City / Borough of Juneau (CBJ)
Solid Waste Management Strategy
Table of Contents

City / Borough of Juneau (CBJ)
Solid Waste Management Strategy
Table of Contents

City / Borough of Juneau (CBJ)
Solid Waste Management Strategy
Table of Contents

City / Borough of Juneau (CBJ)
Solid Waste Management Strategy
Table of Contents

Figures

Tables

Appendices

City / Borough of Juneau (CBJ)
Solid Waste Management Strategy

1.0 Introduction

1.1 Background

The project to develop a Solid Waste Management Strategy (SWMS or Strategy) was undertaken by the CBJ because of several factors, including but not limited to the following:

- After approximately 20 years of operation the two incinerators that had been Juneau's primary disposal method were closed by Waste Management, Inc. (WMI) in June, 2004.

- The incinerators were located on about 45 acres of land owned by WMI and adjacent to a landfill on the same property in the Lemon Creek area. The unlined landfill became the primary disposal method for CBJ's trash after the incinerators were shut down.

- The growing visibility of the landfill operation has renewed questions about its environmental impacts on the Lemon Creek wetlands.

- Attention has been focused on waste reduction / recycling as a way to decrease the amount of garbage being landfilled.

- The ability of Juneau to influence activities in the solid waste management arena, and its relationship to private sector service providers, have become issues of concern in determining CBJ's solid waste future.

In consideration of these factors the CBJ contracted with WIH Resource Group (WIH or the consultant) to develop a SWMS.

1.2 Purpose

The Request – for – Proposals (RFP) issued by the CBJ for a Solid Waste Management Strategy stated the Strategy should address methods of achieving Juneau's commitment to integrated solid waste management practices as expressed in the Comprehensive Plan and Assembly Resolution 1433 (March 19, 1990). Those practices are, in order of priority:

- Waste reduction,
- Recovery / recycling of resources,
- Recovery / recycling of heat or electricity from waste incineration,
- Treatment and processing of waste to reduce volume,
- Waste incineration, and,
- Landfilling in an environmentally sound manner.

Given these priority objectives two key questions are: What is the future role and involvement of CBJ in solid waste management? What form of CBJ "control" over solid waste management should there be and what is the rationale for this?

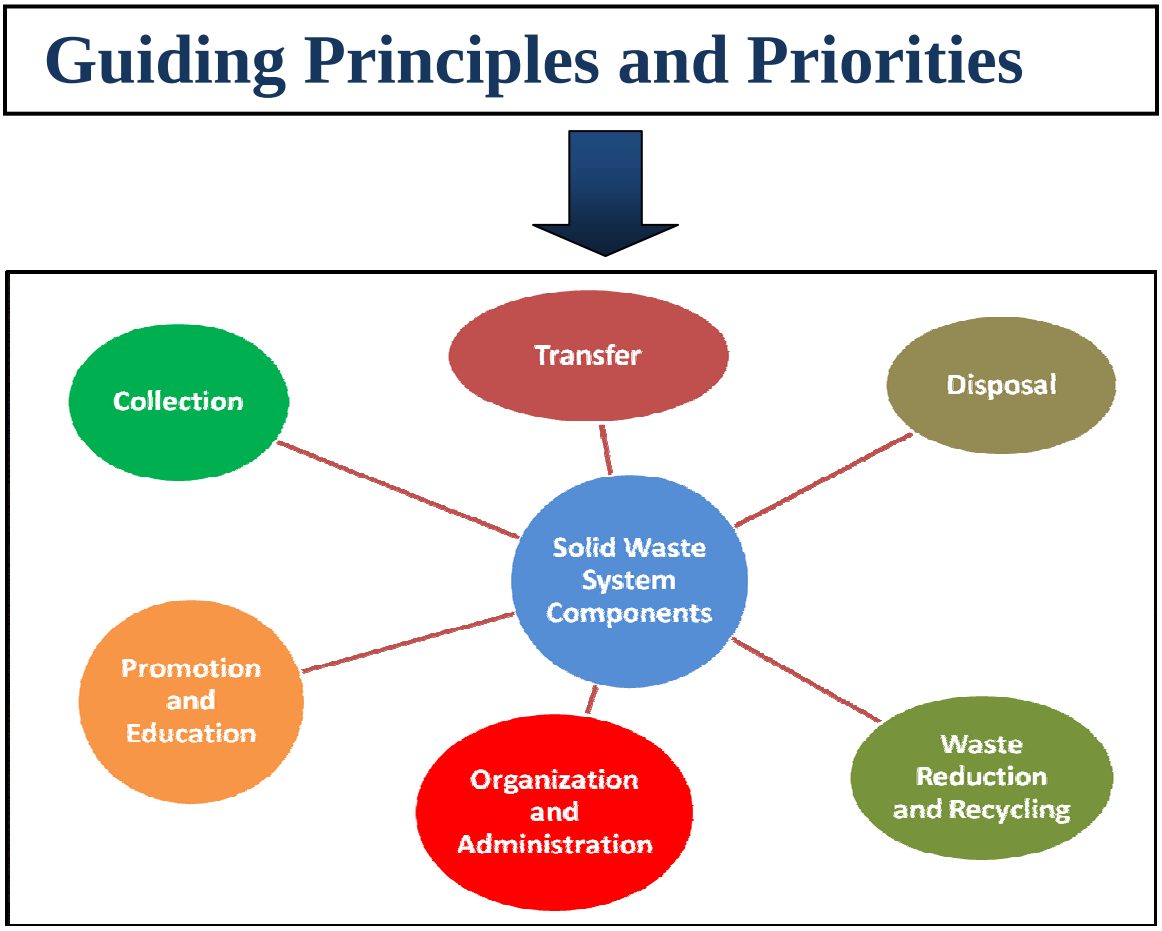
1.3 Methodology and Process

In analyzing a solid waste management system it is important to examine the relationship between the system's goals / objectives, the system components, and the resources allocated to the system operations. Is there balance and consistency between these factors and do they logically support each other or is there conflict and inconsistency? For example, is there an expectation or desire that the system will achieve a high level of waste reduction / recycling but the operational infrastructure and supportive policies necessary to carry this out are inadequate?

The consultant approaches the analysis of solid waste management issues and alternatives from an integrated perspective. The various practices and operations that characterize how solid waste is handled in a given area are viewed as the related components of a solid waste management system. Consideration of individual elements

is done within the framework of the whole program and involves examining how they are related and conflict with, or support, each other. The diagram below portrays the basic structure and components of a solid waste management system.

Figure 1



Basic Components for Solid Waste Management System

The consultant developed this SWMS by visiting Juneau and having discussions with public and private sector representatives about solid waste management conditions and needs. There has been ongoing cooperation and coordination with these representatives for purposes of gathering data and sharing ideas. The information used in preparing this SWMS is the most accurate WIH was able to obtain, either through published reports, interviews with personnel, or from records kept by the appropriate governmental entity / department. Material, data, and comments have also been specifically provided by Arrow Refuse and Waste Management, Inc. as the refuse collection and disposal service providers respectively.

1.3.1 Solid Waste Working Group

A Solid Waste Working Group (SWWG) was formed to give feedback to the consultant and CBJ Assembly on the contents of the Solid Waste Management Strategy as it was being developed. Four meetings of the SWWG were held. The SWWG had eight members as follows:

- David Stone
- Maria Gladziszewski
- Joe Buck
- Cynthia Johnson
- Nancy Waterman
- Dave Hanna
- Gretchen Keiser
- Marcy Larson

In addition to the SWWG meetings, two public meetings were conducted to offer updates on the Strategy development and get comments from interested citizens. The consultant also met with the Public Works and Facilities Committee and individual Assembly members. A formal presentation of the Final Draft Strategy was made by the consultant to the full Assembly on November 29, 2007. At that meeting the Assembly conceptually approved the recommendations of the Strategy.

1.3.2 Strategy Development Sequence

The process for preparing the Solid Waste Management Strategy consists of a series of logically connected technical steps and feedback interactions involving the consultant, the SWWG, and the CBJ Assembly, as portrayed in the figure and accompanying explanation below.

Figure 2

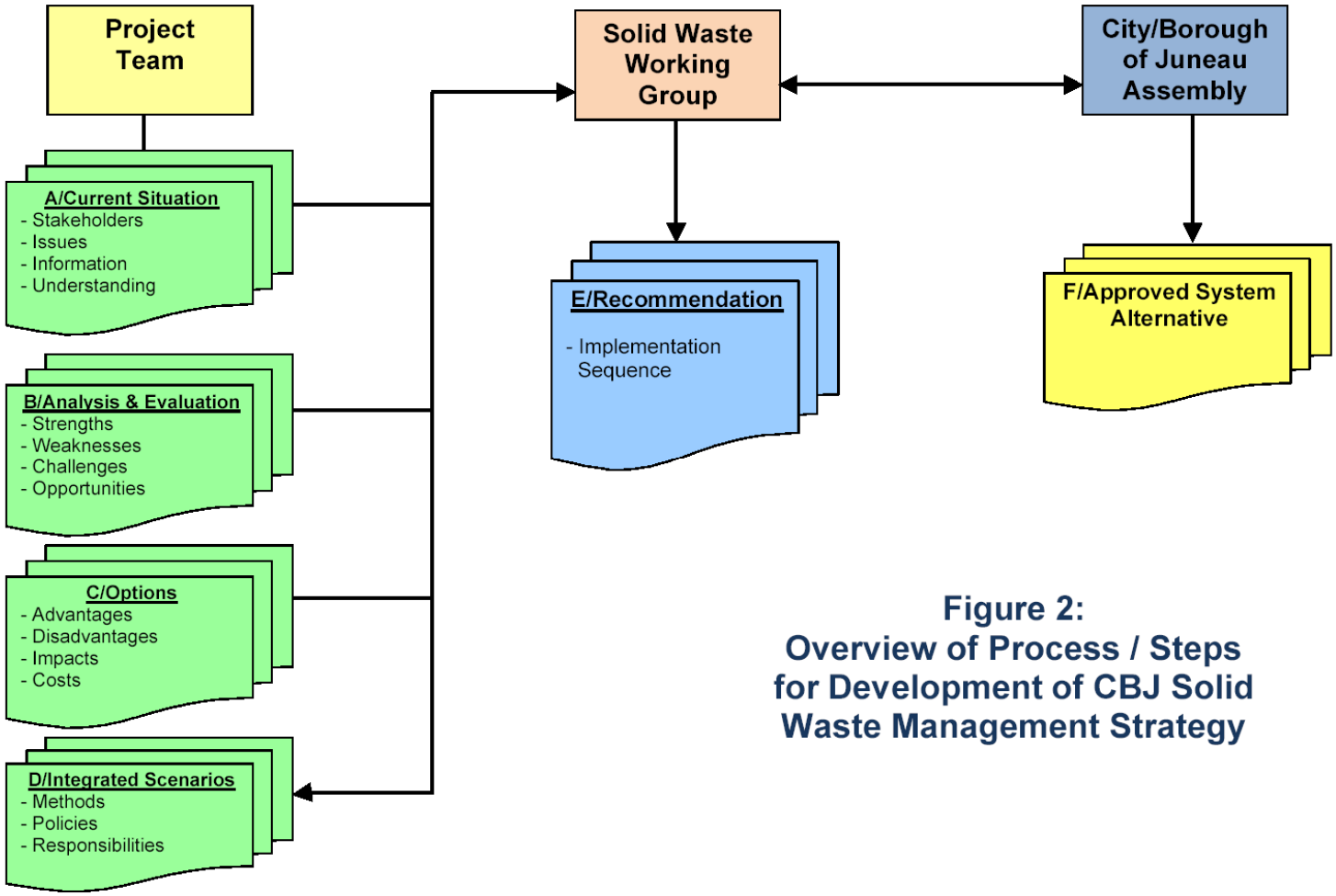


Figure 2:
Overview of Process / Steps for Development of CBJ Solid Waste Management Strategy

The steps in the Strategy preparation process are correlated to the actual sections of this Strategy as follows:

- **A / Current Situation** – Section 2: Local Conditions; Section 3: Existing Solid Waste Management System / Practices; Section 4: Wastestream Quantities and Characteristics

- **B / Analysis and Evaluation** – Section 5: Analysis of Existing Solid Waste Management System / Practices

- **C / Options** – Section 6: Description of Options for Major System Components

- **D / Integrated Scenarios** – Section 7: Recommended Solid Waste Management Strategy / Scenario

- **E / Recommendation** – Section 7: Recommended Strategy / Scenario; Section 8: Implementation of Recommended Strategy / Scenario

- **F / Approved System Alternative** – Section 7: Recommended Strategy / Scenario; Section 8: Implementation of Recommended Strategy / Scenario

2.0 Local Conditions

2.1 Population

- Population is relatively stable with no large increases predicted.

