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Kodiak Island Borough
Final Solid Waste Management Plan

BELL & Associates, Inc.

Kodiak Island Borough Solid Waste Management Plan
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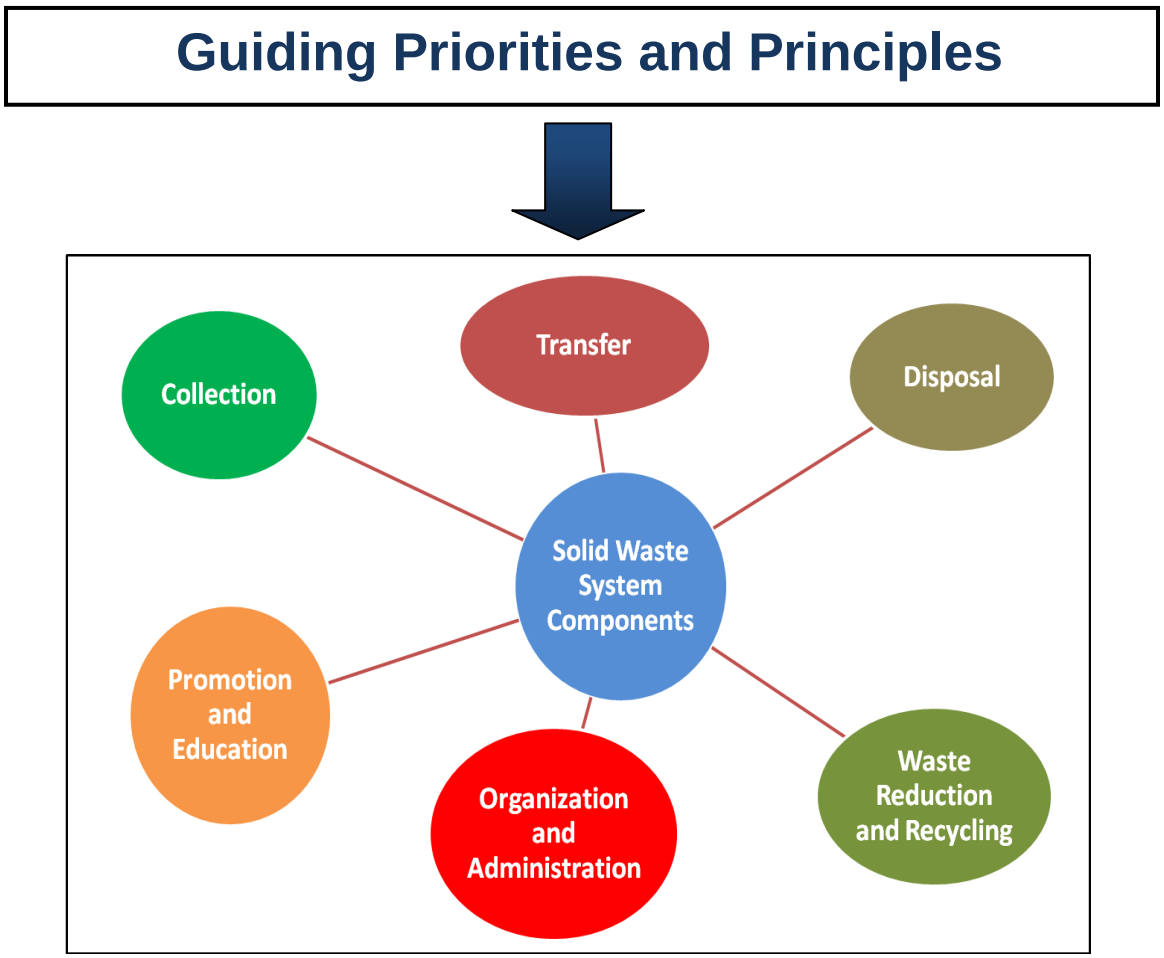
1.0 Introduction

1.1 Concept of the Solid Waste Management System

This Solid Waste Management Plan (SWMP or the Plan) has been prepared for Kodiak Island Borough (KIB or the Borough) by Bell & Associates, Inc. (Bell & Associates or the consultant). The consultant approaches the analysis of solid waste management issues and alternatives from an integrated perspective. This means the various practices and operations that characterize how solid waste is handled in a given area are viewed as the related elements of a solid waste management system. Consideration of individual elements is done within the framework of the whole system. Such a perspective involves examining how the system elements are connected and either conflict with or support each other. The diagram below illustrates the basic structure and selected key components of a solid waste management system.

Figure 1: Basic Components for Solid Waste Management System



In analyzing a solid waste management system it is important to look at the relationship between the priorities and principles that guide the system, how the system components function, and the resources allocated to the system operations. Is there balance and consistency between these factors and are they logically connected or do they go in different or opposing directions? For example, is there an expectation or desire the system will achieve a high level of waste reduction / recycling but the infrastructure of programs, policies, and facilities to carry out this purpose are inadequate?

1.2 Plan Contents and Methodology

The Kodiak SWMP is set up so detailed technical material is placed in a series of appendices and referenced in the substance of the Plan, which consists of seven chapters including this Introduction. The intention is to make the chapters concise, focused, and understandable with supportive and explanatory data, information, and calculations in the appendices.

In an orderly progression, this SWMP covers the following topics, proceeding ultimately to a series of recommendations presented in the form of a coherent system scenario:

- Discussion of current solid waste management methods, arrangements, and facilities.
- Waste disposal projections with related assumptions.
- Advantages and disadvantages of current management methods, arrangements, and facilities.
- Identification of system needs and improvement opportunities.
- Definition of varying management priorities / principles for solid waste system.
- Program, policy, and facility options for basic system components as portrayed in Figure 1 above.
- Combinations of options organized into distinct system scenarios that accomplish different priorities / principles. The format for comparing and contrasting the alternative system scenarios is displayed in Table 1 at the end of this section. The final result of the solid waste planning process is that the KIB Assembly will select a preferred system scenario.

Table 1: Format for Portraying Alternative Solid Waste Management Scenarios			
Solid Waste System Element ▼	**Scenario A** **Minimum Change** **► *Same System***	**Scenario B** **Modest Change** **► *Revised System***	**Scenario C** **Significant Change** **► *New System***
Guiding Priorities & Principles			
1 / Collection			
2 / Handling & Transfer			
3 / Waste Reduction & Recycling			
4 / Disposal			
5 / Promotion & Education			
6 / Organization & Administration			

1.3 Core Questions

In using the methodology and steps noted in the previous section, the SWMP is a resource for determining the future direction of solid waste management in KIB. To assist the Assembly in selecting a preferred system scenario the SWMP should discuss the circumstances and conditions that make KIB unique and how those factors impact solid waste management. In that regard the Plan addresses three sets of questions as presented below.

1.3.1 Waste Collection

- What are the advantages and disadvantages of current methods for collecting trash?
- What are the alternatives for trash collection?
- Should customer contact / interaction be the responsibility of the waste management contractor or KIB?
- What is the best method for billing customers and who should complete the monthly invoicing?

1.3.2 Waste Disposal

- How much waste will KIB need to dispose of in the coming years?
- What are the options for disposal, which one is recommended, and why?
- Should a transfer station be constructed?

1.3.3 Recycling

- What is a reasonable estimate for the amount of recyclable materials that could be recovered?
- Assuming increased recycling is deemed a priority, what combination of policy, program, and facility initiatives are necessary to implement this priority?
- Who should be the lead entity for promotion and education and what are the roles or contributions of other stakeholders regarding promotion / education?
- What resources will be needed to sustain effective promotion / education?

2.0 Local Conditions

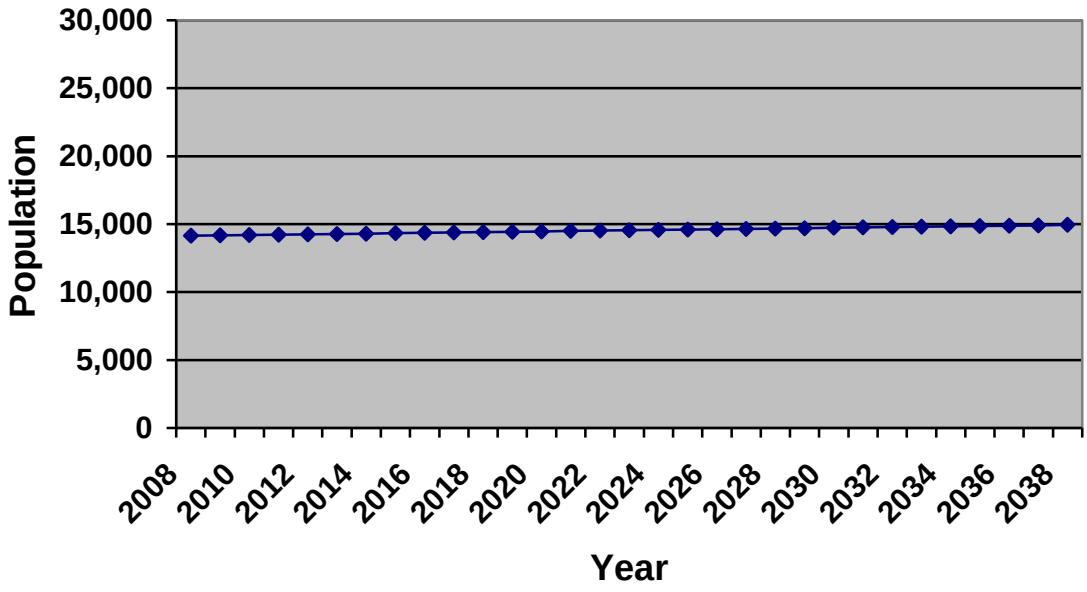
2.1 Overview

KIB is a remote island with a largely rural character and expansive natural environment that is critical to its economy. It has a small, stable population with minimal growth forecasted over the next 30 years.

2.2 Current and Future Population

Population projections for Kodiak Island Borough were calculated using data from the Alaska Department of Labor's (AKDOL) Research and Analysis Section / Demographics Unit. The KIB 2008 population estimate is the basis for projections. An annual growth rate of 0.17% as determined by AKDOL was used to extrapolate KIB population growth from 2008–2013. Similarly, an annual population growth rate of 0.19% for KIB was used for the 2013–2018 period as determined by AKDOL. Finally, an annual growth rate of 0.18%, the average of the two previous growth rates, was used to calculate population figures for the years 2018–2038. The figure and table which follow illustrate the small amount of population growth expected in KIB.

Figure 2: Population Trend



2.3 Political / Institutional Entities and Responsibilities

KIB and the City of Kodiak are separate political entities. Each has a mayor and a legislative body. The KIB Assembly consists of seven members plus the mayor who votes in case of a tie. The Kodiak City Council has six members plus the mayor who also votes in case of a tie. KIB holds the Certificate of Public Convenience and Necessity from the Regulatory Commission of Alaska for purposes of solid waste management. Therefore, it can contract for services throughout the Borough road system including the City of Kodiak. The City operates a sewage treatment plant that also serves Borough residents and businesses.

Solid waste management falls under the KIB Engineering and Facilities Department and is specifically handled by the Environmental Specialist in that Department. The Environmental Specialist reports to the Department Director. KIB operates a landfill for disposal of wastes that employs six full – time people including a Supervisor who is in charge of five Operators. The Supervisor reports to the Environmental Specialist. All the landfill employees are part of the Engineering and Facilities Department. An organizational chart for KIB is provided in Appendix A.

