of the Guam EPA solid waste management permitting process; (2) rules and regulations of the MSW receiving facility (i.e., transfer station, MRRFs, and landfill); and (3) laws or mandates promulgated by *I Liheslaturan Guåhan* applicable to commercial generators.

This planning document is not intended to dictate the style and methods of operation for private business enterprises. However, the development of an integrated solid waste management plan requires the establishment of standards, rules, or procedures that relate to the collection of solid waste with the intended waste diversion and disposal operation to ensure that the ISWMP objectives for recycling and composting are achieved and maximum benefit is derived. Adaptation of existing commercial collection operations to these standards, procedures, and objectives is left to the forces of market competition.

As we have selected recycling, composting and landfilling as the recommended waste diversion and disposal options, the collection and transport methods must maximize diversion of recyclables and compostables prior to their introduction into the municipal solid waste stream, and also maximize the extent to which the waste delivered to the receiving facility is amenable to material recovery. Reduction of total waste stream volume prior to collection implies the application of source separation of recyclable materials and compostable wastes. This type of activity conducted for the outgoing waste stream can be considered as preparatory work for the material entering the MRRFs. The execution of such preparatory work will greatly increase the amount of recoverables by avoiding volume lost due to poor condition and will reduce operational and maintenance expenses by reducing processing required prior to shipment of recyclables to market. Commercial collection shall incorporate these activities or be controlled and modified so as to ensure that they are performed.

The waste management strategy for this component will be influenced and managed through the implementation of mandatory source separation regulations and solid waste management operation (collection, transfer and landfilling) permit requirements. These management tools can effectively require commercial "curbside" collection to capture large quantities of recyclables and raw compost before they enter the solid waste stream as discards or are mixed with other components of the MSW stream. Many commercial generators are currently working with waste haulers to source separate their waste voluntarily.

The collection and transport of commercial MSW will be more clearly understood by examining the requirements of collection from the generators' point of view. Commercial generators will be required to separate wastes into seven categories:

1. Recyclables: Aluminum, glass, tin cans, plastic, paper
2. Green Waste: Vegetation cuttings from landscaping
3. Bulky Waste: Furniture, electronics
4. White Goods: Refrigerators, washer/dryer, air conditioning units, dishwashers, microwaves, ovens/stoves
5. Refuse: Solid waste that is either putrescible or does not belong in the other waste streams
6. Metal: Metal waste other than automobiles or does not belong in the other waste streams
7. Hazardous Waste: Waste defined to be hazardous according to regulations.

The commercial community is somewhat familiar with the majority of these categories because source separation is ongoing. However, this plan recognizes that education and a phased approach will be necessary. Transfer stations will be used to consolidate and transfer wastes from collection vehicles to transport vehicles or direct haul will be utilized for landfilled waste. Means and methods for collection and transport of commercially generated source separated wastes will be determined by market competition. They may also outsource to private companies for collection and transport of waste. New legislation is needed for the mandate of waste separation at commercial establishments to include the definition of specific waste streams.

5.2.1 Mandatory Source Separation

Currently commercial generators are not required to separate recyclable materials from their solid waste. This Plan advocates universal source separation and collection to the greatest extent possible. There are two approaches to achieve source separation: mandatory requirements and market incentives. Mandatory requirements would be implemented through laws or permit conditions. Market incentives could include purchase of recyclable materials, refunds, higher disposal fees, a beautification tax, or other tax incentive.

Source separation legislation will serve to ensure that recycling and composting become the primary focus of solid waste operations at commercial establishments (Public Law 24-313 addresses residential mandatory recycling). The purpose of such legislation should be to facilitate the effective and efficient operation of the selected volume

reduction or disposal method. It should incorporate general requirements of the receiving waste facility in terms of incoming waste categories (dry recyclables, wet compostable wastes, other MSW), and it should allow for more intensive voluntary separation. The legislation should also provide penalties for those establishments whose waste streams delivered to the facility do not meet established standards for incoming wastes.