- Mid – range Juneau population estimate for July 1, 2008 is 32,413 and for July 1, 2018 the figure is 34,447 (Alaska Department of Labor, Research and Analysis Section, Demographics Unit).

- The population projection for the City / Borough of Juneau was calculated using data from a previous estimate by the Alaska Department of Labor, Research and Analysis Section, Demographics Unit. The CBJ population estimate for the year 2008 was used as the base year for the projection in this Solid Waste Management Strategy. An annual mid – range growth rate of 0.64% was used to estimate population growth from 2008 to 2013 consistent with the original projection. An annual mid – range growth rate of 0.57% was used through the year 2038 consistent with the original projection used from 2013 to 2018.

Table 1: CBJ Population Projection

Year	Population Projection	Year	Population Projection
2008	32,413	2024	35,650
2009	32,623	2025	35,855
2010	32,834	2026	36,061
2011	33,046	2027	36,268
2012	33,260	2028	36,476
2013	33,475	2029	36,685
2014	33,667	2030	36,896
2015	33,860	2031	37,108
2016	34,055	2032	37,321
2017	34,250	2033	37,535
2018	34,447	2034	37,750
2019	34,645	2035	37,967
2020	34,843	2036	38,185
2021	35,043	2037	38,404
2022	35,245	2038	38,625
2023	35,447		

2.2 Housing

- Around 8,000 single – family housing units, including single – family residences, duplexes, and mobile homes plus an additional 5,000 housing units in condominiums and apartment buildings.
- Most populated residential areas are situated north of downtown in flat valley floors. Density is high given limited land areas. Downtown has steep hills rising quickly from the business district with residences situated on narrow, short streets having limited access.

2.3 Economy

- Juneau is the capital of Alaska. The public sector accounts for 44 % of the employment base including state government at 26 % and the federal government 5.5 %.
- Private sector accounts for 56 % of the employment base.
- The harvesting and processing of seafood and mining operations are major private sector employers.
- Per capita income is higher in Juneau in comparison to averages for the rest of Alaska and the U.S. but so is the cost of living, due mainly to the cost of buying or renting housing.

2.4 Climate

- Coastal location with mild maritime climate.
- Does not typically experience extreme temperatures – 44 to 65 degrees in the Summer and 25 to 35 degrees in the Winter are average.
- Rainfall ranges from an average of 56 inches / year at the airport to 80 inches / year downtown.

2.5 Geography

- Located along the Inside Passage and within the Alexander Archipelago.

- Physically isolated and accessible only by boat or aircraft.

- Seattle is about 970 air miles to the south and Anchorage is about 570 air miles to the north.

- Consists of 3,250 square miles including 928 square miles of ice cap and 704 square miles of water.

- Part of the mainland, but characterized by dramatic changes in terrain from sea level to mountains within short distances.

2.6 Political / Institutional Entities and Responsibilities

The legislative and decision – making entity for the CBJ is the Assembly. There are nine members of the Assembly. There is also a Public Works and Facilities Committee (PWFC) that considers solid waste management issues. The PWFC is composed of four Assembly members and one non – voting representative from the CBJ Planning Commission.

3.0 Existing Solid Waste Management System / Practices

3.1 Collection

Residences, businesses, and institutions in Juneau are not required to have solid waste picked up at the point of generation. Under terms and conditions established by the Regulatory Commission of Alaska (RCA), refuse collection is provided exclusively by Alaska Pacific Environmental Services / Arrow Refuse (Arrow Refuse). Generators that do not use Arrow Refuse may take their refuse to the landfill and pay the prevailing rates for disposal.

As noted above, Arrow Refuse, a subsidiary of Alaska Pacific Environmental Services, is the current owner of the solid waste collection certificate for the City and Borough of Juneau. Service is optional. Trash containers are provided by the customers or a cart can be rented from Arrow Refuse. Waste is collected weekly at the curb. Commercial customers are provided metal containers ranging in size from 1 yard to 3 cubic yards of volume. Collection frequency varies depending on the needs of the customer. In March 2007, Arrow reported 6,800 residential customers and 550 commercial customers in the CBJ. The current collection system utilized in Juneau consists of rear – load trucks with either a single driver or a crew, depending on the route characteristics. The trucks can collect waste from both residential and commercial customers.

3.1.1 Collection Rates

Collection rates charged by Arrow Refuse for their customers in Juneau are set by the Regulatory Commission of Alaska. The complete set of rates are found in Appendix A. The process of adjusting rates begins when a utility files a Revenue Requirement Study based on previous costs and revenues. "*The Revenue Requirement Study also includes various proposed adjustments to normalize the historical costs. Normalizing adjustments modify booked costs or revenues to make them representative of the cost the utility is likely to incur in the future period when the rates will be in effect. After considering the evidence and allowing, rejecting or adjusting the costs accordingly, the Commission will approve the utility's revenue requirement, which is the sum of: operating expenses + depreciation + taxes + return.* [1] "

[1] RCA Basic Ratemaking Primer, page 2

The allowable operating ratio is 93% of the projected costs. The following table breaks out the cost components of the current residential collection rate for a 32 gallon can collected weekly.

Table 2: Residential Rate Components [2]

Cost Component	Per Month
Operating Expenses & Depreciation	$ 13.56
Margin @ 7% of Collection Costs	$ 1.02
32 Gallon Can Collection Rate	$ 14.58
RCA Tax @ 0.48%	$ 0.07
Juneau Sales Tax @ 5%	$ 0.73
Total 32 Gallon Can Rate	**$ 15.38**

Table 3 is a summary of the collection rates for solid waste services most commonly provided by Arrow Refuse to residential and commercial generators in the CBJ. Appendix A contains a more detailed list of service rates.

Table 3: Summary of Arrow Refuse Monthly Collection Rates [3]

Service	Collection Rate	Container Rent	Taxes	TOTAL COST
32 gallon can collected weekly	$ 14.58	N/A	$ 0.80	$ 15.38
3 – 32 gallon cans collected weekly	$ 21.77	N/A	$ 1.19	$ 22.96
96 gal. commercial cart weekly pickup	$ 22.89	$ 6.55	$ 1.61	$ 31.05
2 yard dumpster collected weekly	$ 101.26	$ 47.15	$ 8.13	$ 156.54
3 yard dumpster collected weekly	$ 151.89	$ 53.69	$ 11.27	$ 216.84

3.2 Handling and Transfer

Waste is taken directly to the Capitol Disposal / Waste Management Landfill by trucks from collection routes or by generators who self – haul garbage on their own. There is no transfer station operation for refuse in the CBJ.

The only transfer operation is for recyclable materials. Recyclables are processed and baled at the recycling facility owned and operated by Waste Management at the landfill. Recyclable materials are loaded and transported in intermodal containers via barge to

[2] Source / Glen Thompson, Arrow Refuse General Manager

[3] Source / Glen Thompson, Arrow Refuse General Manager

Seattle for processing. Scrap metals collected at the landfill are also loaded into intermodal containers for further processing in Seattle.

3.3 Diversion – Waste Reduction / Prevention, Reuse, Recycling, Composting

The Recycling Center is located at the WMI landfill in the building that previously contained the incinerators. It is open five days per week, Tuesday through Saturday. WMI operates the Recycling Center under a contract to the CBJ for an annual fee of $ 165,000. This fee is for managing and operating the Recycling Center. The contract expires at the end of June, 2008. The program is funded by a portion of the $ 4 / month waste management utility fee assessed on all residential households in the CBJ. This fee also funds the Household Hazardous Waste Program (see Section 3.5).

Materials accepted at the Recycling Center include glass containers, aluminum cans, tin / steel cans, newspapers, cardboard, white paper, mixed waste paper, PET # 1 plastic containers, and HDPE # 2 plastic containers. For calendar year 2006 approximately 1,300 tons of recyclables were handled through the Recycling Center (see Section 4.2). WMI processes and markets the recyclables. Once the materials are sold WMI deducts shipping expenses and shares the remaining revenue with the CBJ. Shipping costs in excess of revenues are paid by the CBJ. The contract contains an economic benefit to the contractor since the share of sales revenues allocated to the contractor rises as recycled tonnage increases.

A “Community Values Survey” (March, 2007) performed for the CBJ Comprehensive Plan revealed that “curbside pickup of recyclable materials” was ranked the third most important priority or “change you might want to see in Juneau” by responding residents. Affordable housing for sale and rent were the # 1 and # 2 concerns respectively.

Curbside residential recycling collection service is not offered in Juneau. There is also no organized, systematic, comprehensive recycling collection service for commercial / institutional generators. While there is no comprehensive commercial recycling pickup, there is at least one company offering recycling pickup services to individual commercial clients.

The CBJ, in cooperation with Waste Management, recently initiated a Commercial Recycling Pilot Program to make it easier and more cost – effective for commercial businesses to take recyclables to the Recycling Center at the landfill. Previously businesses with recyclables went across the scale and were charged based on the weight of their materials. Under the Pilot Program participating businesses are charged a flat fee of $ 100 per calendar year and receive a Commercial Recycling Permit. They can proceed directly to the Recycling Center and utilize it as often as needed.

3.4 Disposal

3.4.1 Existing Landfill

Capitol Disposal, Inc. / Waste Management, Inc. (WMI) operates an unlined landfill on approximately 45 acres of property it owns. The landfill has an estimated 30 years of capacity remaining based on receiving about 33,000 tons per year of municipal solid waste and construction / demolition debris. It is permitted by the Alaska Department of Environmental Conservation as a Class I landfill because it takes more than 20 tons per day of combined municipal solid waste and construction / demolition debris. Under the permit the landfill may accept ash from a municipal solid waste incinerator as long as the ash is not hazardous. That means the ash must be periodically examined according to the standards of the TCLP (Toxicity Characteristic Leaching Potential) test defined in Subtitle D of the Resource Conservation and Recovery Act (RCRA).

There is a 10 – year contract between WMI and Arrow Refuse with a clause for automatic, one – year renewals (Section 6). The contract expires on December 31, 2012. Section 2 of the agreement stipulates that Arrow Refuse will take all disposed trash collected within CBJ to the Capitol Disposal Landfill, or another disposal site as designated by WMI, for the duration of the contract.

Refuse disposal charges at the landfill, often referred to as “tipping fees”, are as follows:

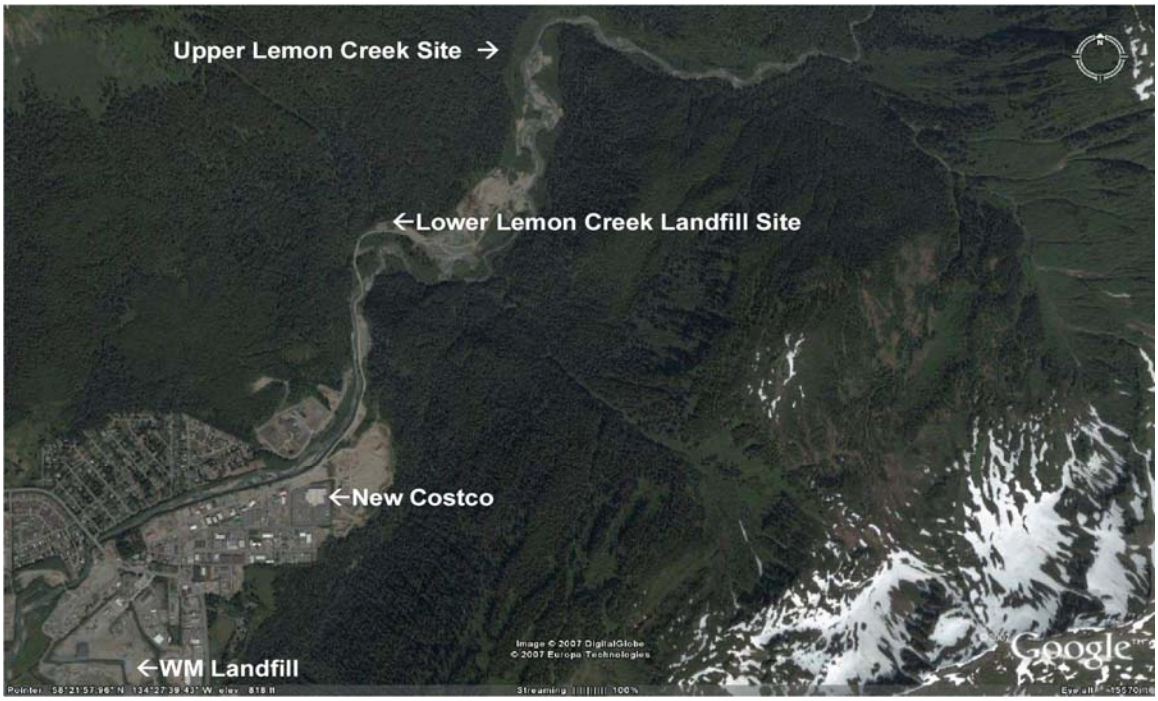
- Arrow Refuse – $ 120 / ton

- Other customers with residential or commercial / institutional solid waste – $ 140 / ton
- Mixed construction and demolition debris – $ 80 / ton
- Small vehicle – flat fee of $ 25
- Large vehicle – flat fee of $ 54

3.4.2 Other Landfill Sites

As a result of a 1993 consultant assessment ("Technical Reconnaissance Study for New Landfill Site Selection", Brown, Vence, and Associates [BVA]), two potential disposal locations were identified in the Lemon Creek Valley area on land owned by the CBJ (see Figure 3 below) and have been formally designated as such by the Assembly in the CBJ Comprehensive Plan.