Table 2
Population Projections

Year	Estimated Population
2008	14,159
2009	14,183
2010	14,206
2011	14,230
2012	14,253
2013	14,277
2014	14,305
2015	14,332
2016	14,360
2017	14,388
2018	14,416
2019	14,442
2020	14,468
2021	14,494
2022	14,520
2023	14,546
2024	14,572
2025	14,599
2026	14,625
2027	14,651
2028	14,678
2029	14,704
2030	14,730
2031	14,757
2032	14,783
2033	14,810
2034	14,837
2035	14,863
2036	14,890
2037	14,917
2038	14,944

3.0 Description of Wastestream

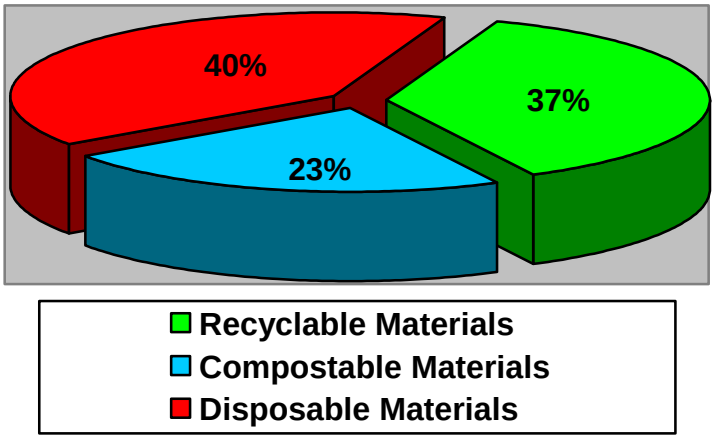
3.1 Overview

Table 3: What Is In KIB's Disposed Wastestream? What Can Be Diverted From Disposal?

Disposed Wastestream Composition & Diversion Potential			
Material Category	**Material Type**	**Percent Composition**	**2007 Tons**
Paper		**34.3%**	**3,383.29**
	Newspaper[1]	4.9%	540.47
	White / Mixed Paper[1]	3.0%	330.90
	Office Paper[1]	2.7%	297.81
	Magazines/Books/Mail[1]	4.2%	463.26
	Cardboard[1]	12.6%	1,389.78
	Other Paper	6.9%	761.07
Plastic		**5.6%**	**617.68**
	Recyclable[1]	1.9%	209.57
	Film	1.8%	198.54
	Other	1.9%	209.57
Metals		**7.7%**	**485.32**
	Aluminum Cans[1]	0.8%	850.11
	Tin Cans[1]	1.0%	88.24
	Other Metals[1]	5.9%	110.30
Glass		**4.4%**	**651.57**
Diapers		**1.5%**	**165.45**
Food Waste[2]		**11.9%**	**1,312.57**
Yard Waste[2]		**3.4%**	**372.04**
Lumber & Wood[2]		**7.5%**	**824.38**
Electronic Waste		**1.1%**	**121.33**
Batteries		**0.1%**	**11.03**
Other		**22.5%**	**2,481.75**
Total		**100%**	**11,024.95**
[1]Recyclable Materials		37.0%	4,081.90
[2]Compostable Materials		22.8%	2,508.99

Waste composition percentages used in the table above are from EPA (Municipal Solid Waste in the U.S. 2005–Facts and Figures) and KIB's 1992–93 Waste Characterization Study. The 1992–93 Waste Characterization Study showing the composition of waste from KIB is in Appendix B. Figure 3 below summarizes the portions of the disposed wastestream that theoretically could be diverted from disposal through recycling or composting.

Figure 3: Diversion Potential in Disposed Waste



3.2 Quantities and Types of Disposed Wastes

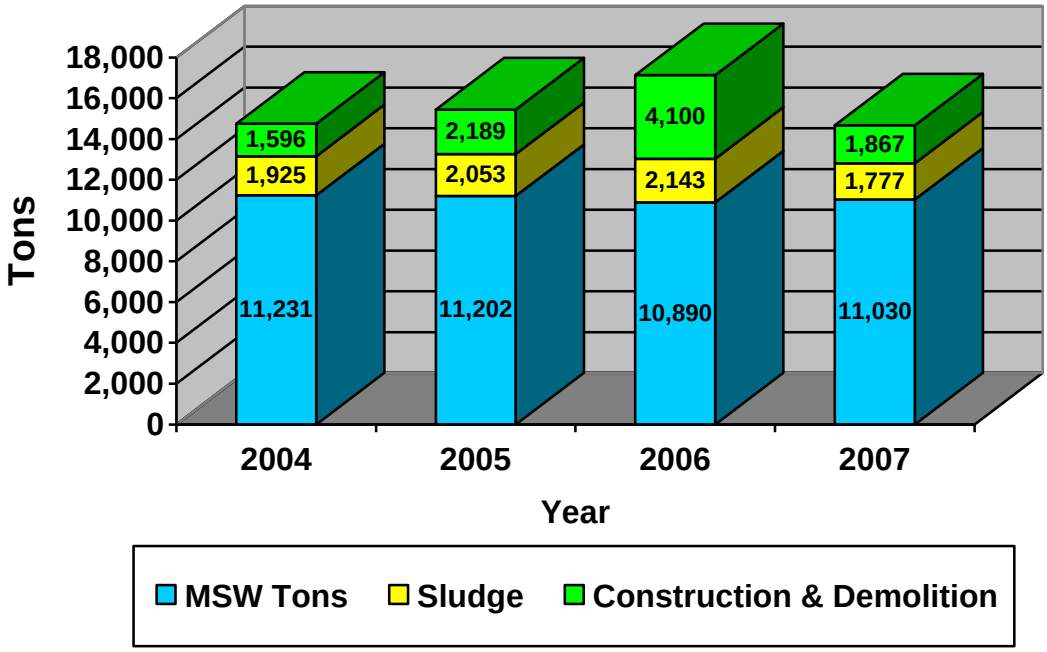
It is noted that "MSW Tons" in the table below refers to municipal solid waste or garbage from residential, commercial, institutional, and industrial generators in KIB. Construction and demolition (C & D) debris will vary from year to year, sometimes dramatically, depending on the number and type of building / renovation projects that occur.

Table 4: What's Going into the Landfill?

Material Category	2004 tons	2005 tons	2006 tons	2007 tons
MSW Tons	11,231	11,202	10,890	11,030
Sludge	1,925	2,053	2,143	1,777
C & D Debris	1,596	2,189	4,100	1,867
Total Tons	**14,752**	**15,443**	**17,133**	**14,674**

The data from the table above is displayed in the figure which follows.

Figure 4: Disposal by Type of Waste



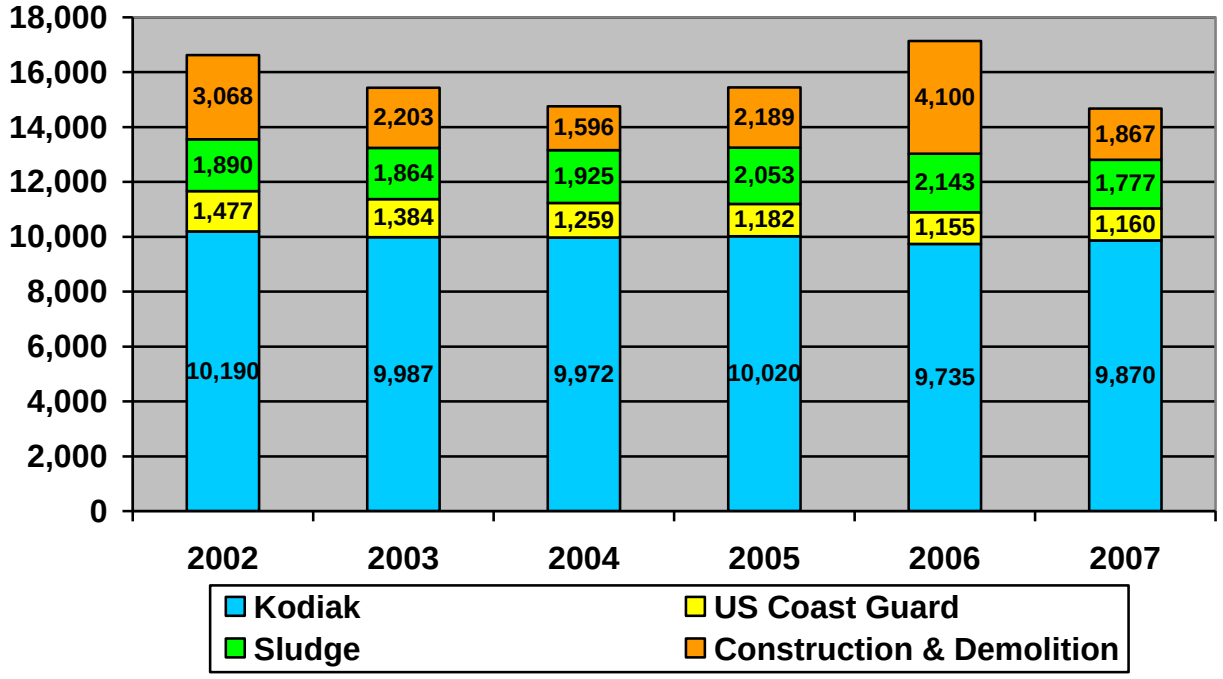
The sources of disposed waste from KIB are as shown in the table below. Total MSW from the previous table comes from three sources – refuse collected by Alaska Waste; self–hauling done by the public or businesses; and waste from the US Coast Guard (USCG), which is collected by a USCG contractor and delivered to the KIB landfill.

Table 5: What Are the Sources of Disposed Waste?

	2002 tons	2003 tons	2004 tons	2005 tons	2006 tons	2007 tons
Alaska Waste & Self – Hauling	10,190	9,987	9,972	10,020	9,735	9,870
US Coast Guard	1,477	1,384	1,259	1,182	1,155	1,160
Sludge	1,890	1,864	1,925	2,053	2,143	1,777
Construction & Demolition	3,068	2,203	1,596	2,189	4,100	1,867
Total Tons	**16,625**	**15,438**	**14,752**	**15,443**	**17,133**	**14,674**

Data from the table above is portrayed graphically in the following figure; “Kodiak” refers to trash taken to the landfill by Alaska Waste and self – haulers combined.

Figure 5: Sources of Disposed Tonnage



3.3 Quantities and Types of Diverted Wastes

For calendar year 2007 Threshold Recycling Services Inc. recovered 500 tons in KIB, as listed in Table 6, based on its contract with the Borough (rounded figure; does not include material from US Coast Guard base; see Section 4.5.1 for discussion of Threshold Recycling). Of that amount 468 tons or 94 percent was various types of waste paper, as follows (data is rounded): mixed paperboard–111 tons; office paper–23 tons; newspaper– 52 tons; magazines–68 tons; cardboard– 214 tons. Under a separate contract Threshold handled an additional 186 tons of recyclables from the US Coast Guard in 2007 (material composition not available).

The information noted above is summarized in the two figures below.