Passing legislation that will require the source separation of recyclable and compostable wastes at commercial establishments will accomplish the following:

- **Increased Recycling and Composting:** The implementation of source separation practices will result in the immediate availability of more recyclable commodities than has ever been achieved previously. There will be a dramatic increase in "supply" of products available for brokers or recyclers. It will also mean the availability of material for composting operations.
- **Avoided Costs:** Source separation has the potential to lead to lower or avoided landfill tipping fee costs to the commercial entity should the separated wastes be diverted from the MSW waste stream to the transfer station or MRRF.
- **Provide Incentives for Recycling-Based Industries:** The immediate increase in supply of recyclable commodities may act to remove constraints upon businesses or industries that rely upon a continuous supply of such commodities for the success of their operation. Without such a supply, these enterprises will not be able to establish efficient and sustainable business operations.
- **Disposal Practices and Awareness of Solid Waste Management Issues:** Requiring source separation will impose changes upon the operations at commercial establishments. More attention will have to be paid to what is disposed and how it is disposed. This simple change will bring about more awareness of conditions surrounding the solid waste system. Disposal practices at the workplace will change, and such changes will make their way to the home and have a beneficial effect on residential waste disposal practices.

5.2.2 The Recommended Commercial Collection and Transport Method

Commercial generators are encouraged to implement source separation of as many recyclable materials as possible. Guam EPA and DPW should explore partnerships with commercial generators and are encouraged to include collection of recyclable materials in the contracts with commercial collectors. If source separation of commercial waste has not progressed significantly by October 2007, then Guam EPA should pursue mandatory source separation requirements through regulations and legislation, such as excluding recyclable material from the landfill, mandatory separation statutes, beautification taxes, and special fees.

5.3 Residential Collection

Residential collection of MSW has historically been performed by the local government and provided free of charge to single family homes. However, over the last several years the Department of Public Works has been under mandates (PL No. 24-272, 24-313, 26-99) to incorporate the privatization of residential solid waste management and recycle twenty percent of this waste. The legislative mandates embodied in Public Laws 23-64, 24-272, and 26-99 call for the privatization of residential collection operations. The Department of Public Works shall implement the Solid Waste Management Plan and privatize Guam's Solid Waste Management System subject to all applicable laws, including Public Laws 24-06 and 26-99. Public Law 24-313 adopted DPW's regulations for solid waste collection and transport. It specifies in Section 104 that recyclables will be collected separately, and Section 109 (a) states that the contracting of services shall be made to meet service requirements that cannot be met by the Department of Public Works (i.e., comprehensive residential waste collection throughout the island).

As a result of the development of this 2005 ISWMP, the following collection model for residential waste management should be put into operation as the various components of the integrated solid waste management system become operational over the next several years.

The collection and transport of residential MSW will be more clearly understood by examining the requirements of collection from the generator's point of view. Residential generators will be required to separate waste into seven categories:

1. Recyclables: Aluminum, glass, tin cans, plastic, paper
2. Green Waste: Vegetation cuttings from trees, plants, grass and leaves
3. Bulky Waste: Furniture, electronics
4. White Goods: Refrigerators, washers/dryers, air-conditioning units, dishwashers, microwaves, ovens/stoves
5. Refuse: Solid waste that is either putrescible or does not belong in the other waste streams
6. Metals: Metal waste other than automobiles or that does not belong in the other waste streams
7. Household Hazardous Waste: Waste defined to be hazardous according to regulations.

The residential community is somewhat familiar with the majority of these categories as a result of recent storm debris cleanups. However, it is recognized in this plan that education and a phased approach will be necessary. Collection will likely be conducted by regional contractors. Transfer stations will be used to consolidate and transfer waste from collection vehicles to transport vehicles. New legislation is needed for the mandate of waste separation at the curbside, to include the definition of specific waste streams.

5.3.1 Mandatory Source Separation with Curbside Collection of All Waste Streams, and Drop-Off and Collection Capability at Transfer Stations

This Plan for collection will involve the separation of MSW at the source (residential customer) into a number of predetermined categories of waste with the addition of dedicated recyclable drop-off and collection facilities at all transfer stations (and possibly other locations as well). The purpose of source separation is to facilitate the sorting of recyclable commodities and compostable materials and to minimize the adverse effects associated with mixed MSW. Examples of these categories include dry recyclables (paper/paperboard, cans, bottles, and plastics), wet compostable material (green waste), white goods, bulky waste, metals, household hazardous waste, and the remaining MSW.