Figure 3: Proposed Landfill Sites for Juneau (BVA 1993)



3.4.3 Southeast Conference Initiative

The Southeast Conference (SEC) is a regional, non – profit corporation composed of approximately 140 members (www.seconference.org/membership.html) including

municipal governments (28), Native American corporations/village councils/organizations (9), Chambers of Commerce (9), transportation organizations (9), non-profit and community/civic organizations (18), as well as utilities, economic development agencies, individual businesses and citizens. SEC's overall agenda and mission is economic development and environmental protection for Southeast Alaska. At the end of July, 2007 the SEC interim Executive Director was replaced by a new, permanent appointment.

SEC is seeking to facilitate and coordinate a multi – entity Regional Solid Waste Treatment Facility (RSWTF) based on the formation of a Regional Solid Waste Authority (RSWA) as authorized by the 2006 Alaska Legislature with the passage of CSHB392. In March, 2007 SEC issued a report titled "Municipal Solid Waste Disposal Alternatives in Southeast Alaska: Developing Regional Solutions". The Executive Summary and Overview expresses SEC's solid waste initiative as follows (page 4):

> "Southeast Conference is evaluating alternatives to decrease and control the costs of handling, processing and disposing of municipal solid waste. It seeks to improve the services for solid waste disposal for Southeast Alaska communities through a collaborative effort of towns and governmental agencies for mutual gain…there are economies of scale to be gained and costs, equipment and risks to be shared when communities cooperate on a unified solid waste program."

The SEC report outlines eight basic steps for implementing a RSWTF (page 5):

- Develop a Solid Waste Authority
- Determine community participation
- Seek funding
- Review facility site options / site selection
- Feasibility studies at one or more sites
- Finalize funding package
- Design / construct
- Operate a Regional Solid Waste Treatment Facility

The SEC report viewed the possible involvement of the CBJ in a RSWTF as uncertain but pointed out the advantages such involvement would have for its feasibility (page 7):

> "For the majority of the time while drafting this report, it was assumed that Juneau, at least initially, would not be part of a regional organization for solid waste disposal. It has a private landfill and its owner, Waste Management, Inc., states the landfill's life expectancy is 25 – 30 years…
>
> In early 2006, Juneau officials expressed interest to be included in discussions for a regional option, while its community leaders review local alternatives. If Juneau's waste stream of 30,000 tons / year (83 tons / day) is added to waste from other communities, the combined annual average would be about 150 tons per day. This volume greatly increases the likelihood of any regional alternative being successful. Juneau's waste stream is larger than the volume now shipped to the Lower – 48 by the six communities that ship municipal waste."

3.5 Special Wastes – Household Hazardous Waste, Junked Vehicles, Scrap Metals

CBJ's only involvement with solid waste management consists of three separate contracts for the handling of junked vehicles, household hazardous waste (HHW), and recyclables. These contracts are managed by the Public Works Administrative Officer in the Public Works Department whose dedication to waste management is about half – time. Program services are provided by private firms. The programs are funded through user fees. The Recycling Program is discussed in Section 3.3. Scrap metals may be taken to a separate area at the WMI landfill for recycling. The programs for junked vehicles and HHW are described below.

- **Junked Vehicles Program** – Events are conducted where residents may bring junked vehicles. The program is not intended for businesses or government agencies. Channel Construction, Inc. is the contractor. Primary funding is through a vehicle registration fee. At least one junked vehicle event and preferably two are held each fiscal year. The contract was recently renewed for fiscal year 2008. The cost for a junked vehicle event is approximately $ 200,000. For fiscal year 2008 the Assembly approved an additional $ 180,000 in funding to insure that two events were

held. Junked vehicles are recycled by Channel Construction through barge transport to Seattle Iron and Metals, Inc.

- **HHW Program** – The contract was recently renewed for fiscal year 2008. The contractor is PSC Burlington Environmental, Inc. HHW collection events are funded through a portion of the monthly $4.00 waste management utility fee paid by all residential households within the CBJ. Businesses and government agencies bringing materials to HHW collection events are charged separately based on material quantities and types.

3.6 Administration and Management

As noted in Section 3.5, the Junked Vehicle, HHW, and Recycling Programs are administered and managed by the Public Works Administrative Officer in the Public Works Department. The Public Works Department is the largest department in the CBJ, and it should be emphasized that this individual has numerous other administrative responsibilities in the Department and functions in the following capacities:

- Purchasing Officer
- Safety Officer
- Travel Officer
- Budget Coordinator
- Human Resources Supervisor

3.7 Regulations

3.7.1 Supreme Court Flow Control Decision

A recent Supreme Court decision – United Haulers Association, Inc. v. Oneida – Herkimer Solid Waste Management Authority (April 30, 2007) – clarified the flow control authority of jurisdictions and public sector solid waste management agencies. In this case, Oneida and Herkimer Counties (members of the Oneida – Herkimer Solid Waste Management Authority, State of New York) adopted flow control ordinances requiring

that solid waste and recyclables (not otherwise recycled) must be disposed of at the location designated by the Authority. The ordinances mandated that solid waste and recyclables disposed of by self – haulers (individuals and businesses) as well as permitted commercial haulers, be disposed at designated Authority facilities. The U.S. Supreme Court held that the ordinances treated in – state businesses exactly the same as out – of – state businesses, and they did not violate the commerce clause of the U.S. Constitution. The Court further found that the ordinances did not discriminate against interstate commerce and any incidental burden they placed on interstate commerce did not outweigh the benefits they conferred on the citizens of the counties.

The Court's decision in this case strengthened the flow control authority of jurisdictions and public sector solid waste management agencies. Assuming Arrow Refuse were no longer operating under terms established by the Regulatory Commission of Alaska, the CBJ and Arrow Refuse could theoretically negotiate a solid waste services contract wherein both parties mutually agreed that disposed waste would be taken to a specified and appropriately permitted disposal operation. The practical limitation on such an arrangement would be the terms of the existing contract between Arrow Refuse and WMI, as discussed in Section 3.4.

3.7.2 Regulatory Commission of Alaska

The collection of solid waste is considered a utility in the State of Alaska and is therefore regulated by the Regulatory Commission of Alaska (RCA). The RCA regulates private collection companies by certifying qualified providers of services. The RCA determines that companies provide safe, adequate services and facilities at just and reasonable rates, terms, and conditions. Companies providing services to ten or more customers are required to have a certificate to operate. The certificate describes the authorized service area and scope of operations of the utility. A certificate may be issued only if the Commission finds the applicant to be fit, willing, and able to provide the utility service requested. The certificate provides the holder an exclusive service area and therefore has an intrinsic monetary value. An RCA service certificate can be sold or transferred, but not without the approval of the agency.

The Commission regulates the rates, services, and practices of solid waste collection only. Recycling is not regulated by the RCA. All costs associated with recycling are not allowable for the purposes of setting rates. If recycling collection services are provided by a certificate holder, the rates charged for these services are outside of the RCA and need to be separated from the regulated rates.

Other points regarding the RCA to be emphasized are as follows:

- Applications for certificates are submitted to the RCA for operations within a defined geographic area. The RCA issues a certificate to either a private sector company or municipal jurisdiction to collect solid waste within that geographical area.

- The RCA regulates the rates charged for solid waste collection services. Recyclable commodities are exempt from RCA rate regulation.

- RCA regulation does not extend to the CBJ or Arrow Refuse if the CBJ is the certificate holder and Arrow is the contracted or franchised collection company. The collection company is then bound by the terms and conditions of the franchise agreement or contract with the City. For example, Ketchikan, and Seward both possess a certificate and have private collection companies serving their areas.

3.8 Costs

Annual payments for the three solid waste programs sponsored by the CBJ total $845,000 and are listed below:

- Recycling - $ 165,000 to contractor.
- Household Hazardous Waste - $ 300,000 to contractor.
- Junked Vehicles - $ 200,000 to contractor plus an additional $ 180,000 authorized by the Assembly.

4.0 Wastestream Quantities and Characteristics

4.1 Disposed Wastes

According to WMI, 30,957 tons of refuse were disposed at the landfill during calendar year 2006. WMI states 2006 was the first year reliable records were kept that distinguished between municipal solid waste (MSW) from residential and commercial / institutional sources and construction / demolition debris (C & D):

- MSW – 23,815 tons (77 %)
- C & D Debris – 7,142 tons (23 %)

Quantities and types of C & D debris are cyclical and determined by the level of construction / demolition activity in the CBJ. Construction / demolition activity can vary greatly from one year to the next. MSW results from daily living / working routines and thus is more consistent and predictable in composition and amounts. Therefore a major focus of this Solid Waste Management Strategy is on the disposal and recycling of MSW.

A model of the composition of Juneau's disposed 23,815 tons of MSW was created based on data from Kodiak Island Borough's 1992 – 3 Waste Characterization Study and EPA's document titled Municipal Solid Waste in the United States: 2005 Facts and Figures [4]. The table and two figures which follow portray that information.

[4] Source: US EPA, www.epa.gov

Table 4: Composition Model for CBJ Disposed Municipal Solid Waste

Material Categories and Types		Percentage by Weight	Tons (Calendar Year 2006)
Paper		**34.3%**	**8,168.55**
	Newspaper**	4.9%	1,166.94
	White / Mixed Paper**	3.0%	714.45
	Office Paper**	2.7%	643.01
	Magazine / Books / Mail**	4.2%	1,000.23
	Cardboard**	12.6%	3,000.69
	Other Paper	6.9%	1,643.24
Plastics		**5.6%**	**1,333.64**
	Recyclable**	1.9%	452.49
	Film	1.8%	428.67
	Other	1.9%	452.49
Glass		**4.4%**	**1,047.86**
Metals**		**7.7%**	**1,835.49**
	Aluminum Cans	0.8%	190.52
	Tin Cans	1.0%	238.15
	Other Metals	5.9%	1,406.82
Diapers		**1.5%**	**357.23**
Food Waste***		**11.9%**	**2,843.99**
Yard Waste***		**3.4%**	**803.27**
Lumber & Wood***		**7.5%**	**1,779.92**
Electronic Waste		**1.1%**	**262.97**
Batteries		**0.1%**	**23.82**
Other		**22.5%**	**5,358.38**
Total		**100.0%**	**23,815.10**
Notes:			
** Recyclable Materials – tons			8,813.29
% of waste stream by weight			37.0%
*** Compostable Materials – tons			5,417.18
% of waste stream by weight			22.8%

The 23,815 tons of disposed MSW from 2006 is multiplied by the percentage of weight for each material category / type derived from the Kodiak and EPA waste composition studies to arrive at the tons of material comprising Juneau's disposed wastestream.