Table 6: 2007 Threshold Tonnage from KIB (excludes Coast Guard)

Materials	Tons
Mixed Paperboard	110.7
Office Paper	23.3
Newspaper	51.6
Magazines	68.4
Cardboard	214.3
Aluminum	4.3
Tin	1.7
HDPE # 2 Colored	3.5
HDPE # 2 Natural	2.2
PET # 1	6.7
Plastic Bags / Shrink Wrap	10.6
Subtotal	**497.3**
Other not identified	2.4
Total Tons	**499.7**

Figure 6: Threshold KIB Tons - Specific Percentages by Weight

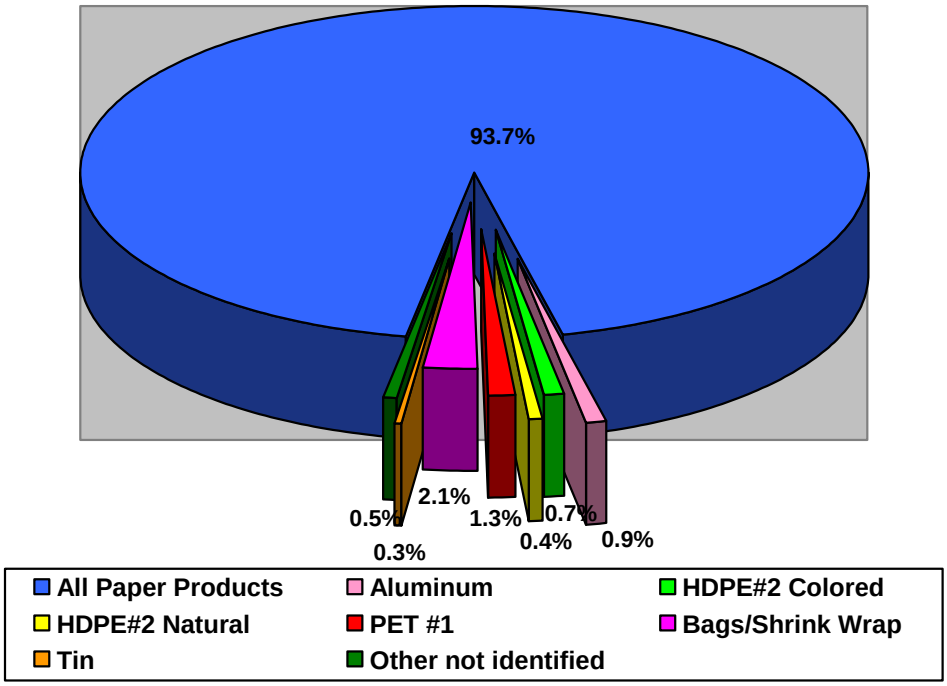
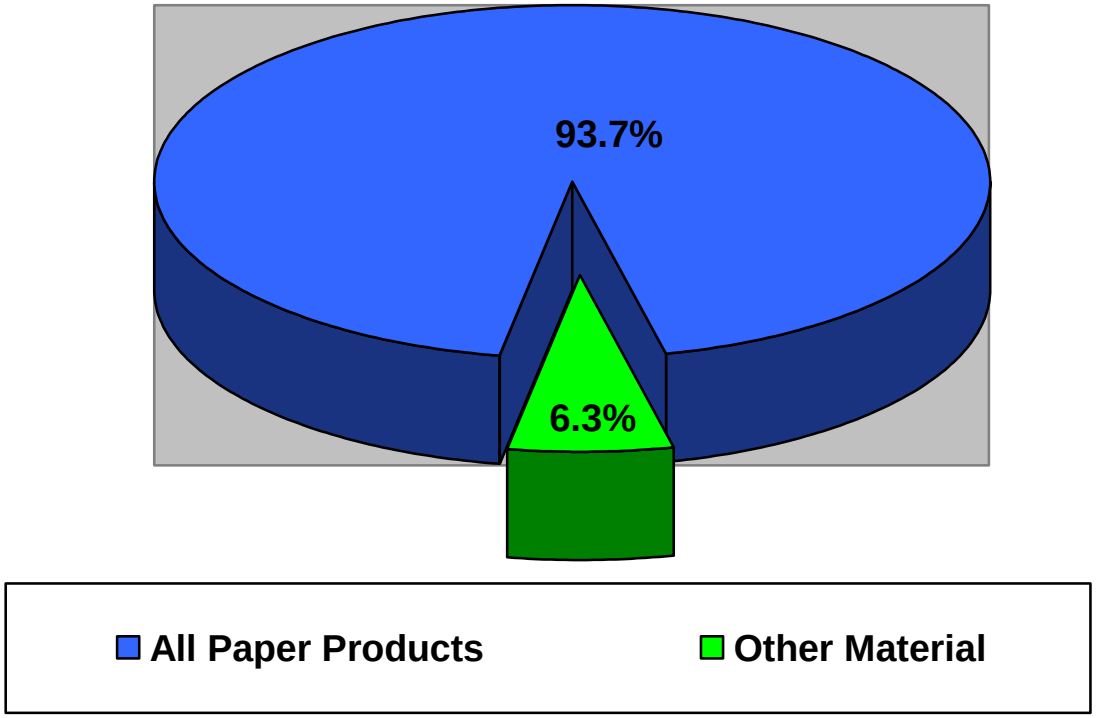


Figure 7: Threshold KIB Tons - General Percentages by Weight



For calendar year 2007 KIB processed and marketed 822 tons of scrap metals. Scrap metals (excluding auto bodies) are presently received, processed, and stored at the KIB landfill by Borough personnel.

3.3.1 Calculation of Diversion Rate

The diversion rate (also sometimes called the recycling or recovery rate) shows what percentage of the total material generated is being diverted from disposal due to reuse, recycling, composting and other similar methods. Two formulas define how to determine the diversion rate:

Tons Generated = Tons Disposed + Tons Diverted

Diversion Rate = Tons Disposed divided by Tons Generated

The diversion rate is usually used in reference to municipal solid waste (MSW) since sludge is not refuse or trash but rather biosolids and construction / demolition debris quantities often fluctuate from year to year. The MSW diversion rate does not normally include recycled scrap metals because the weight of these materials can inflate and thus distort how much MSW is actually being diverted. When feasible, the tonnage of recycled scrap metal is documented but kept separate from the MSW diversion rate.

Based on these considerations the diversion rate for KIB in 2007 is calculated as follows:

- **11,030 tons disposed (see Table 4) + 686 tons diverted (see Section 3.3) =**

  11,716 tons generated

- **686 tons diverted divided by 11,716 tons generated =**

  5.8 % or say 6 % diversion rate

3.4 Projected Waste Disposal

How much waste from KIB will need to be disposed in the future? There are three important variables to consider in projecting future disposal needs – existing disposed tonnages, population growth estimates, and anticipated diversion rates. Reliable data is available about the first two variables but anticipated diversion rates are difficult to predict. Therefore three different diversion levels – low, medium, and high – have been assumed in order to calculate projected waste disposal amounts: low–no increase beyond existing diversion; medium–25 % diversion; high–50 % diversion.

Further, the disposal projection is for MSW or municipal solid waste. The projection does not include construction / demolition debris, which changes annually due to various cyclical economic factors. It also does not include biosolids or sludge, which is not part of the everyday wastestream produced by consumer behavior or commercial activities although it is currently part of the overall wastestream requiring disposal at the landfill.

The waste disposal projection was calculated using MSW data from 2007 as a baseline against the previously discussed future population estimates. The first projection represents the status quo, where increases in MSW are directly linked to increases in population, with no additional diversion. The second projection represents a 25% reduction goal by 2018. The total MSW from the status quo projection is reduced by 2.5% in 2009 and an additional 2.5% every year for ten years until a full 25% of projected MSW is diverted from the wastestream. The remaining 20 years is then calculated using this 25% diversion rate from the status quo projection. The third projection is calculated in the exact same way as the 25% diversion except that it uses a goal of 50% by 2018. Each of the first 10 years increases its diversion by an additional 5% until 2018, thereafter using 50% for the next 20 years.

Table 7: Disposal Tonnage Projections

Year	Population	Tons Disposed – No Diversion Increase	Tons Disposed w / 25 % Diversion	Tons Disposed w / 50 % Diversion
2008	14,159	11,030	11,030	11,030
2009	14,183	11,049	10,772	10,496
2010	14,206	11,067	10,513	9,960
2011	14,230	11,085	10,254	9,423
2012	14,253	11,103	9,993	8,883
2013	14,277	11,122	9,732	8,341
2014	14,305	11,144	9,472	7,801
2015	14,332	11,165	9,211	7,257
2016	14,360	11,187	8,949	6,712
2017	14,388	11,208	8,687	6,165
2018	14,416	11,230	8,423	5,625
2019	14,442	11,250	8,438	5,625
2020	14,468	11,271	8,453	5,635
2021	14,494	11,291	8,468	5,645
2022	14,520	11,311	8,483	5,656
2023	14,546	11,331	8,499	5,666
2024	14,572	11,352	8,514	5,676
2025	14,599	11,373	8,530	5,686
2026	14,625	11,393	8,545	5,697
2027	14,651	11,413	8,560	5,707
2028	14,678	11,434	8,576	5,717
2029	14,704	11,455	8,591	5,727
2030	14,730	11,475	8,606	5,737
2031	14,757	11,496	8,622	5,748
2032	14,783	11,516	8,637	5,758
2033	14,810	11,537	8,653	5,769
2034	14,837	11,558	8,669	5,779
2035	14,863	11,578	8,684	5,789
2036	14,890	11,599	8,700	5,800
2037	14,917	11,620	8,715	5,810
2038	14,944	11,642	8,731	5,821

4.0 Existing Solid Waste Management System

4.1 Overview

Due to its isolated location and small waste volumes, KIB has historically not had a great deal of private sector competition for previous refuse service contracts. The landfill's current operating area has a limited life (see Section 4.4 for additional discussion).

4.1.1 System Revenue

The current KIB solid waste management system is funded from two primary sources: collection rates charged to residents and businesses plus disposal rates charged at the landfill. The table below details these revenue sources from the past fiscal year.

Table 8: Sources of Revenue, FY 2007

Revenue Source	2007 Actual	Customer Count
Residential Customers	$ 1,015,535	2,768 customers
Commercial Customers	$ 1,672,247	494 customers
Disposal for Self – Haulers	$ 617,686	Business and residential customers
Kodiak Sludge	$ 168,059	1,777 tons
US Coast Guard	$ 129,875	1,129 tons of waste
Total	**$ 3,603,402**	

The table below shows the average number of customers serviced by the collection contractor in FY 2007:

Table 9: Solid Waste Service Customers	
City of Kodiak	1,275
Service District #1	978
KIB Residential	515
Commercial	494
Total	**3,262**

4.2 Collection

Under a contract with KIB, refuse collection services are provided by Alaska Pacific Environmental Services Anchorage, LLC doing business as Alaska Waste in the Borough. The contract between KIB and Alaska Waste is in Appendix D. The US Coast Guard has their own contractor for solid waste collection – Kodiak Support Services – who hauls trash to the KIB landfill. Residents within the boundaries of the City of Kodiak are provided with curbside collection of waste as well as drop–off sites at various locations throughout the City. Drop–off

sites or community dumpsters are also found at different places throughout the Borough and are either 3.6 cubic yard or 5.5 cubic yard dumpsters or a 20 cubic yard drop box. Residents outside the city limits do not receive curbside refuse collection and therefore must use the community dumpsters.