These separated wastes may be placed into designated containers or location, supplied by the collector and stationed on the curbside at the scheduled time for regular collection. Multi-compartment collection vehicles may be used to gather separated wastes for transport to either the MRRF or a regional solid waste transfer station. MSW can be collected using typical packer trucks. If the wastes are taken to a regional solid waste transfer station, the compartments for recyclables will be emptied into roll-off containers for transport to the MRRF. For MSW and wet compostable materials, roll-off compactors or other means of compaction may be used to maximize transport efficiency.

The general public will be required to make a shift in the manner in which they dispose of their MSW. Separation at the source will require extra effort on the part of the consumer. People will have to be more aware of what they are throwing away and where they throw it. They will need to learn the types of materials that are acceptable for each category of waste – what is recyclable, what is compostable, what should be landfilled, what can be reused. In short, there will need to be an increase in the awareness of solid waste management issues. Public acceptance of this may be more challenging than the historical practice; however, acceptance and understanding will increase over time as increased awareness and public education take effect.

As with mixed MSW, dedicated containers will be provided for each waste category as appropriate. Other waste containers should be appropriate for the collection vehicle. User fees for the collection of the separated wastes could be charged on a unit cost basis with increases in price for collection of containers beyond the allocated number. These user charges can also be structured to provide for credits for recyclables diverted from the collected waste stream through private recycling facilities or the MRRFs.

The residential collection schedules will continue for municipal solid waste destined for the landfill. However, additional, less frequent, collection schedules for white goods, green waste, and bulky waste will be added so that pickup is comprehensive at the “curbside” of each residential location.

The drop-off and collection service at transfer stations is the alternative to curbside service. The transfer stations will be equipped with containers for specific recyclable commodities, serviced regularly by either a commercial recycler or a commercial hauler

as part of a contract for such services. These services, at a minimum, will be located at transfer stations.

If the transfer stations are operated by commercial recyclers, they may take all recyclable commodities obtained to their own processing facility. If the transfer stations are operated by a commercial hauler under a contract to provide regional collection and transport services, the recyclables will be transported to the MRRFs.

The inclusion of drop-off and collection of compostable wastes at facilities such as these is possible if strict adherence to storage rules and regulations is observed to control odors and disease vectors. Ideally, managed facilities, such as the transfer stations, will be primary drop-off and collection locations of compostable wastes.

Judicious placement of these transfer stations and supporting public education efforts will go a long way in changing the disposal habits and practices of Guam residents. While it is anticipated that the drop-off and collection locations will be useful for those who elect to recycle and may not want curbside collection services, these types of users are already aware of solid waste issues and are doing their part. The potential to promote awareness and change disposal patterns among the public park, beach, and baseball field users, as an example, is perhaps the greater benefit and incentive to implement this collection and transport option.

This collection and transport method will certainly improve the capture rates and effectiveness of recycling and composting operations. At home, some residents recycle voluntarily, but most do not. With the implementation of curbside collection of recyclables, this will change. Away from home (at the beach, public park, and baseball field), many groups do not even pick up their garbage. Implementing this option will provide them with the knowledge and behavior to act as they do when at home. This will result in the capture of what otherwise would have been a large quantity of mixed MSW.

5.3.2 Division of Residential Collection into Service Districts

The implementation of privatized collection of residential wastes will be handled through the letting of contracts. The nature of the contract in terms of size (collection area), length (time), and cost will be determined based on several factors that will have to be examined by the implementing agency. Collection area will have the most significant effect on the contract and will also affect the other terms. The length of the contract will be affected by the time required to recuperate capital outlay for equipment appropriate for the collection area. This in turn will affect the cost of services. Another key consideration is ensuring that local businesses can compete for contracts, thereby stimulating the local economy and assuring the creation of jobs and recirculation of monies within the local economy. Taking these factors into consideration, it is recommended and assumed that residential collection will be provided through contracts for distinct solid waste management regions, established on the basis of, at a minimum, population, projected generation rates, distance and routes, and efficient service intervals. These considerations are handled on a general level here, but should be the subject of greater detail and analysis as part of the mandated privatization plan required by PL 24-272.