Figure 4

Overall Composition of CBJ Disposed Waste

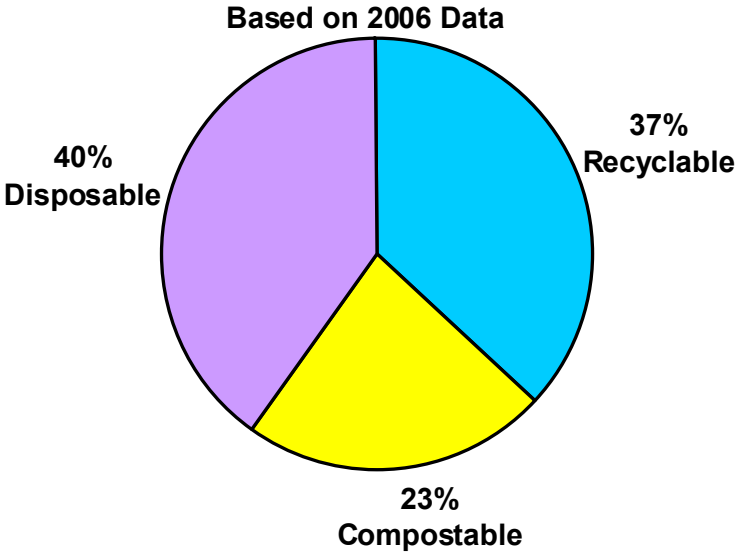
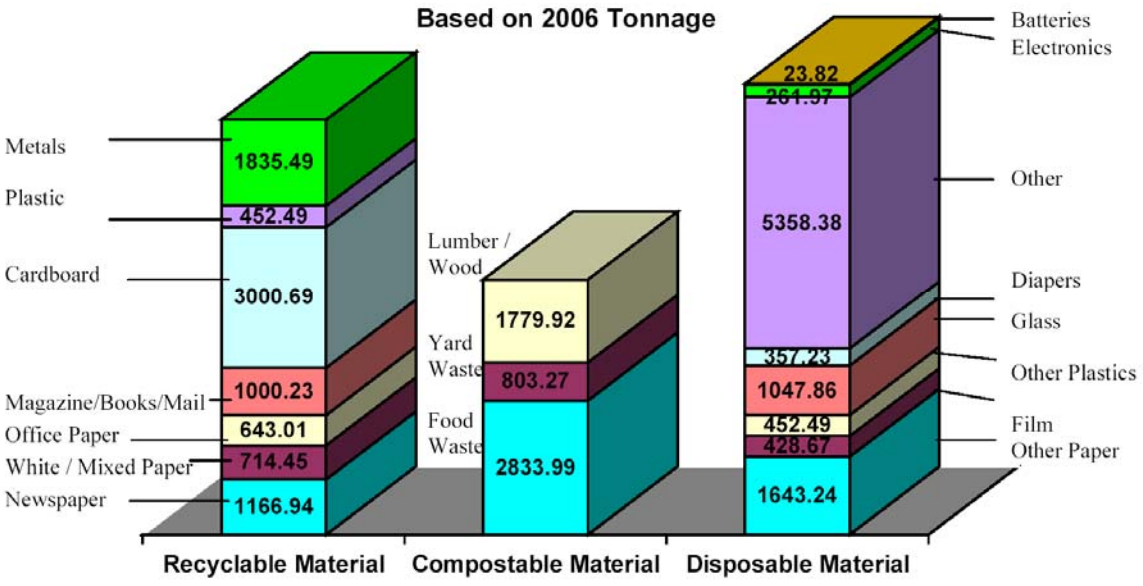


Figure 5

Detailed Composition of CBJ Disposed Waste



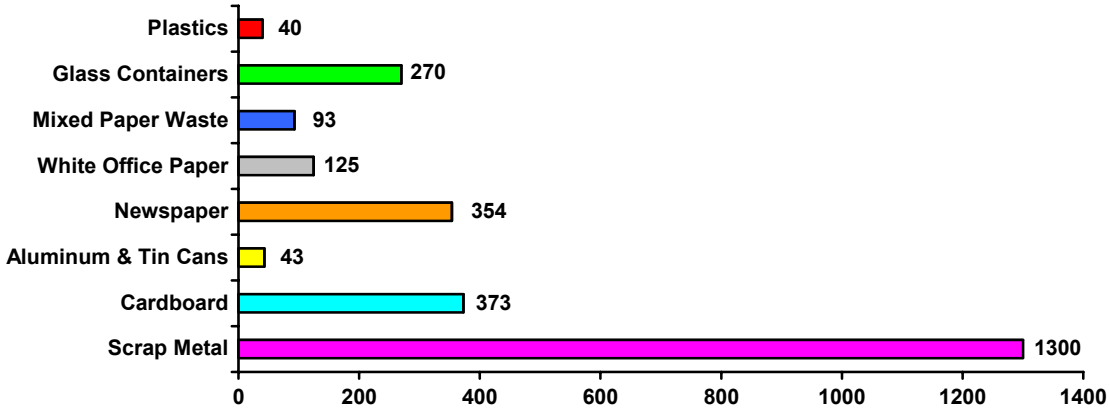
4.2 Diverted Wastes

According to WMI in calendar year 2006 1,300 tons of scrap metals were diverted from disposal, stored temporarily in a separate area at the landfill, and ultimately recycled. For the same period, again according to WMI, approximately 1,300 tons of materials were recovered through the Recycling Center operated by WMI at the landfill, as follows:

- Cardboard – 373 tons
- Newspapers – 354 tons
- White office paper – 125 tons
- Mixed waste paper – 93 tons
- Glass containers – 270 tons
- PET plastic # 1 containers – 28 tons
- HDPE plastic # 2 containers – 12 tons
- Aluminum cans – 19 tons
- Tin cans – 24 tons

The figure below visually represents these recycled material quantities and is based on the data noted above provided by Waste Management, Inc.

Figure 6: Composition of Recyclables Handled by Waste Management (tons)



Over a recent 12 – month period under the Junked Vehicles Program, Channel Construction recycled 893 vehicles, 7 motor homes / travel trailers, and 6 motorcycles. The President of Channel Construction estimates the weight of a junked vehicle at about 1 ton with motor homes / travel trailers weighing somewhat more and motorcycles less. For purposes of this Strategy it is assumed the total weight of all the vehicles is 920 tons.

To calculate the diversion rate (also referred to as the material recovery or recycling rate) the following formulas are applied:

Tons Disposed + Tons Diverted = Tons Generated

Tons Diverted ÷ Tons Generated = Diversion Rate

Using CBJ data (rounded) with the formulas yields the following:

31,000 tons disposed + 3,520 tons diverted = 34,520 tons generated

3,520 tons diverted ÷ 34,520 tons generated = 10 % diversion rate

However, it should be pointed out the heavy weight of the scrap metals (1,300 tons) and junked vehicles (920 tons) distorts the diversion rate. As well, these are specialty materials that are not part of the daily residential / commercial waste stream. To get a more accurate perspective on the MSW (municipal solid waste) diversion rate, the scrap metals / junked vehicles would be documented as recycling but eliminated from the formulas noted above, producing the following results:

31,000 tons disposed + 1,300 tons diverted = 32,300 tons generated

1,300 tons diverted ÷ 32,300 tons generated = 4 % diversion rate

4.3 Disposal Projection

Solid waste tons disposed within a region is a basic metric used to determine disposal / recycling program and facility needs and designs. Tons determine the size of a building, the necessary floor space, flow of traffic within a facility, other operational logistics, and the amount of material diverted for recycling and / or landfilled. A reasonably accurate waste disposal forecast is a critical aspect of solid waste planning and facility design.

The projected waste disposal for CBJ was calculated by finding the average tonnage of garbage disposed per person from current population and waste disposal data: 23,815 tons of MSW divided by the population of 32,413 = .7347 tons of MSW disposed per person per year. This average was then applied annually to the estimated population through 2038 (see Table 1). Table 5 below portrays the resulting anticipated increases in disposed municipal solid waste (not including construction / demolition debris) for a 30 – year period.

Table 5: CBJ Municipal Solid Waste (MSW) Disposal Projection

Year	Population Projection	Projected Tons of Disposed MSW	Year	Population Projection	Projected Tons of Disposed MSW
2008	32,413	23,815	2024	35,650	26,194
2009	32,623	23,969	2025	35,855	26,344
2010	32,834	24,124	2026	36,061	26,495
2011	33,046	24,280	2027	36,268	26,647
2012	33,260	24,437	2028	36,476	26,800
2013	33,475	24,595	2029	36,685	26,954
2014	33,667	24,736	2030	36,896	27,109
2015	33,860	24,878	2031	37,108	27,264
2016	34,055	25,021	2032	37,321	27,421
2017	34,250	25,165	2033	37,535	27,578
2018	34,447	25,309	2034	37,750	27,737
2019	34,645	25,455	2035	37,967	27,896
2020	34,843	25,601	2036	38,185	28,056
2021	35,043	25,748	2037	38,404	28,217
2022	35,245	25,895	2038	38,625	28,379
2023	35,447	26,044			

5.0 Analysis of Existing Solid Waste Management System / Practices

5.1 Observations and Findings – Advantages, Disadvantages, Strengths, Weaknesses

5.1.1 Residential Refuse Collection

The manual method of residential garbage collection in the CBJ is antiquated, inefficient, and unsafe, which is why many similar collection operations have converted to fully automated vehicles operated by one person combined with standardized carts distributed to households. The carts are typically available from manufacturers in three size ranges – 30 to 35 gallons, 60 to 65 gallons, and 90 to 95 gallons.

5.1.2 WMI / Arrow Refuse Contract

The contract between WMI and Arrow Refuse in effect gives WMI "de facto" control over the flow of disposed garbage from CBJ. During the contract period disposal of refuse at a site and / or in a manner not covered by the contract would likely require acceptance or approval by WMI. In other words, CBJ could not direct Arrow Refuse to take waste directly to a barging company for shipment to a landfill in Washington or Oregon unless WMI agreed to such an arrangement.

5.1.3 Land for Facility Infrastructure

There is limited availability of vacant industrial land in Juneau for siting a landfill, incinerator, materials transfer operation or recycling processing / storage facility. Regardless of whether such land is owned by the CBJ or a private party, when it becomes available it is likely it would be strongly sought after by commercial developers. CBJ would either have to set aside industrial land it presently owns for a potential solid waste operation or purchase private land and reserve it. In either case the land is removed as a source of property tax revenues for the CBJ. CBJ has taken this course of action with the two Lemon Creek Valley landfill locations.

5.1.4 Two Identified Potential Landfill Sites

Regarding the two Lemon Creek Valley landfill locations, before either could be developed for refuse disposal the gravel would have to be extracted. This is a long – term process that would likely alter the topography, drainage, soils profile, and other site characteristics in ways difficult to predict at this point in time. Further, there do not appear to be current written descriptions, maps, or engineering drawings of the sites maintained by the CBJ. These factors make it difficult to itemize construction or operating costs for a landfill at either site except at a very general, "order of magnitude" level. They also make it very unlikely that either site would be available to the CBJ for a publicly or privately operated landfill certainly in the short – term planning period of 1 to 5 years and probably in the mid – term planning period of 5 to 10 years. These sites are not viable disposal alternatives for at least the next 10 years and thus fall within the long – term planning period (20 to 30 years) as defined by the CBJ.

5.1.5 Facility for Recycling and Other Solid Waste Purposes

Increasing recycling in Juneau requires an enclosed facility to receive, handle, process, aggregate and store materials prior to market sale. Other forms of diversion from disposal such as a repair / reuse exchange, mulching / composting, and wood waste recovery, as well as a management strategy for disaster debris, also require space. The existing Recycling Center on the same WMI property as the Capitol Disposal Landfill is completely inadequate for such purposes. To accommodate the phased implementation of these functions and services land ranging from 10 to 25 acres is needed even though much of it would be undeveloped initially. It is reasonable to assume this land should be zoned for industrial uses.

In this regard CBJ staff has noted the following:

> "At some point there would be a trade – off between the high cost of acquiring industrial land of this size and limited availability, and the cost of enclosing the use on other undeveloped land…Developable industrial land is going for about $ 12 a square foot. Something of this size in the market is rare and unique and would probably get $ 14 - $ 16, if available. Undeveloped industrial land of this

size is either not available, or the permitting / mitigation / development costs are prohibitive." (E – mail from Heather Marlow to Maria Gladziszewski, July 26, 2007)

To summarize, in finding / developing land suitable for either a landfill, incinerator, or multi – purpose materials recovery and management facility / operation, the CBJ faces serious barriers and constraints given the limited availability of such land and the competition from other potential uses / users. Another approach, perhaps one that is more feasible and practical, is to examine maximizing the long – term utilization of private land presently dedicated to solid waste management based on a more formal public sector / private sector partnership than currently exists.

5.1.6 What About the Southeast Conference Regional Initiative?

The Executive Summary and Overview of the SEC report referenced in Section 3.4 candidly states the following assessment (page 4):

> Southeast Alaska communities and Southeast Conference have completed numerous reports over the past 15 years for solid waste and recycling. The reports, for the most part, led to the same conclusion – there are economies of scale to be gained and costs, equipment and risks to be shared when communities cooperate on a unified solid waste program. However, in past years, there has been no glue to help the communities bind a unified program, and each has gone its own way."

On March 27, 2007 SEC held a Regional Solid Waste Authority Workshop in Juneau to present the findings and recommendations of its Municipal Solid Waste Disposal Alternatives Report and lay out the sequence of actions necessary for creating a Regional Solid Waste Authority (RSWA) and constructing / operating a Regional Solid Waste Treatment Facility (RSWTF). Those actions were outlined in Section 3.4. Discussions with the recently hired permanent SEC Executive Director indicate that since the Workshop these actions are still pending and in particular a Regional Solid Waste Authority has not yet been set up.

It is clear and widely acknowledged that regionalization of solid waste management / disposal in Southeast Alaska has historically been thwarted by several factors:

- Many small communities dispersed over a wide area.
- Geographical isolation of the communities.
- Comparatively small amounts of garbage available for disposal.
- The multiplicity of political and institutional decisions, and decision – making bodies, involved in coordinating on a regional basis.
- The extensive time required to select and develop a site for a Regional Solid Waste Treatment Facility, along with the time required to construct the facility.