The monthly collection cost for residential customers in the City of Kodiak and the Borough is comprised of the following three components:

Table 10: Monthly Residential Refuse Collection Cost

Rate Component	City of Kodiak	Kodiak Borough
Collection	$ 13.82	$ 18.38
Administration	4.41	4.41
Disposal	15.06	15.06
Cost of Service	**$ 33.29**	**$ 37.85**
Collection Rate	**$ 31.00**	**$ 31.00**

It must be noted that the collection cost and collection rate are at odds. An explanation of the cost components follows:

- Collection Cost – This is the contracted amount paid to Alaska Waste to collect waste.
- Administration – These are Borough costs associated with contract management, customer billing, and accounting.
- Disposal – Assumes the average set–out weight of waste is 68[1] pounds a week per residence at approximately $ 102 per ton for disposal plus all other landfill functions (see Section 4.4.5, Table 13 and Appendix C).

All residences are charged a flat rate regardless of how much garbage is put out for collection or discarded in the community dumpsters. However, in the commercial / institutional / industrial sector, rates are based on the number and size of containers serviced and the frequency of service. Appendix D contains the rates for businesses, institutions, and industries.

[1] The 68 pounds per customer per week assumption is calculated in Appendix .

4.2.1 Cost of Community Dumpsters in Residential Areas of the Borough

The cost of the community dumpsters in residential areas of KIB was calculated from January 2007 to December 2007 using the billing records submitted by Alaska Waste. During that period of time, the cost to the KIB for collection service was $329,211. The disposal cost on the estimated 2,656 tons @ $102 per ton is an additional $270,072 for a combined cost of $599,283.

Photo 1: Community Dumpster

4.3 Handling / Transfer

Garbage is transported directly to the landfill from collection routes. There is no transfer station in KIB. Threshold Recycling Services processes, consolidates, and stores recyclable materials at their site in Kodiak (see Section 4.5 below). Threshold also manages a few satellite sites that are used to collect recyclables. KIB, through the contract with Alaska Waste, has the six community cardboard recycle dumpsters brought to Threshold's main location. Bales of recyclable materials are placed in fully enclosed intermodal containers or "vans" for shipment by barge to markets in the Seattle region.

4.4 Disposal

Waste collected on the Island is disposed by burial at the landfill located north of the City of Kodiak off Monashka Bay Road. The unlined landfill is classified by the State of Alaska as a Class I landfill. The landfill accepts the following materials for disposal: municipal solid waste (which is baled on site prior to burial), construction and demolition debris, and sludge from the City's wastewater treatment plant. In addition to disposal operations, the landfill accepts lead acid batteries, appliances, and scrap metal for recycling. Household hazardous waste such as oxidizers, cleaning products, and pesticides are handled, collected, and stored for removal by a contractor. The Borough also operates a small incinerator located in the baler building for medical wastes, confidential documents, euthanized animals and animals for cremation.

4.4.1 Labor

The daily operations of the KIB baler and landfill facility are performed by an on-site staff of five baler / equipment operators and one supervisor. The facility operates six days a week from 8:00 am to 5:00 pm and is open to the public from 10:00 am to 4:00 pm. The nature of the work performed at the facility requires a minimum labor force of four people during working hours to maintain efficient operations and provide a safe environment for employees and customers. That labor force consists of a baler operator, skid loader operator on the tipping floor who also conducts the waste screening and is the scalehouse operator, an equipment operator at the scrap metal area and an equipment operator that conducts road maintenance, works the construction/demolition cell as well as the working face of the landfill.

4.4.2 Baler Versus Compactor

Photo 2: Caterpillar 816F Compactor

There are two primary methods used at landfills to compact waste: a wheeled compactor or a stationary hydraulic baler. A new wheeled compactor (Caterpillar 816 F Series 2) has a price tag of $335,000 plus the operational costs. This machine has a weight of 52,364 pounds and should get the same compaction as the baler. The baler has been fully amortized by the Borough, so future costs are the scheduled routine maintenance and occasional overhauls. Over the last five years the Borough has spent $43,499 to keep the baler running or an average of $8,700 a year. The annual amortized purchase price for a new compactor over 10 years is $33,500.

The current baler operation keeps waste confined to a small protected area, reduces the impact of windblown litter, eliminates the need for public access to the working face of the landfill, and compacts waste to a density of about 1,200 pounds per cubic yard.

While the wheeled compactor is the most widely used method of compaction, it is not the best choice for Kodiak given the low number of wet waste tons, weather conditions, replacement expenses, and service costs.

4.4.3 Closure Costs

Subtitle D of the Federal Resource Conservation and Recovery Act (RCRA) requires a landfill owner to assure adequate funds are available to cap and close a landfill and provide the necessary monitoring requirements for no less than 30 years after it has reached full capacity. KIB has prudently encumbered the projected cost of these environmental requirements. Closure and post–closure costs were initially estimated by the Borough's engineering firm of CH2M Hill in 1996. These costs have been adjusted annually for inflation during the budgeting process.

In 2007, the remaining life of the landfill and the closure costs were in synchronization, meaning that 70% of the landfill had been filled and 70% of the closure costs had been collected. For 2007 the estimated closure costs were $4,603,696. As of the same year the Borough had $3,222,600 (70%) of estimated closure costs in trust. The remaining $1,381,096 will be collected based on the projected 120,000 tons the landfill would receive over the next eight to ten years. The closure cost per ton is $11.51 ($1,381,096 divided by 120,000 tons).

As part of this Solid Waste Management Plan the Borough has updated the projected closure and post-closure costs. While the closure costs were reasonable, the post-closure costs for leachate treatment ($502,600) and operations and maintenance ($341,086) will increase the

amount the Borough must set aside during the remaining life of the current cell. This is summarized in the table below:

Table 11: KIB Landfill Closure and Post-Closure Costs

Cost Category	Prior Estimate	Updated Estimate	Notes
Closure Cost (cap and fill current cell)	$ 3,335,700	$ 3,344,654	
Post-Closure Costs			
Leachate System	190,200	692,800	
Monitoring	697,399	690,047	
Operations and Maintenance	285,298	626,384	
Required Cost to be funded by the KIB	4,508,597	**5,353,885**	**A**
Closure Fund Balance (June 30, 2008)	3,222,587	3,222,587	**B**
Remaining Amount to Fund	1,286,010	2,131,298	**C**
Remaining Landfill Tons	105,000	105,000	**D**
Closure / Post-Closure Cost per Ton	12.25	20.30	**E**
Projected Tons of Mun. Solid Waste, 2008-9	15,600	15,600	**F**
Amount to Encumber in 2008 / 2009	$ 191,064	**$ 316,650**	**G**

Notes
A: Sum of projected costs
B: Assumed fund balance
C: Required amount to fund less the current fund balance
D: Projected landfill life in tons
E: Remaining amount to fund divided by projected landfill life (tons)
F: Average tons received by the landfill over the last 5 years
G: Cost per ton multiplied by projected tons

4.4.4 Sludge

The KIB landfill accepts sewage sludge from the City of Kodiak's treatment plant for disposal. In other jurisdictions sewage sludge or bio–solids are either composted, land applied, or incinerated. Sludge accounted for 1,777 tons or 12% of the total waste tons disposed in 2007 and 18% of disposal revenue.

4.4.5 Disposal Costs on Kodiak

There are two primary activities at the KIB baler and landfill facility – recycling and disposal. The costs of operating the landfill for purposes of refuse disposal are summarized in the following table covering fiscal year 2007, that is, July 2006 to June 2007:

Table 12: What Does It Cost for Landfill Disposal?

Category	Cost / $	Comments
Labor	$ 571,047	Staff (6.5 Full-Time Equivalents)[2]
Professional Services	113,830	Engineering & Contracting Services
Closure Costs	270,000	Fixed Amount
Operations	203,357	Supplies, Utilities, Insurance
Building & Equipment	272,639	Depreciation
Total Cost for Disposal	$ 1,430,873	15,900 tons of material (a)
Disposal Cost per Ton	**$ 90**	**15,900 tons of material (a)**

NOTE: (a) municipal solid waste + sludge + construction / demolition debris

Processing of residential and commercial recyclable materials is carried out by Threshold Recycling while scrap metal recycling is part of the operations conducted at the landfill. Both are discussed under Section 4.5 below. Funds to pay the costs of Threshold's contract and scrap metal recovery come from landfill revenues. The following table considers these additional expenses (**bold text**) in calculating the total cost for operating the baler and landfill facility.

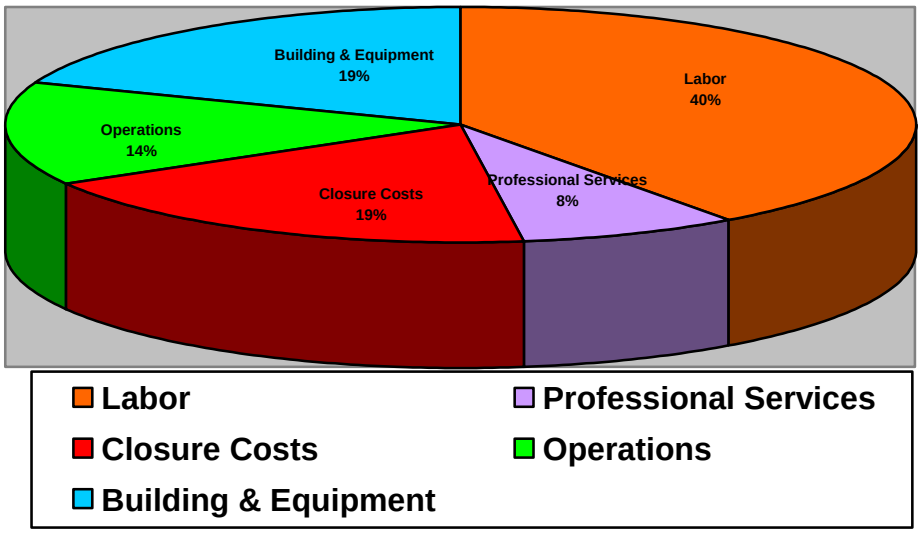
Table 13: Total Cost for Baler / Landfill Facility

Category	Cost / $	Comments
Labor	$ 571,047	Staff (6.5 Full-Time Equivalents)
Professional Services	113,830	Engineering & Contracting Services
Closure Costs	270,000	Fixed Amount
Operations	203,357	Supplies, Utilities, Insurance
Building & Equipment	272,639	Depreciation
Scrap Metal Recycling	**17,273**	**Transport Cost to Seattle Markets**
Threshold Recycling	**168,963**	**Contracted Cost**
Total Cost for Facility	$ 1,617,108	15,900 tons of material (a)
Facility Cost per Ton	**$ 102**	**15,900 tons of material (a)**

[2] The half FTE is the Environmental Specialist who is split between landfill and administration.

Disposal costs at the landfill noted above are portrayed visually in the figure below.