The privatization of waste collection was addressed in Public Laws 24-139 and 24-272. However, the contract to privatize the collection of solid waste was never implemented. Public Law 26-99 mandated DPW to divide the collection into three districts by July 3, 2002. Recent discussions with DPW indicate that the privatization process will take place in 2006. (See Section 2.1.2)

5.4 Government Collection

Currently the majority of Government of Guam agencies contract with commercial haulers for collection and transportation and waste. The Department of Public Works and the Mayors self-haul their waste. The Department of Parks, Recreation and Historic Preservation collects and transports waste from public parks and recreational facilities. Implementation of commercial and residential collection alternatives described in the preceding Sections will result in the reduction of Government collection operations. However, this diminishment should not be construed to mean that the MSW generated by Government facilities should not be subject to the same requirements applied to other facilities or generators. As with commercial collection operations, the need for Government collection to support and promote recycling and composting is crucial to the success of Guam's recycling-based integrated solid waste management system. Government collection, with respect to this Section, is intended to be what remains of the Solid Waste Management Division of DPW after the privatization of residential collection occurs. As solid waste operations continue to be privatized, it is appropriate that most, if not all, of the government waste be handled by private entities. A small operation may be maintained for the collection and transport of MSW from government agencies, institutions, and public facilities.

The collection and transport of MSW will be more clearly understood by examining the requirements of collection from the generators' point of view. Government generators will be required to separate wastes into seven categories:

1. Recyclables: Aluminum, glass, tin cans, plastic, paper
2. Green Waste: Vegetation cuttings from trees, plants, grass and leaves
3. Bulky Waste: Furniture, electronics
4. White Goods: Refrigerators, washer/dryer, air-conditioning units, dishwashers, microwaves, ovens/otoves
5. Refuse: Solid waste that is either putrescible or does not belong in the other waste streams
6. Metals: Metal waste other than automobiles or does not belong in the other waste streams
7. Hazardous Waste: Waste defined to be hazardous according to regulations.

The government institutions are somewhat familiar with the majority of these categories as a result of recent storm debris cleanups. However, it is recognized in this plan that education and a phased approach will be necessary. Transfer stations will be used to consolidate and transfer wastes from collection vehicles to transport vehicles. New legislation is needed for the mandate of waste separation at the institution to include the definition of specific waste streams. Means and methods for collection and transport of government generated source-separated wastes will be determined by market competition. They are anticipated to be outsourced to private companies for

collection and transport of waste. Current government collection and transport will need to adjust to its downsizing, changes to promote recycling, and possible phasing out.

5.4.1 Mandatory Source Separation with Regular MSW Collection

As discussed initially in Section 5.1, mandatory source separation is recommended as a part of the collection and transport component. Government facilities serviced by the Government collection operation should separate their waste by types as specified by the receiving facility. All wastes generated from these facilities shall be processed at the MRRFs. All containers used in the storage, collection and transport of the MSW (including recyclables and compostable waste) should meet any standards developed by DPW. Collection of wastes at government facilities shall be taken to include servicing of any recycling drop-off and collection centers at these facilities

5.5 Regional Solid Waste Transfer Stations

There are currently three solid waste transfer stations used in the collection and transport of MSW. However, these stations are used primarily for the transfer of MSW from self-haul vehicles to the Ordot Dump facility. They are not used for transfer of MSW from collection fleet vehicles to transport vehicles (dedicated to transporting waste from transfer station to an MRRF or disposal facility). These solid waste transfer stations currently accept all municipal solid waste and green wastes; there is no waste sorting taking place at the transfer stations. The Department of Public Works also sets its own policies on the hours of operation, types of waste accepted, and how the waste must be packaged. The current cost varies from two dollars per load to four dollars. Only residential waste is being accepted.

During the operation of the landfill at Layon, only commercial hauling trucks will be accepted at the landfill. Transfer from fleet vehicles to the larger hauling vehicles will then become the accepted operational mode. The transfer stations will become the integral and pivotal component of the management system. A new fee schedule must be in place, and all types of waste must also be accepted. A ban on green waste and construction waste at the landfill will be part of its operating conditions.