A key question at this point is "What should Juneau's role and response be relative to SEC's solid waste regionalization initiative?"

It is important to note that in addition to the history and factors noted above regarding this initiative, there is a fundamental conflict between the priorities in Juneau of advancing waste reduction / recycling and controlling the aesthetic / environmental impacts of landfilling and the vital contribution CBJ would make to a RSWTF. That contribution, as quoted from the SEC report in Section 3.4, is trash. In fact, the more trash that Juneau can contribute the better for the economic and operational feasibility of a RSWTF, either publicly or privately run. The more tons of garbage there are, the more units of feedstock the construction and operating costs for a RSWTF can be spread across. Conversely, as CBJ accomplishes more diversion this actually lessens its value as a participant in a RSWTF.

There is a strategy that reconciles these opposing directions, at least on an interim basis. That strategy would call for Juneau, through a formal arrangement with WMI, to offer its landfill as a temporary regional disposal site for Southeast Alaska jurisdictions while a more long – term RSWTF was implemented. The addition of approximately 23,000 tons / year (SEC report, Executive Summary and Overview, page 7) would

reduce the life span and hasten the closure of the Capitol Disposal Landfill, but it could also potentially provide Juneau with additional revenue, based on specific terms of the agreement with WMI. Such revenue could help fund waste reduction / recycling efforts in the CBJ.

5.2 Needs, Challenges, and Opportunities

The range of solid waste management options that are pragmatically rather than theoretically available to Juneau is constrained by the following factors:

- Remote location with limited access. Recyclable materials must be transported by sea to markets in the Seattle area. If not disposed locally, refuse must be barged and rail – hauled to landfills in Washington or Oregon.
- Relatively stable population. Quantities of disposed trash and recoverable recyclables are comparatively small. This means Juneau is not an attractive market for outside firms to invest in, either for disposal capacity or recycling infrastructure.
- Due to the above factors, there is a lack of private sector industry competition for provision of waste management services.
- Suitable sites for alternative disposal operations – a new landfill or incinerator – are limited because of the physical and environmental geography / topography of Juneau. Space is at a premium and environmental protection is vital to CBJ's economy.
- There is little historical or current solid waste planning, implementation, or operational experience / expertise on the part of CBJ government personnel. CBJ Public Works Department has limited staff available for solid waste management. CBJ relies heavily on the private sector for direct provision of waste services through separate contractual arrangements and terms. It is doubtful the Public Works Administrative Officer can manage more separate solid waste service contracts without curtailing other responsibilities.

Juneau has compounded the problems listed above by consciously excluding itself from direct contractual involvement with the two key service providers – Arrow Refuse and WMI. It means that desired solid waste services must be acquired in a piecemeal fashion as evidenced in the three different contracts now in place for junked vehicles, household hazardous waste, and recycling. This situation inhibits the ability and willingness of both Arrow Refuse and WMI to make significant capital or operational investments (other than those required by applicable regulations / statutes) because there is no stable, long – term, guaranteed timeframe for making such business decisions. In the case of WMI these decisions are not ultimately made by local company personnel but at corporate levels where the Juneau marketplace is very small in comparison to others in more populated, accessible, and high – growth regions.

Juneau's unique situation is illustrated by the table below which summarizes basic solid waste service arrangements in ten other jurisdictions. Direct service provision by the jurisdiction and / or contracts with private companies exist in each jurisdiction. The table highlights a central contradiction for the CBJ regarding solid waste management: There is high public and decision – maker interest in such priorities as limiting disposal at the WMI landfill, expanding waste reduction / recycling, and environmentally responsible management of various waste streams. However, CBJ essentially has few substantive mechanisms for implementing programs and policies that have significant positive impact on these priorities.

Table 6: Solid Waste Management in Other Jurisdictions

1/ Coolidge, Arizona	- City provides residential & commercial refuse collection / private haulers provide some contract commercial collection services - Waste taken to local private transfer station
2/ Livingston, Montana	- City provides residential & commercial refuse collection - Trash taken to county-operated transfer station for rail transport to distant private landfill
3/ Santa Fe, New Mexico	- City provides residential & commercial refuse collection - Trash taken to landfill operated by regional agency
4/ Silver City, New Mexico	- City provides residential & commercial refuse collection - Trash taken to landfill operated by regional agency
5/ Ketchikan, Alaska	- Borough & private hauler provide residential / commercial refuse collection - Borough has contract to have trash taken by barge & rail transport to private landfill in Washington - Borough owns & operates material recovery facility
6/ Kodiak Island, Alaska	- Borough has contract with hauler for collection of residential & commercial refuse - Trash taken to landfill operated by Borough - Recycling services (drop – off depots, commercial pickup) provided by non – profit group partially funded by Borough
7/ Lewiston, Idaho	- City has contract with hauler for collection of residential & commercial refuse - Trash taken to transfer station owned / operated by City & City has contract with county – operated landfill in Washington for disposal
8/ Boise, Idaho	- City has contract with hauler for collection of residential & commercial refuse - Trash taken to landfill operated by county
9/ Beaverton, Oregon	- City has six franchised haulers for residential & commercial refuse collection - Trash taken to transfer station operated by regional agency for truck transport to distant private landfill
10/ Bellevue, Washington	- City has contract with hauler for residential & commercial refuse collection - Trash taken to county – operated transfer station for truck transport to county – operated landfill

A primary purpose for implementing a range of aggressive waste reduction / recycling program and policy initiatives is to control the growth of the landfill, extend capacity at the current site, and reduce the need for future disposal infrastructure / technology. Waste reduction / recycling is also the most underdeveloped operational component of CBJ's solid waste system in comparison to collection and disposal. Therefore it offers the greatest opportunity for CBJ to become more directly involved with the system and direct it toward the accomplishment of public policy objectives.

However, such a role will necessarily entail more formal relationships with service providers through consolidated contracts so services are structured consistent with those objectives. It will also give CBJ leadership responsibilities for promotion/education/outreach and system organization/administration. Finally, to significantly expand overall diversion there needs to be a centralized facility for receiving, processing, and storing recyclables along with a materials reuse / exchange operation. This is commonly referred to as a materials recovery facility or MRF.

6.0 Description of Options for Major System Components

6.1 Collection

- The RCA Certificate presently held by Arrow Refuse can be transferred to the CBJ and then CBJ and Arrow Refuse can negotiate a contract for delivery of a wide a range of solid waste services including residential and commercial recycling collection. Under such an arrangement the terms of the contract would not be subject to RCA regulation.

  Representatives of Arrow Refuse have stated both formally and informally their interest in having their certificate title transferred to the CBJ and continue operations under a long – term contract / franchise agreement.

- Collection needs to be set up where the hauler manages the wastestream. A contract or franchise should stipulate that the hauler is the service provider, pays for disposal, bills the customer, reports on a regular basis to the CBJ, and includes the necessary system fees in the rates.

- Fully automated residential refuse pickup; three different sizes of carts available; variable rates depending on the size and number of carts used; meaningful rate incentives for waste reduction / recycling. Please refer to Appendix E for additional details.

6.2 Diversion – Waste Reduction / Prevention, Reuse, Recycling, Composting

- Curbside residential recycling collection service for the materials now accepted at the Recycling Center, with the possible exception of glass. Full commingling of materials. Please refer to Appendix E for additional details.

- Commercial / institutional recycling collection service for cardboard and various types of paper grades including white office, colored office paper, and mixed waste paper. Full commingling of materials

- Mandatory recycling participation requirements with graduated penalties for non–compliance.

- Establish minimum materials reuse / recycling standards for construction and demolition (C & D) projects.

- Construction / operation of a materials recovery facility with enough dedicated land for multiple diversion and management functions in the future. Please refer to Appendix E for additional details.

6.3 Disposal

It is anticipated that C & D debris will continue to be disposed of in Juneau at the WMI Landfill since this is a wastestream that is difficult and costly to handle and cannot be easily or economically containerized for barge transport to a landfill in Washington or Oregon. It is also not common practice to incinerate mixed C & D debris because of the inert, non–organic materials typically found in this wastestream. Quantities and components of this wastestream are also difficult to predict from one year to the next. The disposal alternatives listed below therefore pertain to the approximately 24,000 tons per year of normal, daily residential and commercial / institutional garbage – municipal solid waste (MSW) – now disposed from Juneau.

- Participation in future regional disposal facility through the Southeast Conference.

- WMI Landfill as interim regional disposal site for trash from CBJ and other SE Alaska communities.

- Combination of barge / rail transport to landfill in Washington or Oregon. Please refer to Appendix D for a detailed discussion of this option and its estimated planning – level costs.

- Build new landfill in or near Juneau. Please refer to Appendix C for a detailed discussion of this option and its estimated planning – level costs.

- Build new incinerator in or near Juneau. Please refer to Appendix B for a detailed discussion of this option and its estimated planning – level costs.

- Continue to use WMI Landfill (Juneau garbage only).

6.4 Administration and Management

- To the extent feasible, for ease and efficiency of administration, multiple contract arrangements could be replaced by integrating several services under one "master vendor" who utilizes various specialty subcontractors.

6.5 Regulations

- Adoption of an ordinance establishing that all generators shall have standardized solid waste collection services for refuse and designated recyclables as determined by whether they are in the residential or commercial / institutional sector. Service provision and billing are to be applied universally throughout the CBJ.

7.0 Recommended Solid Waste Management Strategy / Scenario

7.1 Conclusions

The central conclusion is that under present circumstances the CBJ has only marginal control and leverage in the solid waste system and this is not consistent with having extensive public policy expectations, priorities, and objectives for solid waste management.

It is acknowledged that in finding / developing land suitable for either a landfill, incinerator, or multi – purpose materials recovery and management facility / operation, the CBJ faces serious barriers and constraints given the limited availability of such land and the competition from other potential uses / users. However, CBJ should make an effort to determine whether a minimum 10 – acre parcel of industrially zoned land (publicly or privately owned) can be set aside for future solid waste management purposes. This provides CBJ greater flexibility than relying strictly on private sector resources and opens up more opportunities for public / private partnerships. At the same time CBJ should be discussing with Arrow Refuse and WMI how land they own could be used to meet future solid waste management needs, especially for materials reuse, recycling, and possibly composting.

There are no compelling economic, environmental, or operational reasons to discontinue using the WMI Landfill for purposes of disposal. Documentation regarding the status of the landfill (also referred to as the Capitol Disposal Landfill) was requested by the consultant from the Alaska Department of Environmental Conservation (ADEC). ADEC is statutorily responsible for permitting and regulating the landfill. In particular, three documents were requested, provided, and included with this Solid Waste Management Strategy as Appendix F:

- Letter describing ADEC's role in landfill permitting and regulating along with the current environmental and operational status of the WMI Landfill.
- Copy of the most recently issued permit and associated terms / conditions.
- Copy of the report describing the most recent formal site inspection conducted by ADEC.

ADEC commends Waste Management's operation of the landfill and states it is in compliance with all applicable regulatory requirements (see letter dated October 17, 2007 from Doug Buteyn, Northern/Southeastern Program Coordinator, ADEC Solid Waste Program). The current permit to operate as a Class 1 landfill was issued effective November 23, 2005 and is valid for a period of five years, until November 23, 2010. Prior to that point in time the permit must be renewed and would be valid for another five year period. A letter from ADEC to Waste Management dated August 22, 2005 describes results from the most recent formal site inspection which took place July 20, 2005. Further information or questions regarding these documents or other topics related to ADEC's permitting and regulatory role concerning the WMI Landfill may be directed to Doug Buteyn in Fairbanks at 907 / 451 – 2135 or Ed Emswiler in Juneau at 907 / 465 – 5353.

7.2 Recommended Strategy / Scenario – A Foundation for the Future

The recommended solid waste management strategy / scenario is designed to build on the strengths of the present system by encouraging further development of the private refuse collection / disposal and recyclables processing / marketing operations but with CBJ providing more substantive program / policy guidance and contractual oversight.

The recommendations are intended to be considered, approved, and implemented as integrated package instead of on an item–by–item basis. This offers a comprehensive rather than a piecemeal strategy for addressing the CBJ's solid waste priorities. The recommendations are also intended to be consistent with the analysis regarding solid waste issues in Section 5 and the conclusions from Section 7.1.