Figure 8: Disposal Costs by %



4.5 Diversion – Waste Reduction, Recycling, Composting

4.5.1 Recycling

Threshold Recycling Services Inc. maintains a receiving, handling, processing, storage, and marketing operation for recyclable materials in Kodiak. Outside of the site are two drop–off stations for recyclables. Three additional satellite drop-off stations are located in the Borough. Six cardboard – only dumpsters in the Borough and the City are hauled to Threshold's main site through KIB's contract with Alaska Waste. Threshold also picks ups recyclables from commercial businesses and institutions. Materials handled by Threshold include but are not limited to the following:

- Aluminum cans
- Tin cans
- Cardboard
- Brown paper bags
- Newspaper
- Magazines
- White office paper
- Colored office paper
- File folders
- Envelopes
- Paper towel / toilet paper rolls
- Mixed waste paper
- Paperboard boxes (such as for cereal, crackers, tissue)
- PET (polyethylene terephthalate) # 1 clear plastic containers
- HDPE (high – density polyethylene) # 2 colored plastic containers

In calendar year 2007 KIB paid $196,434 to Threshold for recycling services. Under terms of the contract, KIB pays $9,000 per month for up to 30,000 pounds of recyclable materials

processed and shipped to markets off-island ($9,000 / 30,000 pounds = $0.30 per pound or $600 per ton). After 30,000 pounds, the payment amount is reduced by 50% to $0.15 per pound or $300 per ton. During 2007, Threshold processed about 500 tons of material (KIB contract; Threshold has a separate recycling contract with the US Coast Guard) at an average cost to KIB of $393 per ton.

The KIB landfill is a collection, processing, and storage point for scrap metals. The landfill receives approximately 1,500 to 2,500 pounds per week from residents and businesses on the Island. The current rate charged by the Borough for handling this material stream is $275 per ton. The cost to process the material in 2007 was approximately $70 per ton. In 2008, the value of scrap increased from $73 per ton to $200 per ton, thus decreasing the Borough's processing cost per ton to $9 per ton profit. The table below displays the difference in cost over calendar year 2007 to the first four months of 2008.

Table 14: Scrap Metal Processing Costs

Cost Category	2007	2008
Tons processed	822.20	564.25
Labor cost	$ 47,075	$ 31,383
Equipment cost	$ 24,070	$ 16,518
Shipping cost	$ 42,026	$ 33,844
Material value	$ (55,641)	$ (86,550)
Cost per ton	$ 69.97	$ (8.51)

In 2007 the Borough shipped out 1,644,400 pounds (822 tons) of scrap metals to Schnitzer Steel Industries, Inc. in Tacoma, Washington and anticipates the remaining stockpile of 1,800,000 pounds (900 tons) will be reduced further to 80,000 pounds (40 tons) by September 2008.

4.5.2 Composting

There is no KIB composting operation at the present time.

4.6 Household Hazardous Waste

Household hazardous waste (HHW) can be taken to the KIB landfill Monday through Saturday from 10 am to 4 pm year round free of charge. As well, there is an annual clean–up event held on the first Saturday of May when the public can bring their HHW to the Kodiak High School parking lot free of charge. The materials gathered over the year and from the event are shipped off-island to a disposal facility permitted for HHW. KIB currently contracts with Phillips Services Corporation (PSC) out of Anchorage to assist in disposing of HHW materials.

In addition, there is a "tag–on" service for commercial generators, who are responsible for contacting PSC directly and paying for the shipping and disposal of their waste. The benefit to commercial generators is that KIB has already paid to have PSC come to the island for the clean–up event. The KIB landfill does not accept commercial hazardous waste so generators must make arrangements directly with PSC.

4.7 Special Wastes

Table 15: Current Handling Methods for Special Wastes

1 / Sludge	Collected by the City and disposed of in working face of landfill.
2 / Tires	Disposed of in dumpsters or brought to the landfill by the public are then baled and landfilled.
3 / E – waste	Baled and landfilled or the public can take to Threshold to recycle for a fee.
4 / Wood	Disposed of in construction / demolition cell at landfill.
5 / Fishing gear	Disposed of in construction / demolition cell at landfill.
6 / Carcasses	Generally disposed of in dumpsters and are then baled and landfilled.
7 / Construction / demolition debris	Disposed of in construction / demolition cell at landfill.
8 / White goods / scrap metal	Brought to the landfill either by the public or the collection contractor. Fluids are removed; material is shipped off-island for recycling.
9 / Restaurant cooking oil / grease	Disposed of in dumpsters, baled and landfilled. Threshold also takes restaurant cooking oil to burn at their facility. The oil that is not able to be burned is then disposed of in a dumpster.
10 / Furniture / mattresses / other bulky items	Disposed of in dumpsters or brought to the landfill by the public are then baled and landfilled.
11 / Yard waste	Disposed of in dumpsters or brought to landfill by the public. Therefore some is baled and landfilled and some is disposed of in the construction / demolition cell.
12 / Propane tanks	Disposed of in dumpsters or brought to landfill by the public; disposed of in the construction / demolition cell.

4.8 Organization and Administration

Solid Waste Management falls within the responsibilities of the KIB Engineering and Facilities Department and is specifically handled by the Department's Environmental Specialist. Other Department employees (six total; see Section 4.4.1) operate the baler and landfill facility for disposal of waste, scrap metal recycling, and HHW receiving / storage. KIB does not deal with auto bodies. There is a contract between KIB and the US Coast Guard that allows refuse from

the USCS to be disposed at the landfill. Other waste management functions are performed by contracted private entities, as noted below:

- Contract with PSC for HHW management services.
- Contract with Threshold Recycling Services.
- Contract with Alaska Waste for residential and commercial refuse collection.

KIB staff also does the billing for solid waste collection services and responds to inquiries about those services from residents and businesses.

5.0 Analysis of Existing Solid Waste Management System

5.1 Observations and Findings

5.1.1 Service Arrangements / Contracts

In the past KIB has relied on a variety of arrangements with private entities – both for– profit companies and non–profit organizations – to manage various wastestreams such as scrap metals, residential and commercial recyclables, household hazardous waste, and municipal trash. Some of these arrangements resulted from competitive procurement procedures and others have been informal, sole source oral agreements or contracts executed without a formal request – for – proposals or bids process.

From the consultant's knowledge of such arrangements it does not appear they have been reviewed by an attorney with expertise in solid waste contractual terms and conditions. In particular, some of the arrangements lack a clearly defined, equitable distribution of obligations, responsibilities, and protections among the involved parties. They also do not provide for specific, regular reporting requirements and protocols by contractors. Both of these are essential for KIB to monitor contract compliance and meet accountability standards.

An illustration of how this currently presents problems for KIB is the way refuse collection is presently set up. Customer billing is done by the Borough rather than the hauler; the hauler does not pay for disposal; and the Borough pays the hauler rather than the customer paying the hauler. Also, both the hauler and the Borough receive and respond to customer complaints. This situation places administrative burdens on KIB personnel that consume time and resources.

Another illustrative problem is the lack of clarity surrounding the handling of hazardous waste, particularly generated in the harbor / cannery area. Such material is placed in dumpsters, picked up by the hauler, and placed on the floor in front of the baler at the landfill. At that point it becomes a health and safety issue for Borough staff. The parties responsible for the generation or collection of the waste, under current conditions, do not share in the responsibility or liability for management and disposal of this material.

Collection must be set up so the hauler manages the wastestream. Rather than have the hauler compile and submit data to KIB for subsequent payment, the contract needs to be reworked so that the hauler is the service provider, pays for disposal, bills the customers, reports on a regular basis to the Borough, and includes the necessary service and system fees in the rates. If the hauling company pays for disposal then it is very unlikely to pick up materials for which it is not charging a rate.

5.1.2 Residential Sector Refuse Pickup

Residential waste collection in KIB is inefficient because there are no standardized, uniform refuse containers; trash is picked up manually by crews; and in City neighborhoods with collection there are also dumpsters. This is a duplicative and costly service to offer. In addition, the present residential waste collection method does not offer a basis for implementing curbside recycling service.

Photo 3: Residential Setout

5.1.3 Recycling

There are material conservation benefits from recycling. However, the closest markets for recyclables from KIB based on existing ocean barging routes are in the Seattle region. Getting recyclables from KIB to this region consumes significant resources, so it is likely the overall environmental impact is marginally positive or even negative. Within the context of conditions in KIB, the main benefits of waste reduction / recycling are landfill preservation and avoidance of the costs and impacts associated with disposal.

However at the current diversion rate of 6 % (see Section 3.3.1) these benefits are minor and do not represent a large amount of cost reduction or diminished disposal impacts. Nevertheless the current cost to recycle through the Threshold contract averages nearly $ 400 per ton and adds about $ 196,000 per year in contract fees that must be paid for through rates at the landfill.

There is no curbside residential recycling collection service currently available in KIB. Threshold Recycling offers pickup of recyclables from commercial / institutional generators but this is limited by the resource and equipment constraints Threshold operates under. These constraints influence not only collection of recyclables but also materials processing, storage, and marketing operations since those operations are done in a building not designed for such purposes (see Section 5.2 below).

5.1.4 Construction and Demolition (C & D) Debris

By its nature, the quantities and types of C & D debris can vary widely over time based on economic activity involving building and renovation. Further, much C & D debris is bulky, heavy, inert, hard – to – handle, and non – organic. For these reasons, under any disposal alternative it should be understood that most C & D debris will continue to be disposed in the KIB landfill because it is not capable of being incinerated or economically transported off–island.

5.1.5 Landfill Operation

The consultant has found no compelling operational or economic reasons to justify terminating operations of the landfill by the KIB. Given the small volume of disposed refuse, along with the historical and contemporary liabilities associated with the landfill, it is not a desirable investment target for the private sector. However, the only way to reliably determine private sector interest is to issue an RFP (request–for–proposals) for operation of the landfill and evaluate responses in comparison with continuing the Borough's role in this part of the solid waste system. If such an RFP is issued the Borough itself should respond for purposes of evaluating costs for public versus private operation of the landfill.

5.2 Needs, Challenges and Opportunities

5.2.1 Recycling

The role of Threshold Recycling under a scenario where recycling is broadly expanded in KIB is not clear at this time. The consultant offers no recommendation on this matter because ultimately the future of recycling and Threshold's involvement with it are policy issues for KIB to decide.

A letter from Threshold to the consultant dated March 27, 2008 (see Appendix H) explains that "challenged employees" are used in various aspects of the recycling operation amounting to 15 percent of personnel costs. This is a valuable community service fulfilled by Threshold. As the letter notes, "…one of our avowed goals is to provide work and training for persons with disabilities." However, the letter estimates Threshold could handle about twice the current material volume at its existing site[3]. Threshold acknowledges another facility with more automated equipment would be needed to accept, process, store, and market additional material quantities above that level. This may not be consistent with the previously stated organizational goal. Further, Threshold is not sure their favorable shipping rate of $ 475 per container would be maintained if material volumes increased.

[3] In 2007, Threshold processed around 686 tons of materials from KIB, including the US Coast Guard.

Another challenge is trying to predict what it would cost if Threshold handled larger quantities of recyclables. In its letter Threshold understandably hesitates to make such a prediction because the nature of its recycling operation would change dramatically with a new facility and more automated equipment. A budget from Threshold for the period October 2006 to September 2007 is in Appendix G. Based on the current contract between Threshold and KIB, payments to Threshold from the Borough for calendar year 2007 totaled $196,434 for 500 recycled tons. It costs the Borough an average of $ 393 per ton for recycling. Whether this cost would go up or down if the tonnage grew is an open question. Threshold Recycling seems to enjoy broad community support in KIB, however, it is doubtful if Threshold by itself has sufficient resources for significant recycling expansion. Threshold acknowledges such an expansion could not be accomplished with its existing building and manual operation.

Increased recycling in KIB will necessitate a centralized facility deliberately designed for receiving, processing, and storing recyclables. Depending on land availability, such a facility could serve multiple purposes such as materials reuse / exchange and refuse transfer.