For the privatization plan for residential collection and servicing of existing commercial and government collection streams, the operations at the existing transfer stations must be re-evaluated in terms of efficiency of operation, services, location, configuration, capacity, and number of stations. This re-evaluation will include the incorporation of recyclable collection and buy-back, compost distribution, weighing and fee collection facilities and other components of this ISWM plan.

When the Layon Landfill becomes operational in September 2007, solid waste operations will be conducted in ways quite different from what is currently practiced. With respect to the solid waste transfer stations, two major differences will impact their operation. First, the number of different solid waste activities will increase. Second, these activities will be performed by potentially different entities by region. This will require functional and spatial expansion at the solid waste transfer stations. If such

expansion is not possible within the boundaries of the existing stations, new sites may have to be found. At a minimum, the transfer stations should incorporate the following:

- Weighing, billing and fee collection facilities
- Data collection facilities
- Non-recyclable solid waste receiving, storage, and transport
- Recyclable collection (and potential processing: baling, packaging, etc.)
- Compostable waste receiving, storage, and transport (and possibly processing)
- Transfer facilities for all incoming components of MSW (recyclables, compostables, non-recyclable MSW)
- Finished compost distribution facilities.

A feasibility study is urgently required to identify the number and locations of transfer stations. This feasibility study should re-evaluate the number of transfer stations (currently three) needed on the island and their location relative, primarily, to population densities and haul routes to arrive at the number of transfer station(s), location(s), and size(s) that will be cost effective, flexible, and convenient for operators, waste haulers and residential drop-off services. A detailed scope of work is required for this feasibility study.

5.6 Performance Standards

5.6.1 Collection and Transport Performance Standards

Currently, collection of municipal solid waste (MSW) on Guam is conducted through a combination of government operated and commercially operated fleets. What MSW collection will consist of, with the continued implementation of this plan, is source separation and collection of recyclables from residential, commercial, government and federal agency waste streams incorporating the use of transfer stations, with drop-off and collection center capabilities, for waste consolidation and diversion. To the maximum extent possible under the conditions as identified in this plan, waste diversion of recyclables and compostables will be required. The final residual MSW stream will then be transported to the sanitary landfill for final disposal.

5.6.2 Municipal Solid Waste Collection

The collection component of the ISWM system will, by mandate of PL 26-99, be performed primarily by private entities and will involve only minimal collection by the government. The performance criteria required for this component were developed with this in mind.

5.6.2.1 Functional Standards

- A. Collection system shall include provisions for self-haul of wastes to transfer stations.

Basis: As private collection will involve costs for collection as well as disposal (tipping fees), there may be a movement among the business community, especially smaller business, to employ self-haul practices for

MSW disposal. Also for the convenience of the residential community, self-haul should remain an appropriate option to transport waste from homes to the transfer stations.

- B. DPW shall re-evaluate sites for regional solid waste transfer stations.

Basis: As part of the implementation of the integrated solid waste management system, the functional expansion of solid waste transfer stations will occur. This functional expansion will likely necessitate a spatial expansion of facilities as well. Interim activities should include verification of the boundaries of each existing transfer station, determination of actual area, estimate of usable area at each station (based on topography or other constraints) and preliminary space estimates for the component to be implemented.

- C. Privatization of residential collection shall be such that any division or grouping of routes shall not adversely affect the rapid and efficient removal of solid waste from dwellings in all villages.

Basis: It is anticipated that the privatization strategy employed for the collection and transport component will involve the letting of several contracts for collection. In establishing the areas covered by each contract, care should be taken to avoid groupings or routings that will be difficult to maintain, or which will cause delays in collection. Operationally it shall be the most cost effective approach available.

- D. Privatization of residential collection shall be such that costs for collection and disposal will increase, and, therefore, costs to the consumer are to be minimized while still providing the minimum level of service specified herein.

Basis: Establishment of collection areas should be optimized to minimize costs, considering such factors as haul distance, housing density, etc. While collection rates will be determined by the Public Utilities Commission based upon actual costs, the actual costs can be minimized by optimizing layout of collection routes and contracts.

5.6.2.2 Operational Standards

- A. Residential collection shall be performed at each dwelling at least once per week on pre-scheduled days for the refuse waste stream as defined below. Collection services for other waste streams are to be collected based on the anticipated volume of the other waste streams and the needs of the community, taking into account the most efficient and economical frequency of collection that is appropriate.