The core elements of the recommended solid waste management strategy / scenario to be implemented during the period 2008 to 2012 are as follows:

- **Recommendation # 1:** Continue to use WMI Landfill for disposal.
- **Recommendation # 2:** Hire Solid Waste Coordinator.
- **Recommendation # 3:** Adopt a policy on universal (mandatory) trash and recycling collection service for all generators.
- **Recommendation # 4:** Transfer Arrow Refuse RCA certificate to CBJ.
- **Recommendation # 5:** Form two – way, long – term contractual partnerships between the CBJ and Arrow Refuse and between the CBJ and Waste Management Inc. for a minimum period of 10 years.
- **Recommendation # 6:** Secure land for a multi – purpose materials recovery facility (MRF).
- **Recommendation # 7:** Design and implement fully automated residential refuse collection with carts and variable rates.
- **Recommendation # 8:** Design and construct MRF.
- **Recommendation # 9:** Design and implement multi – faceted / multi – media series of promotion, education, and outreach activities that is regular and ongoing.
- **Recommendation # 10:** Design and implement curbside, residential recycling collection service based on commingling materials.
- **Recommendation # 11:** Design and implement commercial / institutional recycling collection service based on commingling materials.
- **Recommendation # 12:** Adopt minimum reuse / recycling standards for specified construction / demolition projects.

Recommendations # 3 (Adopt a policy on universal [mandatory] trash and recycling collection service for all generators), # 4 (Transfer Arrow Refuse RCA certificate to CBJ) and # 5 (Form two – way, long – term contractual partnerships between the CBJ and Arrow Refuse and CBJ and Waste Management, Inc. for a minimum period of 10 years) are the essential basis for the other recommendations and for the overall solid waste management strategy / scenario. Sections 7.2.1 to 7.2.3 offer further discussion on Recommendations # 4 and # 5.

Regarding Recommendation # 3, representatives from the CBJ and Arrow Refuse could formulate a general statement about the minimum types of waste / recycling collection service required of residential and commercial sources which would then be refined and further detailed in negotiations for transfer of the RCA certificate. The rationale for having a policy that all generators become solid waste accounts and pay for a basic level of solid waste services (garbage disposal plus handling of recyclables) is as follows:

- The policy emphasizes the principle of equity and "fair sharing of costs" concerning operation of a comprehensive solid waste system that has direct and indirect benefits for the entire CBJ and those who live and work in it.
- The policy extends the current voluntary "subscription" rate base to provide full coverage for all the CBJ and is consistent with the present $ 4 / month residential assessment for the recycling program and household hazardous waste management.
- The policy establishes the broadest possible rate base for distributing the capital and operating costs associated with Recommendations # 2 and # 6 through # 12. The combination of a 10 – year contract period as included in Recommendation # 5 and a CBJ – wide rate base yields a mechanism for controlling the impacts of those costs over time in a fair, equitable manner.
- The policy significantly increases the convenience and accessibility of recycling opportunities for residences, businesses, and institutions, and thus is likely to produce much larger quantities of material recovered for recycling than is now the case.
- The policy offers the option of consolidating all charges related to solid waste services into a monthly rate rather than having multiple individual fees that are selectively applied.

7.2.1 Transfer of RCA Certificate from Arrow Refuse to CBJ

The Regulatory Commission of Alaska is located in Anchorage. Based on conversations with James Keen, Engineering Section Supervisor (907 / 263 – 2121), transfer of the Certificate of Public Convenience and Necessity now held by Arrow Refuse to the CBJ requires completion and submission of a Transfer Application Form (referred to as Form

PU – 103) available at rca.alaska.gov. RCA review and approval of the application typically would not last longer than six months. The two main contacts for the CBJ on this matter are Mr. Keen and David Lawrence, Chief Administrative Law Judge (907 / 263 – 2127). It is emphasized that according to Mr. Keen the certificate transfer will be facilitated if it is supported by Arrow Refuse, with such support being expressed formally to the RCA at the outset of the application process

Since the RCA Certificate provides the exclusive right of the holder to engage in a regulated monopoly, it clearly has a calculable intrinsic economic value. The value of the certificate will be one of the primary issues in the contract negotiations between the CBJ and Arrow Refuse.

7.2.2 Advantages and Benefits of Recommendations # 4 and # 5

Recommendations # 4 and # 5 provide the opportunity for an extended business relationship between the CBJ and Arrow Refuse and the CBJ and Waste Management that has mutual advantages and benefits for all three entities. Those advantages and benefits are as follows:

City / Borough of Juneau

- Greater ability to accomplish public policy goals, objectives, and priorities in solid waste management through contractual terms and conditions, sharing of resources, and enhanced cooperation / coordination with the private sector.
- Greater control and predictability regarding rates and costs since they can be negotiated annually and spread out over a 10 – year contract period.
- Modernization and expansion of services for refuse collection and recycling that promotes increased operational efficiency and reliability.

Arrow Refuse and Waste Management

- Guaranteed, stable timeframe of contracted service provision.
- Capital investments are more justifiable from a business perspective due to the long – term contractual commitment and the related amortization period.

- Substantially reduces the amount of political controversy and uncertainty surrounding solid waste management by formalizing goals, objectives, priorities, roles, and responsibilities.

7.2.3 Setting of Rates

Once transfer of the Certificate of Public Convenience and Necessity from Arrow Refuse to the CBJ has been officially approved by the RCA then a contract for solid waste services can be established directly between CBJ and Arrow Refuse without involvement of the RCA. As part of the contract negotiation service rates would be determined.

There are three methods of adjusting collection rates. A cost – based method requires the hauler to submit financial records to support the requested rate increase. An indexed method adjusts rates by a factor such as the Consumer Price Index (CPI) or Producer Price Index (PPI). A third method is a combination of the cost and indexed methods, such as using the PPI for fuel, but a review of collection operations costs for the balance of the rate. A detailed article written by attorney Constance Hornig on each adjustment method is included in Appendix G.

8.0 Implementation of Recommended Strategy / Scenario

Table 7: Implementation Schedule / Sequence for Juneau Solid Waste Strategy, 2008 – 2012

Recommendation	Activities / Steps	Timeframe: Start ► End
1 / Continue to Use Waste Management (WM) Landfill for Disposal	• Formally inform WM use of landfill is preferred disposal method • Advise WM of desire to enter into long–term disposal agreement • Include Arrow Refuse in these communications	Present – approximately 30 years
2 / Hire Solid Waste Coordinator	• Prepare description of position • Advertise position • Interview selected candidates • Make selection	January, 2008 – July, 2008
3 / Policy on Universal Trash & Recycling Collection Service	• Prepare general policy statement for adoption by Assembly that all residential & commercial / institutional generators will be provided a basic level of collection service for refuse & specified recyclables • Hold public hearings to receive comment on proposed policy • Inform interested parties that service details are subject to contractual negotiations between CBJ & Arrow Refuse • Finalize & approve policy	January, 2008 – December 2008
4 / Transfer Arrow Refuse RCA Certificate to CBJ	• Contact appropriate RCA staff re procedures for certificate transfer • Complete, submit application form, with written support from Arrow Refuse • Monitor evaluation of application, address any RCA concerns	January, 2008 – July, 2008
5 / Form Contractual Partnerships Between CBJ, Arrow Refuse, & Waste Management	• Set up general contractual agreement for WM to operate landfill for disposal & possibly MRF for materials recycling / reuse • Set up general contractual agreement for Arrow Refuse to provide collection services for refuse & recyclables • Refuse delivered to WM Landfill, recyclables taken to MRF • Contract details determined by program & service decisions made re solid waste management strategy components # 7 to # 12 below	January, 2008 – March, 2009

Table 7: Implementation Schedule / Sequence continued

Recommendation	Activities / Steps	Timeframe: Start ► End
6 / Secure Land for Multi – Purpose Materials Recovery Facility (MRF)	• Inventory available public & private land, including WM property • Determine most suitable area • Obtain necessary zoning status & other relevant planning / legal decisions so property is not developed for other purposes • Meet with WM to discuss CBJ & WM roles in MRF re ownership of building / equipment & daily operations	May, 2008 – July 2008
7 / Design & Implement Fully Automated Residential Refuse Collection with Variable Rates	• Meet with Arrow Refuse to review options on number & size of carts • Also review options on rate structure & differences between rate levels • Arrow Refuse to order trucks & carts • Prepare schedule for initiation of service • Hold community meetings, distribute promotion / education materials to inform public about new refuse collection procedures	January, 2009 – June, 2010
8 / Design & Construct MRF	• WM & / or consultant to produce layout of MRF & related Facility Operations Plan • CBJ to prepare Request–for–Proposals (RFP) & select contractor(s) or WM to arrange for construction • CBJ to prepare RFP for baler & select vendor or WM to arrange for acquisition of baler • CBJ & / or WM to provide construction management, oversight, monitoring	June, 2009 – March, 2010
9 / Design & Implement Promotion, Education, Outreach (PEO) Plan	• CBJ primarily responsible for promotion, education, outreach with assistance / coordination from WM & Arrow Refuse • Adopt distinct slogan / logo for program identity • PEO should use variety of media & methods for communicating • Messages & materials need to be simple, clear, consistent, regular, ongoing	January, 2010 – ongoing

Table 7: Implementation Schedule / Sequence continued

Recommendation	Activities / Steps	Timeframe: Start ► End
10 / Design & Implement Residential Recycling Collection Service	• Meet with Arrow Refuse to determine materials collected, frequency of pickup, instructions to residents • Arrow Refuse or CBJ to buy carts & arrange for their distribution • Recyclables to be commingled in 1 cart • Materials brought to MRF for basic processing, shipment	July, 2010 – July, 2011
11 / Design & Implement Commercial / Institutional Recycling Collection Service	• Meet with Arrow Refuse to determine materials collected, instructions to generators • Carts or dumpsters for storage of recyclables provided by Arrow Refuse • Recyclables to be commingled in container • Materials brought to MRF for basic processing, shipment	July, 2010 – January, 2012
12 / Adopt Recycling Standards for Designated Construction & Demolition Projects	• Research similar policies, related ordinances from other cities • Set up stakeholder advisory committee of representatives from construction / demolition industry • Designated size & type of projects to be impacted • Designate materials to be targeted for recovery / reuse • Incorporate into building permit requirements • Contractors can use Arrow Refuse for hauling materials or make their own arrangements • Materials to be taken to MRF for recycling / reuse	July, 2011 – June, 2012

Appendix A

Refuse Collection Rates in Juneau:

January, 2008
Arrow Refuse Rate Schedule

Pick–ups per Week	Rate per Month	Additional Cans Monthly Charge	Pack out < 60' per can per month	Pack out > 60' per can per mo	Drive in < 60' per container per month	Drive in > 60' per container per month	
1 Can Collection Service (Residential only)							
1	14.58	Extras only	3.34	6.67	3.34	5.00	
3 Can Collection Service (Residential)							
1	21.77	8.69	10.03	20.01	10.03	15.00	
2	45.75	16.31	20.07	40.01	20.07	30.01	
3	68.62	24.51	30.10	60.02	30.10	45.01	
4	91.52	32.67	40.13	80.02	40.13	60.02	
5	114.70	40.87	50.17	100.03	50.17	75.02	
6	137.26	49.03	60.20	120.04	60.20	90.03	
7	183.05	65.36	70.24	140.04	70.24	105.03	
Extras	per can	2.00	0.77	1.54	0.77	1.15	
Optional Roll Cart Rental		**W/Bear Lids**					
96 Gallon Cart	6.88	11.35					
Plus City Tax @ 5% and RCA Tax at .48%							
Service	**Rate**	**Rental**	**Taxes**	**Total Cost**			
1 – 32 gallon can	14.58	-	0.80	15.38			
3 – 32 gallon cans	21.77	-	1.19	22.96			
1 – 96 gallon cart	21.77	10.81	1.79	34.37			
Commercial Container Monthly Collection Charge by Size and Pick–ups Per Week							
Container Size	**1**	**2**	**3**	**4**	**5**	**6**	**7**
96 Gallon Cart	22.89	45.75	68.62	91.52	114.70	137.26	183.05
1.0 Yard Dumpster	50.63	101.26	151.89	202.51	253.14	303.77	354.40
1.5 Yard Dumpster	75.94	151.89	227.83	303.77	379.71	455.66	531.60
2.0 Yard Dumpster	101.26	202.51	303.77	405.03	506.29	607.54	708.80
3.0 Yard Dumpster	151.89	303.77	455.66	607.54	759.43	911.31	1,063.20
Extra Pick–up per Yard	12.66	25.31	37.97	50.63	63.29	75.94	