It is recognized that KIB's geographical location, distance from markets, and comparatively small wastestream pose challenges for making recycling cost – effective. To control the expenses related to handling recyclables, KIB could consider providing various forms of assistance and resources to facilitate a public sector / private sector partnership setting up a Resource or Materials Recovery Facility (RRF or MRF) for expanding recycling. This is discussed further in Section 6.5.1 below.

5.3 Guiding Priorities / Principles for Future Waste Management Practices

The KIB Strategic Plan for 2008 – 2012 outlines the Borough's mission, vision, and guiding principles. It was adopted by the KIB Assembly on January 12, 2008 as Resolution # FY 2008 – 22. Section V – G is titled "Solid Waste Collection and Disposal Goals and Objectives". This section contains the following statements which could be viewed as the main priorities and principles for directing the development of solid waste programs, policies, and facilities in KIB:

- 1 – Consolidate existing plans and long – term needs into a comprehensive solid waste plan that addresses the solid waste function for the next 30 years in an economic and efficient manner.

- 1 – e: Continue to take steps that will extend the existing landfill site through comprehensive recycling and other means for as long as possible without going out of the current permitted area.

- 1 – f: Develop a fee structure to give citizens incentive to recycle.

- 1 – g: As part of the plan identify and quantify all forms of subsidies and equate progressive effects such as recycling to the impact on landfill life and the relationship to costs.

- 1 – I: Encourage KIBSD and Kodiak College to recycle waste and to add recycling education to their education programs.

- 2 – Evaluate and analyze the recycling program to create a long – term participatory program and plan that is economically sustainable.

- 2 – a: Coordinate with stakeholders and product producers with a focus on rewarding good practices and minimizing solid waste production.

- 2 – b: Identify key sources of the waste stream and, through stakeholder and task force methods, address how to minimize the volume and costs of handling those items identified.

As portrayed in Table 1, Section 1.2, there should be a close connection between the priorities and principles that guide a solid waste management system and the combination of programs, policies, and facilities that perform the essential functions of the system – refuse collection, handling, transfer, and disposal; waste reduction / recycling; promotion / education; organization and administration. Consistency between the substance of the system elements and the guiding priorities / principles is necessary if goals and objectives are to be achieved.

For KIB, there are three general directions for solid waste management in the future – maintain the system, modify the system, or change the system. With each of these directions there are related priorities, programs, policies, and facilities, as outlined below.

5.3.1 Maintain the Solid Waste System

- Provide trash collection services at the lowest cost possible.
- Residences should all pay the same rate for garbage pickup and be able to put out whatever trash they have. Families that are large should not be penalized by having to pay higher rates.
- Expand the landfill outside of the current permitted area so there is enough capacity to handle KIB's waste disposal needs for the short – and long – term.

5.3.2 Modify the Solid Waste System

- Provide trash collection services using modern trucks and containers that can be operated efficiently.
- Rates for garbage service should be based on how much you throw away. The more you put out for disposal the more you should pay.

- Remove trash dumpsters from residential areas that already have or will have regular collection service.
- Minimize the administrative time and resources KIB staff now devote to solid waste collection activities.
- Whatever the KIB solid waste program turns out to be, the promotion / education / outreach activities associated with this program should be a major responsibility of KIB staff.

5.3.3 Change the Solid Waste System

- Take steps immediately to stop putting regular garbage into the landfill. The landfill should only be used for debris from construction or demolition projects. All remaining trash should be shipped off of KIB to another disposal site in Alaska or the Pacific Northwest.
- Collection of refuse and recyclable materials are vital services that should be provided directly by KIB employees with equipment owned by KIB.
- Adopt a formal KIB policy that reduction, reuse, recycling, and composting of materials is preferable to disposal through landfilling or incineration.
- KIB should commit to achieving specific reductions in the amount of disposed waste within certain timeframes, such as 25 % by 2012 and 50 % by 2020.
- Provide economic and / or other incentives for KIB residents, businesses, institutions and service providers to reduce waste.
- Establish a central facility for receiving, processing, and storing recyclable and reusable materials.
- Make recycling significantly more convenient, available, and accessible for residents, businesses, and institutions.
- Adopt policies and procedures that require residents, businesses, and institutions to recycle certain specified materials.

6.0 Description of Options for System Components

6.1 Collection

Emphasize operational efficiency for residential refuse pickup by adopting a uniform system using standardized carts for storage emptied by either semi–automated or fully –automated vehicles where logistically feasible. For example, all involved residences would be offered a cart in three different sizes – say, 48, 65, or 95 gallons. Each residence picks a cart appropriate to its waste generating behavior. The rate would vary for each cart size, with the larger cart costing more. Every extra cart would be charged at a rate equal to, or greater than, the first cart. This approach is consistent with having a variable, "Pay – As – You – Throw" residential rate structure similar to what exists now in the commercial sector where cost is directly connected to the amount of trash set out for collection.

Photo 4: 96 and 48 gallon roll carts

6.2 Procuring of Collection Services

One of the primary objectives of this Plan is to procure collection services for the KIB. Before an RFP for collection services is issued to potential vendors the following questions on the future solid waste and recycling collection system need to be considered, and a decision reached by the members of the Assembly. Once a decision has been reached, Borough managers and the consultant will develop an RFP that incorporates the policy direction provided by the Assembly.

6.2.1 Should Kodiak implement a cart system for collecting garbage and recyclables from residences and small businesses?

The existing manual method of residential collection is labor-intensive, out-of-date, inefficient, and unsafe. Waste is set out for collection at the curb in cans, carts, bags, boxes, or loose. Collection crews of one, two or three people, one driving the truck and the other(s) collecting the waste by hand, pick up the trash and throw it into the rear of the truck. There are two ways to collect waste using the cart – based system: semi – automated and fully automated.

Semi – Automated

Trash is collected using standardized roll carts and dumped into the truck with a hydraulic cart tipper. Crew size for a semi-automated collection route is one. The truck is equipped with a steering wheel on the right side of the cab so the driver can stand while driving from house to house. Rather that picking up various containers or bags by hand, the driver rolls the cart onto the tipper affixed to the truck where the mechanized lift dumps the materials into the hopper.

The primary advantage of semi-automated over manual is the tipper dumps the cart rather than the driver. The other is the use of standardized containers for waste.

Fully Automated

Trash is collected in the same carts as semi-automated however the trucks are equipped with a mechanical arm that picks up the cart. The driver operates the mechanical arm from inside the cab of the truck. There are two big advantages of a fully automated route: driver safety and increased productivity based on the number of carts serviced. Since the mechanical arm picks up and dumps the cart, the driver's risk of injury is greatly diminished. The second advantage is the mechanical arm can pick up and dump a cart in about 15 seconds, therefore increasing the number of carts collected over a semi-automated and manual route.

Photo 5: Fully Automated Collection

Other reasons for moving to cart – based collection system are as follows:

- Standardized collection containers: Carts may range in volume from 20 gallons up to 96 gallons.
- Higher level of service: Customer convenience is increased and litter and garbage in the streets is reduced.
- Rate stability: Collection rates over the long-term (5 to 10 years) fluctuate less for automated when compared to other methods of collection.
- Future services: Automated collection trucks can pick up carts designated for residential recyclables and yard debris, so the KIB can add additional services in the future at a lower cost due to fleet / cart standardization.
- Commercial collection tubs: Fully automated trucks can also be fitted with a universal arm gripper to collect 300 and 450 gallon commercial collection tubs[4].

Bears

One of the Borough's primary concerns with moving to a fully automated system is the use of collection carts that are not resistant to bears. The current collection method along the road system is not designed to address the bear issue although roll-off containers presently used are bear-resistant. Trash day in the City of Kodiak offers any bear a wide selection of dining choices because waste is set out in open cans, bags, and in any other manner residents choose to place waste out on the curb. Some community dumpsters located along the road system are not resistant to bears or other vectors and the doors on bear resistant dumpsters are consistently and routinely left open by the public.

[4] 300 gallon tub is equal to 1.5 cubic yard container and a 450 gallon tub is equal to a 2.25 cubic yard container.

It is recommended that curbside refuse collection be expanded to include not only residences in the City of Kodiak but also the metropolitan and outlying, rural areas of KIB on the road system. In the more urban sections of the City and Borough regular roll carts would be provided. Residential customers in the outlying, rural areas of the Borough will get collection at the curb with bear-resistant roll carts similar to the ones currently being utilized in Anchorage, based on an investigation into the applicability of the Anchorage containers to KIB.

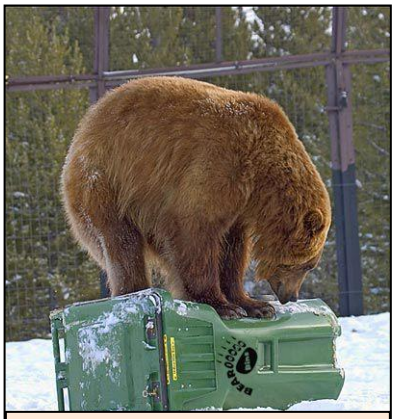


Photo 6: Bear Resistant Cart

Hybrid System

There are three manufacturers that build a collection body and system to collect carts either fully automated, semi-automated, or manually. This gives the waste collector the flexibility to utilize one truck for various circumstances. For example, collection in town could be fully automated and in the remote areas that would use bear resistant carts, the driver could move to semi-automated.

6.2.2 Should rates be variable, that is, a Pay-As-You-Throw structure based on the size / number of the cart(s) / container(s) and the frequency of collection?

Pay-As-You-Throw (PAYT) is a method of setting collection rates based on the amount of waste set out for collection. This method creates a direct economic incentive to recycle more and/or to generate less waste. Two key considerations for PAYT on Kodiak are rate equity and economics. PAYT treats garbage collection the same as other utilities in that customers pay for the services they consume. Secondly, PAYT would eliminate waste generators that are currently subsidized in the existing system by setting rates at a cost of service for both residential and commercial services. This is a fair and equitable approach to establishing collection and disposal rates.

6.2.3 If a cart collection program is implemented, should the utilization of community dumpsters be discontinued where curbside waste collection is provided?

The City of Kodiak is one of a few jurisdictions in the United States where duplicative residential services are offered – residential curbside collection of waste and local dumpsters for additional disposal. While the community dumpster program is popular with many residents, it's also expensive and wasteful. As noted earlier, the cost of the program in 2007 for the approximately 33 containers located within the metropolitan area was estimated at $599,284. Revenue generated from Borough customers @ $31 per month covers $555,396, leaving a shortfall of $43,887. In addition to regular garbage, many items disposed in the community dumpsters are large and bulky such as televisions and furniture that normally would be self-hauled to the landfill. The community dumpsters provide an ideal way for individuals to avoid the responsibility of paying for disposal, thus creating increased costs to the overall solid waste management system.

Photo 7: Community drop box overflowing with garbage and left open for bears.

Alternatives that could be implemented to replace the community dumpsters may include a "call-to-haul" for bulky items such as old furniture or appliances, a drop-off depot for household hazardous waste, and larger garbage carts (up to 95 gallons). A new approach will be implemented over time; dumpsters will not simply disappear without implementation of one or more replacement services.

Elimination of the community dumpsters puts the burden of disposal expenses on the generator of the waste, would greatly reduce the commercial sector subsidy necessary to fund the dumpsters, and be compatible with a PAYT rate structure.