Basis: In order to ensure that residential solid waste storage meets applicable regulations (Public Law 24-313) and does not pose health concerns, consistent collection frequency in accordance with publicly announced schedules must be accomplished. Frequency of collection must be at least once per week for the refuse waste stream, but may be changed as

appropriate considering the collection and storage standards developed (type and size of container, etc.).

- B. For residential collection, to ensure continuity and consistent collection practices for the consumer, regardless of changes in the collection system operator, all residential dwellings in every village island-wide should utilize a standard for collection procedures (separation categories, set-out and set-back, etc.) and container types for the implementation of source separation and collection of the various waste streams generated. Standards should be determined by DPW through the process of outsourcing the solid waste collection services of the residential community. However, at a minimum, services for collection shall include the following separated waste streams:

1. Recyclables: Aluminum, glass, tin cans, plastic, paper
2. Green Waste: Vegetation cuttings from trees, plants, grass and leaves
3. Bulky Waste: Furniture, electronics
4. White Goods: Refrigerators, washer/dryer, air-conditioning units, dishwashers, microwaves, ovens/stoves
5. Refuse: Solid waste that is either putrescible or does not belong in the other waste streams
6. Metals: Metal waste other than automobiles or does not belong in the other waste streams
7. Hazardous Waste: Waste defined to be hazardous according to regulations.

Basis: Ease of use for the customer, in terms of storage and collection, is a crucial factor in the success of the volume reduction and disposal strategy. For this reason, the collection and storage procedures the residential customer will be asked to perform must remain unchanged even though the contractor providing collection services may change. Establishing of standards for collection and container type will accomplish this.

- C. Refinement of Container Standards.

Basis: The container standards in DPW regulations (Public Law 24-313) should be reviewed and updated. The legislative mandate for the privatization of residential solid waste collection will involve the letting of contracts. There may be a different contractor or contractors providing MSW and recyclable collection services for residents. Each contract will have a limited term, and, therefore, the possibility exists that different contractors will provide these services over time. In the interest of providing consistent service to the consumer and minimizing the costs associated with the collection of MSW and recyclables, a standard will be developed which specifies the exact type of container and collection system to be used to implement this Plan. The standard will take into consideration performance criteria developed for this Plan. All residents, regardless of location and region, will be able to use the same containers for MSW and recyclable collection. Research into this aspect of collection and transport

can be initiated by DPW and continued (if necessary) by any succeeding management entity.

D. Development of Collection Standards, Rules, and Regulations.

Basis: With the refinement of the container standard, the manner in which MSW will be stored at and collected from each residence will change dramatically. In order to meet the performance standards specified for the collection and transport component of the integrated solid waste management system, the current practice of using any container and placing them in homemade container stands will have to be changed. DPW has developed a collection standard for containers, specifying that all residential waste must be placed in acceptable containers and all containers must be covered with a proper lid. DPW should initiate the development of a collection standard that specifies the acceptable placement of containers during collection and non-collection periods, acceptable number of containers per household, method of setting out containers and setting them back, as well as responsibilities of both the collection contractor and the resident.

E. Assessment of Government Service Fleet.

Basis: In anticipation of the transfer of residential collection responsibilities to a contractor, DPW should assess the condition, value, and applicability of its remaining service fleet to meet the diminished service requirements this transfer will bring. The need for packer trucks used for residential collection will be decreased, depending on how soon contracts are implemented and when container and collection standards are developed and implemented.

5.6.2.3 Legal/Regulatory Standards

A. DPW shall privatize collection, transportation, and disposal of solid waste from all dwellings in all villages of Guam.

Basis: Public Laws 24-06, 24-272, and 26-94, and 2005 ISWMP.

B. DPW will administer, supervise, and fulfill the responsibility of the Government of Guam in any legally established contract for solid waste collection activities and operations.

Basis: Public Laws 23-64 and 26-99.

C. Guam EPA to issue permits for the operation and modification of all solid waste collection systems.

Basis: Public Law 23-64.

D. Fees for residential collection to be set by the Public Utilities Commission (see performance standards for billing and collection).