Commercial Container Rental Rates							
Rear–Load Container	**Monthly**	**W/ Bear Lids**		**Delivery**			
96 Gallon Cart	6.88	11.35		25.00			
1.5 Yard Dumpster	44.01	57.75		25.00			
2.0 Yard Dumpster	49.51	63.25		25.00			
3.0 Yard Dumpster	56.37	83.87		25.00			
Service	**Rate**	**Container Rent**	**Taxes**	**Total**			
96 gallon cart	22.89	6.88	1.64	31.41			
1.5 yard weekly	75.94	44.01	6.60	126.55			
2 yard twice a week	202.51	49.51	13.86	265.88			
3 yard four times a week	607.54	56.37	36.52	700.43			
Special Pick – Up Rates and Charges							
Cans / Cart	5.72	Per Pick-Up					
1.5 YD	18.99	Per Pick-Up					
2 YD	25.31	Per Pick-Up					
3 YD	37.97	Per Pick-Up					
Tires (no rims)	6.00	Each					
Drop Box Service							
Roll–Off (Pull Charge)	**109.63**	**E&R (Service Fee)**					
Delivery Charge	**54.82**	**Delivery or Do Not Return (DNR)**					
Drop Box Rental Rates							
Box Size	**Monthly**	**2 Week Min.**		**Box Delivery**			
10 Cubic Yard	162.26	81.13		54.82			
20 Cubic Yard	324.50	162.25		54.82			
30 Cubic Yard	368.51	184.26		54.82			
40 Cubic Yard	412.49	206.25		54.82			
Service	**Pull Rate**	**Box Rent**	**Delivery**	**Tax**	**Total Service Fee**	**Plus Actual Disposal @ $120 Per Ton**	
10 YD Residential (One Time)	109.63	81.13	54.82	13.75	259.33		
20 YD Commercial Customer	109.63	324.50		23.88	458.01		
30 Cubic Yard Compactor	109.63	-	-	6.53	116.17		

NOTES

Appendix A is the January 1, 2008 Rate Schedule as provided by Arrow Refuse

- No 2 can service per the RCA
- Commercial rate includes the container rent and the service fee
- Drop Box is the pull fee, demurrage, and disposal fee
- Only the 96 gallon cart is available for rent
- All these rates do not include a 5% City tax

Appendix B

Incineration of

Municipal Solid Waste

INCINERATION ANALYSIS FOR CITY / BOROUGH OF JUNEAU (CBJ)

1. INTRODUCTION

a. Incineration is a waste treatment technology that involves the combustion of organic materials and/or substances. Incineration of waste materials converts the waste into ash, flue gases, particulates, and heat. The flue gases are cleaned for pollutants before they are dispersed in the atmosphere. The purpose of using incineration as a waste disposal method in the CBJ would be to reduce the amount of MSW (municipal solid waste) requiring landfill disposal. However, approximately 10-25% by weight of the waste stream would still need to be landfilled. This waste would consist of non-combustibles that will not burn at all, such as glass, metal, concrete, soil; ash, meaning combustible material that passes through the incinerator but does not burn completely; and bulky waste that is too large to fit into the incinerator.

2. WASTESTREAMS USED AS FEEDSTOCK

a. What types of wastes are suitable for incineration?

In general the following types of wastes are suitable for incineration:

- Garbage, trash, or refuse generated by residences, offices, businesses and similar institutions. This includes paper, plastic, food waste, cardboard, leather, textiles, wood and similar materials that are not in a suitable condition for recycling or re-use because they are broken, dirty or otherwise contaminated.
- Small amounts of metals, glass, dirt, rocks, concrete, and other non-combustible materials mixed in with solid waste. These materials do not burn and promote wear and damage to incineration equipment. However, they are tolerated because it is not practical to sort out and remove such materials from the waste stream.
- Automobile and pickup truck tires can be burned, but the rate at which tires are fed to the incinerator must be carefully controlled to minimize air emissions from the tires.

b. What types of wastes are not suitable for incineration?

The following types of wastes are not suitable for incineration:

- Chemical and hazardous wastes, whether from residential, commercial, or industrial sources.
- Large tires such as from earth-moving equipment are generally not suitable for burning.
- Bulky wastes such as couches, mattresses, and other large furniture that are too large for the incinerator.
- Wastes containing large amounts of metal, glass, or other non-combustible materials.
- Wastes that could otherwise go to a landfill permitted to receive inert waste. Examples of these materials are tree stumps, concrete, rubble, broken asphalt, gypsum wallboard.

- Yard wastes such as lawn clippings, leaves, tree and shrub trimmings, contain too much moisture to burn efficiently and will generally decrease the efficiency of incineration.

c. What about medical wastes?

Modular incinerators are used to burn medical waste in the U.S., although other methods of disposing of medical waste have become more available. Burning medical wastes in the same incinerator used for solid waste could provide additional income to the facility and help dispose of a difficult waste. However, there may be regulatory requirements that limit or prohibit burning of medical wastes in the same incinerator (see Question 8d for additional discussion).

d. How are materials separated prior to burning?

- It is difficult to separate suitable from unsuitable materials. A skid-steer loader (such as a "Bobcat") may be used to push relatively large, unsuitable materials such as metal objects off to one side of the facility tipping floor.
- Manual separation is inefficient, unpleasant, and exposes workers to health and ergonomic hazards. Manual separation should be minimized.
- Vehicles carrying yard, construction / demolition, and bulky wastes such as couches and mattresses can be required to unload in an area that does not receive solid waste for burning. This is an effective way to keep these unsuitable materials out of the incinerator feedstock, but may be an inconvenience to customers, especially if the materials are mixed in a single load.

e. How do seasonal waste fluctuations affect incineration?

In most geographic areas solid waste experiences some seasonal fluctuations. For example, more waste is typically generated during warmer months than colder months, except for the Christmas holiday period. During the holidays there are surges in shopping, consumption, and resultant refuse disposal. Tonnage spikes are also attributed to spring and fall cleanups. During periods of significant rainfall, the waste may contain more moisture and therefore not burn as well as during dryer periods. An incineration facility would adjust its operating hours to match seasonal fluctuations in waste tonnage.

3. INCINERATOR TECHNOLOGIES

a. What types of incineration technology have been used in the United States?

The following incineration technology has been used in the United States for MSW:

- **Controlled-air, modular** (factory-fabricated) units suitable with a total capacity of about 95 Tons per Day (TPD). Juneau will fall in this category, especially if aggressive waste reduction / recycling measures are implemented.
- **Mass burn**, field-assembled units suitable for facilities of at least 200 TPD or larger. This technology will not be suitable for the CBJ due to the relatively small quantity of solid waste projected over the next 30 years.
- Refuse-derived fuel (**RDF**) field-assembled units suitable for larger facilities of at least 200 TPD. Again, this technology is also not applicable to the CBJ due to the tonnage thresholds.

- **Rotary kiln** and **fluidized bed** units: few currently operating units in the U.S.; this technology does not have an established history of operation in the U.S.

  Since the 1970s, the vast majority of small (less than about 150 TPD capacity) U.S. incineration facilities have employed controlled-air, modular units. While mass burn incinerators are more efficient at generating electricity, they are not the appropriate choice of technology for areas with relatively small waste streams such as the CBJ. Most waste-to-energy (WTE) facilities currently operating in the U.S. and Europe utilize mass burn technology; Spokane Washington and Marion County (in Brooks) Oregon are two examples. As well, WTE is of marginal relevance to the CBJ due to the reliance on hydro–power for energy generation which is generally considered a clean, renewable, and sustainable technology.

b. How does a modular incinerator work?

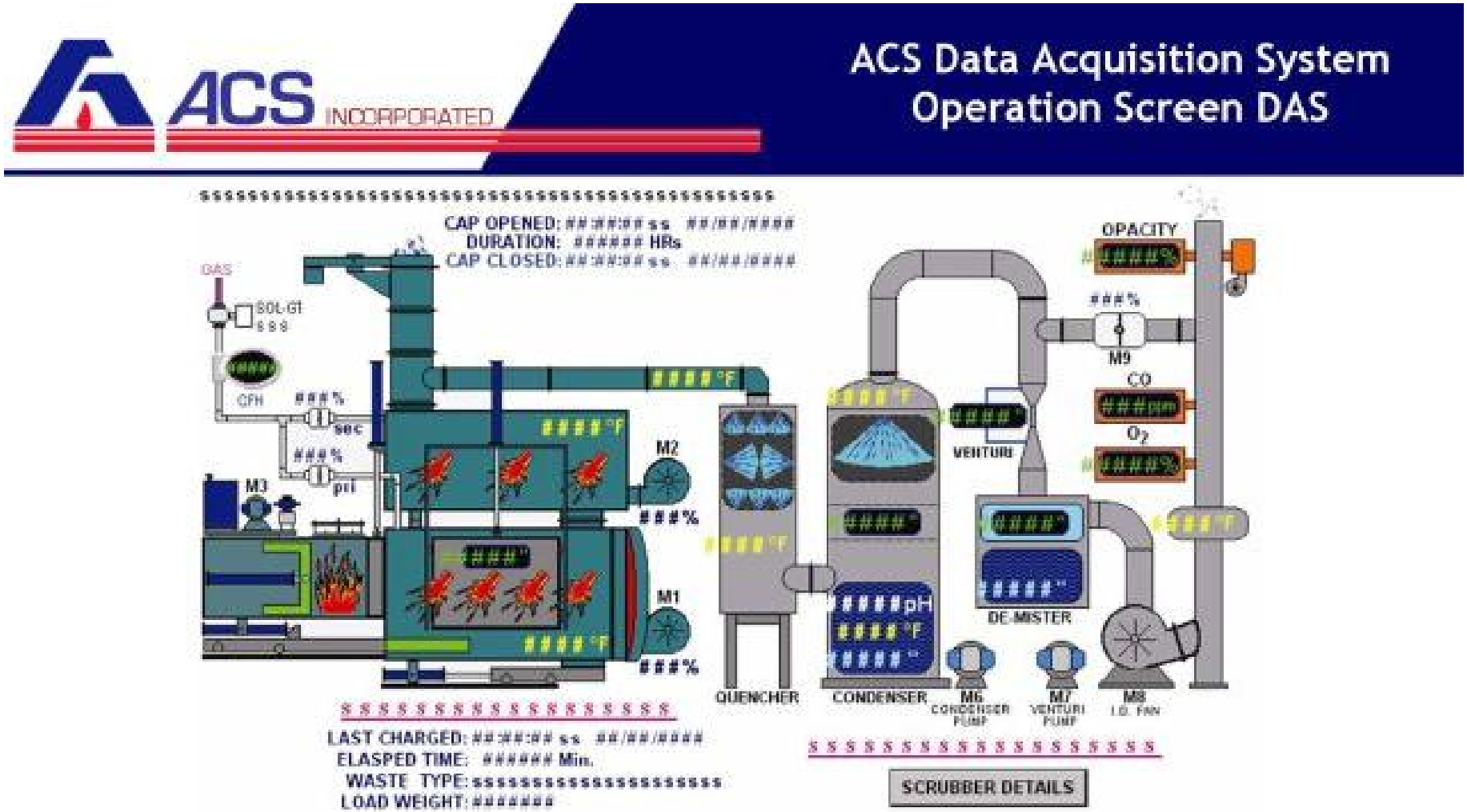
The term "modular incinerator" is synonymous with "controlled-air incinerator." A modular incinerator uses a three-step process to heat and dry the waste, release volatile combustible gases, and finally burn the gases. Waste is loaded into a feed hopper and then pushed into the primary chamber by a hydraulic ram. The waste sits on a stair-step series of stationary hearths. A hydraulic ram pushes the waste across each hearth and tumbles it down to the next lower level hearth, promoting burnout of the waste. The primary chamber uses the principle of pyrolysis to burn waste with less than the amount of oxygen required for complete combustion (called sub-stoichiometric conditions). By using less air in the primary chamber, less particulate matter is carried into the secondary chamber by the hot gases. Burners fired with oil or natural gas maintain the primary chamber temperature at about 1600 degrees (F).

An ash ram pushes the residue through an opening at the far end of the primary chamber, where it drops into a water-filled tank for quenching (cooling). A chain conveyor is typically used to drag the ash up an incline and into a dump truck or container, for subsequent disposal in a landfill that is specifically designed and permitted to receive ash.

Volatile gases flow from the primary to the secondary (oxidizer) chamber where more combustion air is added to consume carbon monoxide, particulate matter, and volatile organics. Local regulations require that the gases be exposed to elevated temperatures for at least 1-2 seconds, which may require a third (tertiary) chamber. Fossil fuel-fired burners maintain secondary and tertiary chambers at a temperature required by local regulations, typically 1800 degrees (F).

The basic design elements and layout of a typical modular incinerator are presented in the diagram below.

Schematic of Modular Incinerator
(Courtesy of ACS, Inc.)



4. AIR POLLUTION CONTROL

a. What are the regulations for incinerator air pollution?

The numerous Federal, state and local regulations for air emissions from incinerators address a wide variety of air pollutants including particulate matter, acid (corrosive) gases, and compounds that are toxic or otherwise hazardous to the health of humans, animals, and plants.