6.2.4 Should the next collection contract be a long-term one, for example, a 7-10 year term of contract with 7 years to amortize equipment and a 3 year extension as an incentive?

Collection operations are capital-intensive ventures. An automated garbage truck will cost approximately $220,000. A roll cart for garbage storage and collection will cost $55 each, plus shipping costs. This is equipment that, while expensive, will last seven to ten years with regular care and maintenance. For a hauler, making a large capital investment in this equipment is more feasible with a long – term contract. It will allow for ample time to recover the capital costs, provide a longer period for distributing rate increases, and provide greater control over rising rates for the Borough and City of Kodiak.

6.2.5 Should the collection company be responsible for billing all residential and commercial customers? and,

6.2.6 Should the collection company be responsible for customer service?

There is an inefficient duplication of efforts and costs under the current system. KIB provides the contractor with a detailed monthly billing register which the contractor fills in to reflect the account activity for that billing period. The contractor generates a detailed monthly billing register and submits the invoice to the KIB for payment. All information on that register / invoice is then keyed in by the KIB to generate invoices that are mailed out to KIB residential and commercial customers. The City invoices residential customers that are hooked up to the water and sewer systerm. In addition to the billing, a high percentage of customer calls are handled twice: first by the Borough, and then by the contractor (or vice versa). If the customer's question can't be answered by Borough staff, that individual or Borough staff calls the contractor to relay the question or issue for resolution.

The Borough budgets $20,000 for the billing and customer service functions alone, which is low considering the person completing this task spends over 50% of their time on these tasks. The contactor already generates the activity for the billing register and answers all the customer complaints that come through the Borough, so their costs are being paid for in the rates. The only item that the contractor is not paying for is the cost of mailing out the invoice.

Turning over the duties of billing and invoicing solely to the collection contractor will not totally relieve the Borough of its responsibility as the manager of the collection contract. If a customer has a complaint, whether it is billing or customer service related, and it is not addressed by the contractor in a manner that is satisfactory to the customer, their next call would be to the Borough program manager for final resolution.

6.3 Disposal

6.3.1 Overview

The current active cell receiving municipal solid waste (MSW) at the Kodiak Landfill has a projected life expectancy until July 2014 [5]. In the interim period, Kodiak Island Borough has three disposal options to consider prior to the closure of this cell: 1) construct a lined cell adjacent to the current active cell, 2) incineration of MSW, or 3) export MSW to an off – island landfill. Each option analyzed in this section has specific challenges and substantial costs. Two of the options, construction of a lined cell and incineration, require an extensive planning period if one or the other is chosen as the future method of disposal. Thus the earlier action can be initiated for undertaking either option the better.

6.3.2 Additional Landfill Capacity

KIB reviewed this alternative in 1997-98 with a study completed by CH2M Hill. The preliminary design recommended construction of a lined 6 to 8 acre cell adjacent to the existing active cell. For this Solid Waste Management Plan the consultant reviewed two additional sites. Site 1 is to the southwest of the current inert cell and Site 2 is the land currently leased to the VFW. The table below summarizes the three areas and the expected cell life of each.

Table 16: Proposed Lined Cell Sites

Cell Site	Site Size In Feet	Square Feet	Acres	Tonnage Capacity	Life in Years
CH2M Hill	650' x 525' x 650' x 525'	345,156	7.9	138,600	10
Site 1	1,087’ x 945’ x 1012’ x 919’	978,134	22.45	400,000	30
Site 2	2024' x 966’ x 2360’ x 1269'	2,449,560	56.23	3,000,000	200

[5] KIB Landfill Permit to ADEC

The area identified by CH2M Hill has a limited life of only eight to ten years. This should be considered a short–term solution to the long–term disposal needs of the Borough. Site 1 has a longer life, but its constraint is the stream that runs through the middle of the site would have to be re-routed. Re-routing the stream would add significant costs to the project. Site 2 is the best option for a long–term solution; however, the VFW has a lease with the Borough for the property until 2027.

Photo 8: Site 1

Moving from the Borough's current unlined cell to a fully compliant lined cell will be expensive due to the additional environmental and operational features of the lined cell (as required by Subtitle D of the Federal Resource Conservation and Recovery Act) and the treatment of leachate. [6] Recovering the costs of the new cell and the operational costs is exacerbated by the small amount of waste generated by KIB toward which these costs can be allocated. Aside from the high costs to operate a lined landfill in a wet climate, landfilling as a disposal method is a known and proven technology.

Photo 9: Site 2

Projecting construction and operating costs six years into the future with precision (once the current active cell has been filled) is difficult. Therefore, the costs associated with the

[6] Leachate is the liquid that drains or "leaches" from a landfill and it varies widely in composition depending on the age of the landfill and the type of waste disposed. It usually contains both dissolved and suspended material.

construction of a lined cell are presented using low, medium, and high estimates (see Appendix L for details). Operational costs have been projected using the current costs and then inflated. The expected landfill disposal costs from these estimates ranges from a low of $212 a ton to a high of $258 per ton.

Planning and permitting necessary to expand the current landfill is a process that could take three to six years. The permitting process can be time–consuming and expensive and thus it is strongly emphasized this process be started immediately if the decision is made to continue with landfilling waste as the preferred disposal method.

6.3.3 Incineration

An alternative to landfilling waste is incineration[7]. Incineration would be used to reduce the volume of the wastestream and thus extend the life of the current cell from six to almost twenty years.

A controlled air modular unit would be the type of incineration technology utilized in Kodiak. A modular incinerator uses a three–step process to heat and dry the waste, release volatile combustible gases, and finally burn the gases. To accommodate the unit, the current configuration of the baler building would have to be upgraded and expanded to allow for floor sorting and temporary storage of waste. The incinerator would burn continuously for 24 hours a day, five days a week and require an increase in the workforce.

The permitting process involves state and federal agencies charged with the regulation and protection of air and land resources. However, the time required for completion could be less than compared to landfilling. Incineration is most cost–effective if the current active cell can be utilized for ash disposal. Ash disposal at the KIB landfill has been assumed in estimating the cost per ton for incineration. The projected cost per ton for incineration is approximately $219 per ton.

6.3.4 Waste Export

Regional landfills in the Columbia River[8] basin and the Kenai Peninsula were considered for the export of Kodiak's MSW. Compared to landfilling and incineration, barging waste to an off–island landfill is the simplest method of disposal but also the most expensive. Shipping costs, which have been historically volatile, comprise over 54% and up to 77% of the total projected costs for this option.

Since a majority of the costs for exporting waste are tied to the price and volatility of fuel, costs could be unpredictable and the span of control for KIB is limited. For these reasons it is

[7] Incineration is a waste treatment technology that involves the burning of organic materials and / or substances.
[8] There are three regional landfills: Waste Management owns Columbia Ridge Landfill in Arlington, Oregon, Allied Waste owns Roosevelt Regional Landfill in Roosevelt, Washington, and Waste Connections owns Finley Buttes Landfill in Boardman, Oregon.

recommended to not pursue further consideration of exporting waste as a disposal alternative and to focus the remaining analysis on landfilling and incineration.

6.3.5 Future Landfill Expansion

The Borough will need a landfill for the foreseeable future whether it chooses to incinerate or continue to landfill MSW. The primary byproduct of incineration is ash that will require disposal at the landfill. Inert waste such as construction and demolition materials will also require landfilling. Therefore, the Borough needs to insure that an adequate area is available to expand the existing landfill over the next 20 to 50 years.

The current active cell has approximately eight years of life and the lateral expansion on the northeast side of the landfill would add an additional 10 years of life for a total of 16 years or until 2025. Once these areas have been filled to capacity, Site 1 would be the next logical area to expand. However, re–routing the stream will present an engineering challenge as well as a financial burden. Securing Site 2 land would require the Borough to cancel the lease with the VFW prior to 2027, a decision that could have legal and public relations impacts.

The decision to construct any future cells has to be made dependant on the ability of the Borough to secure the land necessary for expansion. The only other alternative for expansion is the adjacent Sawmill property to the northeast. The best case scenario would be to secure the Sawmill property now and include this area as part of any future expansion of the landfill. If the Borough decides in the future this property is not needed for expansion, it can either sell it or use it for other purposes.

Figure 9: Adjacent Land Northeast of Landfill

6.3.6 Projected Costs

Comparing costs for the disposal options is complicated because of the different implementation timeframes associated with each alternative. For example, landfill design and permitting costs will be incurred over the next 18 months, whereas the construction costs will not be incurred until 2013–14 calendar year. Incineration costs will be incurred over the next 18 to 24 months. Quotes for barging costs from September 2007 are already outdated and will vary relative to fuel price fluctuations. Each disposal option has separate detailed costs and needs to be reviewed in their respective context. Please refer to Appendix L for further discussion. The table below provides a cost summary.

Table 17: Cost Per Ton for Disposal Options

Disposal Option	Implementation Year	Cost per Ton
Lined Landfill	2014	$ 212 to $258
Incineration	2010	$ 219
Waste Export	2016	$ 209 to 289

6.3.7 Next Steps

The landfill option provides the Borough with a definite disposal method until 2025. At that point in time, if the Sawmill property is owned by the Borough, the landfill could expand in that direction or KIB could re-route the stream and expand to the southwest of the inert cell. Either way, there are decisions that need to be made in order to plan beyond the year 2025.

If Incineration is chosen, the Borough will still require a landfill to dispose of the ash, but the current cell life is extended for approximately 20 years. Once that cell has been exhausted, the Borough would have to build a lined cell to handle the ash. In addition to the cost of constructing a lined cell, the incinerator will be approaching the end of its useful life and need to be replaced. A prudent solid waste plan will require a sinking fund not only for the replacement of the incinerator, but also for the replacement (or partial) replacement of the current unlined cell once it has been filled with ash.

A detailed discussion of the three primary disposal options – continued landfilling on KIB, incineration, and transport to an out – of – state landfill – is contained in Appendix L.

6.4 Diversion – Waste Reduction, Recycling, Composting

6.4.1 Recycling

- Increase the convenience of recycling participation through the use of standardized roll carts for storage and collection of recyclables from residences and small businesses. Recyclables would be mixed together or commingled in the carts. This strategy depends on implementation of the modernized, cart–based refuse collection approach discussed in Section 6.2 above. Vehicles utilized for the collection of trash could be used for picking up recyclables as well.

- For larger commercial / institutional generators using dumpsters or other storage bins for refuse, collection of designated commingled recyclables using a variety of containers would be offered where logistically feasible.

- Establish centralized facility for receiving, processing, and storing recyclables along with a materials reuse / exchange area and refuse transfer capability.

- Identify land approximately 5 acres or more in size owned by the Borough or the private sector for the materials recovery / reuse / transfer facility.

It is recognized that KIB's geographical location, distance from markets, and comparatively small wastestream pose challenges for making recycling cost – effective. To control the expenses related to handling recyclables, KIB should consider providing various forms of assistance and resources to facilitate a public sector / private sector partnership for expanding recycling and setting up a Resource Recovery Facility, as outlined below:

1. Leasing land owned by KIB at a nominal fee for the purpose of locating a centralized operation dedicated to the storage, processing, and marketing of recyclables, as well as other materials reuse, exchange, and diversion activities that may be developed in the future.

2. Sharing the costs and construction management responsibilities for a building / facility to fulfill the recycling and other functions noted in # 1 above.

3. Sharing the costs for purchasing a baler and other basic handling equipment for the recycling building / facility.

4. Expediting procedures related to the zoning and permitting of the recycling building / facility.

5. Reduction of property taxes related to the recycling building / facility.

6. Assumption of primary responsibility for implementing promotion / education / outreach (PEO) efforts and preparation / production / distribution of PEO materials.

6.4.2 Composting

Composting on Kodiak Island must overcome five primary challenges:

- Adequate area to compost
- Sufficient bulking materials
- Climate
- Initial investment for facility and equipment
- Market development

These are discussed in the sections below.

Adequate Area to Compost

To sustain a municipal – scale composting operation a flat area of at least 3 acres is needed. The most logical area to compost materials would be the northeast corner of the landfill for the following reasons: 1) The area is already permitted for disposal operations, so an amendment to the permit to allow composting should be relatively easy to obtain; 2) This is already a central drop – off point for most of the compost feedstock; and, 3) The staff and equipment necessary for compost operations are already located at the landfill.

Photo 11: Suitable Composting Site

Although the landfill is the most logical area, it also presents a problem because the area that would be used for composting is also the area planned for lateral expansion of the next landfill cell. Placing the compost site in that area would limit the Borough's future disposal capacity. Other areas of the island could be used for composting operations, but costs would increase substantially due to the transport of feedstocks, the duplication of staff and equipment, and the cost of permitting an additional solid waste site, unless that area was adjacent to the existing landfill footprint.

Sufficient Bulking Materials

Due to the wet and heavy nature of sewage sludge, a bulking agent is required for effective composting and to produce a quality end product. This assumes a policy decision is reached between the KIB and City of Kodiak that the ultimate best use for sludge or biosolids is composting rather than disposal. The ratio of sludge to bulking material is approximately 1 part sludge to 2.5 parts bulking material. The City of Kodiak produces 2,000 tons of sludge annually, or 77 tons every two weeks. Assume that a new batch of compost would be started every two weeks and the total time needed to compost the materials is 12 weeks. The

Borough will need an initial stock of 1,155 tons of woody material (77 tons of sludge x 6 two week cycles x 2.5:1 ratio of wood to sludge). Assuming that 45% of the bulking material will be screened out and reused, the Borough will need an inventory of no less than 635 tons of woody feedstock to carry out the composting process involving sludge.

Based on waste composition data, the annual yard and wood waste delivered to the landfill is estimated to be approximately 1,196 tons. However, this number should be reduced to account for materials that either are unsuitable for composting, such as treated or painted wood, or are too small to be separated from the wastestream such as a small bag of lawn clippings. These calculations are summarized as follows:

Table 18: Composting Feedstock Estimates

Material	Waste Tons	Feedstock Tons	Assumptions
Yard Waste	372	223	Assumes 60% of waste would be diverted to compost
Wood Waste	824	164	Assumes 20% of clean lumber is diverted to compost
Totals	**1,196**	**388**	

The annual amount that could be diverted from the landfill and used in composting operations is approximately 388 tons. Therefore, to assure uninterrupted composting operations the Borough would need to find more adequate, reliable supplies of bulking materials, in addition to those disposed at the landfill.

Climate

The high annual rainfall on KIB presents further complications to composting and increases costs. Excess water absorbs heat, increasing the time required for the pile to reach adequate composting temperatures. Too much water can significantly diminish the quality of the product. Additional steps such as placing protective covers over the windrows as the product cures or employing a bag containment system during active composting will allow the compost to maintain adequate levels of moisture without saturation. A covered area will be necessary to protect feedstock (mainly sludge) as well as the finished products from erosion due to rain and wind. Since the growing season is limited, the storage area must be adequate to secure finished product for six to nine months when weather conditions are typically not conducive to land application.

Initial Investment for Facility and Equipment

The initial cost of the equipment and infrastructure will be substantial. At a minimum, a non-porous (paved) area must be constructed to prevent leaching of the compost liquids into the soils and groundwater. A storm

Photo 12: Trommel Screen

water system will divert run-off from the compost piles to an adequate filtering system. Some of the necessary equipment such as a dump truck, front loader, and tractor are already in use at the landfill. The following table is a listing of some of the projected facility components, equipment, and related costs the Borough would need to consider prior to commencing composting operations.

Table 19: Composting Capital / Start – Up Expenses

Description	Quantity	Cost	Notes
Facility Upgrades			
Concrete / asphalt (sq. foot)	12,000	$ 480,000	$40 per sq. foot
Curing pad drainage system	1	$ 319,700	prior work cost
Filter system for run-off	1	$ 363,400	prior work cost
Covered area for material storage	3,200	$ 352,000	$110 per sq. foot
Equipment			
Grinder / Shredder (used)	1	$ 75,000	
Trommel screen	1	$ 100,000	small unit
Windrow turner	1	$ 25,000	Attach to tractor
Aeration equipment	1	$ 20,000	
Total Cost		**$ 1,735,100**	

Market Development

Assuming there is an adequate supply of bulking material, the Borough could produce approximately 2,200 tons of compost annually. Is there a market or markets for 2,200 tons of soil amendments in KIB? To justify the investment in a composting operation this question needs to be answered at the outset. The rocky nature of the island and the high cost of transporting soil from other areas provide a great opportunity for the sale of compost and compost – blended products. There is an apparent need for high-quality soil amendments that may attract both commercial and residential buyers. It may be possible to develop partnerships with agricultural users and wholesale / retail outlets, thus reducing the need for the Borough to actively market the compost products over the long–term. However, the Borough must take the lead in determining potential outlets for the finished products.

Photo 13: Shelter area for the storage of finished compost

Conclusions

Composting is a proven method of waste management used by many communities to produce a useful end product for sale and reduce the quantities of material disposed. Composting is consistent with an overall solid waste system scenario in KIB that emphasizes maximizing diversion. As discussed above though, there are considerable obstacles to creating a viable composting program in KIB. The critical factors are expressed in the following questions:

- Are there stable, long – term markets for the compost in Kodiak?
- Does KIB have sufficient resources and the political will to site, procure, and finance a composting system that would be effective, given the local climate and geographic conditions?
- Can the compost be produced and transported to market(s) at a cost lower than the selling price?
- Is composting cost – effective compared with other methods (such as landfilling) for managing the organic portion (including sludge) of Kodiak's wastestream?

There is already some historical experience and basic infrastructure regarding recycling in KIB's public, private for–profit, and non–profit sectors. In contrast, composting would be an entirely new enterprise. Thus it seems logical that if KIB made a commitment to a maximum diversion scenario then expanding recycling would be emphasized first while the feasibility and impacts of composting are explored further. Indeed, some of the primary elements of that scenario such as semi – or fully – automated residential refuse collection vehicles, different sized carts, variable "Pay – As – You – Throw" rates, and the development of a conveniently located, multi – purpose Resource Recovery Facility, would all support the ultimate implementation of composting.

6.5 Household Hazardous Wastes

Maintain current contractual arrangement since there is no facility on the island permitted for the management / disposal of household hazardous wastes.

6.6 Special Wastes

Table 15 in Section 4.7 summarizes current management methods for 12 types of special wastes. To significantly enhance the recycling of some of these materials, or initiate recycling or reuse for those presently disposed, necessitates construction and operation of the central Resource Recovery Facility discussed previously.

6.7 Organization and Administration

6.7.1 Private Sector Service Provision

Future arrangements for managing various wastestreams should be secured through competititive procurement procedures rather than informal, sole source oral agreements or non–competitive contracting. Existing and future service contracts should be reviewed by an attorney with expertise in solid waste contractual terms and conditions. Such contracts should contain an equitable distribution of obligations, responsibilities, and protections among the involved parties. In particular, clearly defined regular reporting requirements and protocols for contractors are essential for KIB to monitor contract compliance and meet accountability standards.

6.7.2 KIB / US Coast Guard Cooperation and Coordination

KIB and the USCG should consider greater cooperation and coordination in solid waste management by jointly contracting for refuse collection and recycling collection / processing / marketing services. From a strictly technical perspective there are operational efficiencies, economies of scale, and negotiating advantages to be achieved through such a combined approach to service procurement. It is acknowledged there may be institutional hurdles to overcome; however, this alternative is worth examining.

6.7.3 Responsibilities of Waste Collector

Refuse collection should to be set up so the contracted hauler directly manages the wastestream both operationally and economically. Since the hauling company is the service provider it should logically pay for disposal of collected waste; bill the customers; report on a regular basis to the Borough; and include all necessary service and system fees in the rates.

6.7.4 Public Sector Service Provision

KIB's remote island location, rural environment, stable population, and small amount of refuse do not make it an attractive market for private sector competition and investment regarding solid waste management services and infrastructure. Given this situation and these factors, KIB may want to seriously consider directly operating other primary components of the solid waste system such as refuse collection and collection, processing, and marketing of recyclables. For future procurement of these and possibly other solid waste services, KIB itself could prepare and submit proposals / bids in response to RFPs and RFBs. The RFPs / RFBs would be written and issued by an independent panel which would also review responses and select the winning vendor.

7.0 Conclusion

7.1 Alternative System Scenarios

Based on the existing solid waste system evaluation and different guiding priorities for the future (Section 5), plus the program, policy, and facility options (Section 6), contrasting combinations of priorities and options can be formulated into alternative system scenarios. These are presented in the table that follows.

Table 20: Alternative Solid Waste Management Scenarios for KIB

Solid Waste System Element ▼	**Scenario A** **KEEP BASIC SERVICES** **Minimum Change** ► ***Same System***	**Scenario B** **ENHANCE BASIC SERVICES** **Modest Change** ► ***Revised System***	**Scenario C** **MAXIMIZE DIVERSION** **Significant Change** ► ***New System***
Guiding Priorities & Principles	- Maintain essential solid waste management functions	- Upgrade safety, efficiency of residential refuse pickup operation - Expand contractor administrative responsibilities	- Universal refuse & recycling services for homes, businesses - Emphasize diversion & extending landfill life
1 / Collection	- Current approach, except remove residential dumpsters	- Fully automated or semi–automated for residences - 2 or 3 different cart sizes - Variable rates based on cart size & number - Eliminate residential dumpsters	- Fully automated or semi–automated for residences, variable rates - 2 or 3 different cart sizes - Eliminate residential dumpsters
2 / Handling & Transfer	- Current approach	- Current approach	- Central, multi–faceted Resource Recovery Facility for recycling, reuse, exchange, yard waste, HHW, C & D materials, waste transfer, education
3 / Waste Reduction & Recycling	- Current approach - Except private auto body recycler under contract	- Current approach - Except private auto body recycler under contract	- Aggressive, comprehensive - Recyclables collection for homes, businesses - Services provided through partnership between KIB, City of Kodiak, non–profit, & private sector entities
4 / Disposal	- KIB Landfill	- KIB Landfill	- KIB Landfill - No public or trash vehicles at landfill
5 / Promotion & Education	- Basic level - Coordinate with Threshold on waste reduction / recycling	- Basic level, but introduce new residential trash program - Coordinate with Threshold on waste reduction / recycling	- KIB leadership - Coordinate with service provider(s) - Multi–media, ongoing
6 / Organization & Administration	- Current approach - Issue RFP for collection of trash	- Collector pays for disposal, does billing, responds to customer concerns directly	- Collector pays for disposal, does billing, responds to customer concerns directly - 1 primary contractor plus possible sub – contractors