Incinerators in the capacity range of 35 to 250 TPD (the range of interest to the CBJ) are governed by Federal regulations 40 CFR Part 60, *"New Source Performance Standards for New Small Municipal Waste Combustion Units; Final Rule"*, promulgated on December 6, 2000. The air pollutants covered under these regulations include dioxins / furans, cadmium, lead, mercury, particulate matter, opacity, sulfur dioxide, hydrogen chloride, nitrogen oxides, carbon monoxide, and fugitive ash. These regulations are comprehensive and cover the following major aspects of an incineration system:

- Pre-construction requirements
- Materials separation plan
- Siting analysis
- Good combustion practices
- Operator training
- Operator certification
- Operating requirements
- Emission limits
- Monitoring (automated continuous emissions monitoring for carbon dioxide, sulfur dioxide, nitrogen oxides and carbon monoxide)
- Stack testing
- Record – keeping and reporting

As a minimum, a 35-100 TPD incinerator in the CBJ will need to meet the Federal air emissions limits of 40 CFR Part 60 (the NSPS regulations cited above). Furthermore, State of Alaska and local officials have the option of making the limits even more stringent. Emissions requirements would not be finalized until a permit application was actually submitted to state and local authorities. This uncertainty poses some degree of implementation risk for an incinerator.

A Title I (Federal) permit application would be necessary to begin construction and a Title V (Federal) permit application is necessary one year after startup.

b. What is the trend for regulation of small incinerators?

In general, the trend over the last 15 years has been to make air pollution regulations more stringent, thus decreasing the level of air emissions allowed. Operating conditions and operator training requirements have become tougher as well. Furthermore, since the public's desire to build new incinerators has decreased in the last 5-10 years, further tightening of Federal regulations seems unlikely.

c. How is incinerator air pollution controlled?

Hot gases from an incinerator are treated in a scrubber to remove particulate matter, acid gases, and toxic compounds. First, the gases must be cooled from about 1800 degrees F down to less than about 400 degrees F. This can be accomplished by sending the gases through a boiler or heat exchanger to remove heat and lower the temperature. Alternatively the gases can be sprayed with water (or a lime solution) to quench (cool) the gases.

Carbon particles are minimized by maintaining proper combustion conditions – adequate temperature of about 1800 degrees F, turbulence in the combustion chambers, and sufficient residence time in the incinerator. Carbon and metal particles can be captured in a fabric filter (often called a baghouse) that works like a furnace filter or vacuum cleaner bag. Alternatively, the particles can be electrically charged and then captured on magnetized metal plates in an electrostatic precipitator, similar to a household electronic air cleaner.

Typical acid gases such as hydrochloric and sulfuric acid result from burning waste that contains chlorine (e.g., vinyl plastics or food waste that contains salt) or sulfur. Contacting the acid gases with lime or a similar alkaline solution can neutralize these gases. Dry scrubbers inject dry lime powder into the gas stream, while wet scrubbers use a liquid lime solution. In the latter case, the water evaporates and the lime particles, along with sulfur or chlorine compounds, are captured by the particle-removal device (bag house or precipitator described above).

Toxic or hazardous compounds are controlled by:

- Banning them from the waste entering into the incinerator (directing them to a licensed hazardous waste facility).
- Maintaining proper combustion conditions as described above for particles.
- Capturing them along with the lime particles.
- Injecting powdered, activated carbon into the gas stream. Toxic compounds attach to the carbon powder and are captured in the precipitator or bag house.

5. ASH DISPOSAL

a. How would an incineration facility dispose of its ash?

An incinerator produces two kinds of ash: 1) bottom ash (metal, glass, soil, rocks, unburnable materials, plus partially burned pieces of potentially burnable materials) and 2) fly ash (particulate matter captured by the air pollution control system). In general, bottom ash is less of an environmental concern because toxic compounds are less likely to leach out

of bottom ash. Fly ash may contain heavy metals and other toxic compounds and is considered more of an environmental concern.

Based on the tonnage of waste processed by the incinerator (i.e. greater than 20 tons / day), the resulting ash must be disposed in a Class I municipal solid waste landfill (MSWLF), in accordance with 18 AAC 60.300(c)(1). A Class I landfill newer than 1991 requires a liner. While the CBJ landfill is a Class I landfill, it does not have a liner. Nevertheless, the landfill took incinerator ash when Juneau's incinerators were operating and is still permitted to take it as long as the ash is not hazardous (conversation with Ed Emswiler, Alaska Department of Environmental Conservation, August 14, 2007).

However, disposing future incinerator ash in the Juneau landfill could expose the incinerator's owner/operator to potentially significant financial liability if the unlined landfill is determined to have caused pollution of soil or groundwater. Regardless of the "real" contribution of ash to the pollution problem, the cost of defending the incinerator in an environmental lawsuit would likely be substantial.

Incinerator ash must pass the Federal Toxicity Characteristic Leaching Procedure (TCLP) test before it can be disposed in a landfill. Ash must be tested on a regular basis, with frequency of testing determined by state or local environmental officials. If the ash proves to be hazardous, it would be prohibited from disposal in the CBJ Landfill. Disposal at a licensed hazardous waste landfill would likely be more expensive than at the CBJ Landfill and involve higher transportation costs. This uncertainty about ash disposal is another implementation risk for a new incinerator in Juneau.

6. INCINERATOR OPERATION

a. What operating cycle would the incinerator use?

In general, it is more efficient to operate an incinerator continuously (24 hours a day). Intermittent operation ("cycling" the incinerator) requires fossil fuel to heat up the incinerator to proper burning temperatures after it has cooled down from inactivity. Heating and cooling cycles can eventually cause damage to the refractory ("fire brick") lining of the incinerator chambers, increasing repairs, an important component of operating and maintenance (O & M) costs.

An incinerator of a given capacity and sized for 24 hour / day operation will be smaller than one sized for 8 hour / day operation. Therefore, the continuous-burn (24 hour / day) unit will have a lower capital cost. Fossil fuel use will be lower as well, since the incinerator does not need to be warmed up each morning.

Modular incinerators typically operate 5 days a week, allowing the weekend for cool-down and maintenance. A two-week shutdown for annual maintenance and overhaul is also typical. Therefore, 250 operating days per year is normally assumed when calculating the necessary incineration capacity.

7. POTENTIAL INCINERATION FACILITY IN THE CBJ

a. What would be the major components of an incineration facility?

An incineration facility for CBJ would require the following major components:

- Scales and scale house.
- Incinerator building with waste storage area, control room, restrooms/locker rooms, lunch room/ meeting room, office, storage, and maintenance shop.
- Modular (controlled air) incinerators and air pollution control system. Some of the equipment might be located outdoors.
- Site roadways, landscaping, parking and stormwater control.
- Utilities: sewer, water, stormwater, natural gas (or other fossil fuel), electricity, phone, Internet.
- Rolling stock: front-end loader, pickup truck.

Assuming that electricity is being generated (as opposed to just selling the steam), a waste-to-energy (WTE) facility would require all of the above, plus the following:

- Steam generating equipment (boiler), steam turbine, electrical generator, control room and employee facilities.
- Electrical substation and power transmission lines.

b. Would waste-to-energy (WTE) make incineration more attractive financially?

Since electricity for the CBJ is generated by hydropower, a clean and renewable source of energy, the incineration of municipal solid waste (MSW) to produce steam and electricity is probably not economically competitive.

The heat released by burning solid waste is typically captured in a boiler, producing steam and (occasionally) hot water. Steam can be piped directly for use in space heating, industrial processes, or drying applications. In many European cities, it is common to have "district heating" systems of underground pipes that send steam to nearby buildings to provide space heating. In the U.S., steam is typically used to turn a steam turbine that in turn drives an electrical generator. Most large (over 400 TPD) U.S. incineration systems generate and sell electricity to help offset their operating costs.

The following factors contribute to the success of a WTE system:

- A long-term, reliable, politically stable supply of solid waste. This generally requires that local jurisdictions sign an agreement to send a certain amount of solid waste to the WTE plant each year. Each jurisdiction pays for incineration of a guaranteed minimum quantity of waste, regardless of whether it actually delivers the waste. The agreement must last long enough to recover the cost of the plant.
- Sufficient revenue to recover capital costs (interest and principal on borrowed funds) and operating costs (labor, utilities, ash disposal, equipment replacement, repairs, etc.). Revenues include:

- Tipping fees ($/ton charged to dispose of waste at the WTE plant);
- Income from the sale of electricity or steam; and
- Funds contributed by local governments.

- Continuing citizen support for the WTE facility and its operations. Dealing with citizen protests or lawsuits regarding issues such as air or water emissions, odors, truck traffic, etc. is time-consuming and expensive.
- Stable regulatory environment. Essential changes in regulations may require frequent and/or expensive upgrades or changes in plant operation, the costs of which may be difficult to recover without increasing tipping fees.

As noted previously, electricity for the CBJ is generated by hydropower, a clean and renewable source of energy. Given this factor, and the reasons discussed below, the incineration of municipal solid waste (MSW) to produce steam and electricity (waste-to-energy or WTE) is probably not **economically** competitive or feasible in the CBJ:

- A basic incineration facility requires incinerators, waste storage and administration buildings, air pollution control equipment, and a control system. A WTE plant requires all that, plus a steam turbine, electric generator, electrical switching gear, and a more sophisticated control system. Funding either an incineration facility or a WTE plant will probably require the sale of bonds.
- The approximately 24,000 tons per year (TPY) of disposed municipal solid waste from the CBJ represents a relatively small quantity of MSW to burn, compared with other U.S. locations where WTE has been successful. Small amounts of waste convert to small amounts of steam or electricity and result in a small revenue stream that will not justify the additional construction and operating costs of steam generation and electrical generation equipment required for a WTE facility.
- Selling steam requires a major steam customer in close proximity to the WTE plant. A piping system to deliver steam and return condensate (water from the condensed steam) must be constructed between the WTE plant and the steam customer. Unlike Europe, it is rarely the case that an American industrial steam user is located an economical distance from the WTE plant. Furthermore, the WTE plant would be required to deliver steam according to the customer's demand schedule, typically 24 hours a day, 7 days a week for most industries. The modular incinerators that would likely be used at a CBJ facility may be continuous (24 hour/day) units, but most likely will be shut down on weekends and are not suitable for 24/7 operation. They would probably operate 5 days a week before shutting down for routine maintenance. The resulting intermittent steam delivery would likely not be acceptable to most industrial users.
- Selling electricity requires even more infrastructure. Besides the boiler to produce steam, there is a steam turbine / generator combination to generate electricity. Although the retail price of electricity (cents per kilowatt hour) may seem high to most homeowners, a WTE plant would be selling electricity at wholesale rates which are considerably lower. Utilities are no longer required by law to purchase electricity from small facilities such as WTE plants. A CBJ WTE facility would produce relatively small amounts of power. Furthermore, the power would be intermittent (say 5 days a week) and not have the high degree of reliability required by a utility. For these reasons, a CBJ WTE facility would probably be paid lower rates for its electricity.

- Pending a detailed cost / benefit analysis, it seems unlikely that a WTE would be able to cover its operating costs and pay off the bonds using the small revenue stream resulting from sale of small amounts of electricity or steam, unless tipping fees were relatively high.

Under the following scenarios a WTE facility might become feasible in CBJ:

- Negotiating favorable tipping (disposal) fees for additional waste from other jurisdictions and / or private parties may bring enough extra waste to a CBJ WTE plant to create operational economies of scale, as well as additional revenue.
- Scrap tires are a problem waste: they pose a fire and mosquito hazard if stored outdoors and do not compact well in landfills. Theoretically, limited amounts of car and pickup truck tires could be burned at a WTE plant, and their high energy content would increase the output of steam/electricity. Special fees for tire disposal (e.g. $1 a piece) bring in additional revenue that is disproportionately higher than solid waste, on a $-per-ton basis.

  Coos County, a rural area on the Oregon coast, has a 150 TPD incineration facility using equipment similar to the former facility in CBJ. It burns approximately 24,000 tons per year of MSW, about the same amount as disposed in CBJ. In 2002, a feasibility study (EnviroMech) found that even if waste were supplemented with scrap tires or out-of-county waste, it would not improve the economics enough to justify adding a boiler and steam turbine/electrical generator to the existing incineration system.

8. COSTS

a. What order-of-magnitude / planning level <u>capital</u> costs should be expected?

"Hard" components of the capital cost include:

- Purchase of land to build the facility (8-10 acres including buffers).
- Site improvements (roadways, parking, landscaping, utilities).
- Off-site improvements (access roads, traffic signals).
- Construction of buildings.
- Equipment purchase and installation.

"Soft" components of the capital cost include:

- Environmental and land use permitting process (cost increases in proportion to the amount of opposition to the project). An Environmental Impact Statement (EIS) may be required for permitting a facility in Juneau.
- A health risk assessment may be required by local authorities.
- Engineering feasibility studies, designs, plans and specifications.
- Legal fees during project development.
- Administration / staff time during project development.
- Economic feasibility studies, financing arrangements, bond reports.
- If WTE, negotiation of power sales agreement.

- Testing of air emissions from completed facility to obtain a permit to operate.

Although recent and current cost data is available for the design, permitting, construction, and operation of landfills, this is not the case with MSW incinerators. The most recent MSW incineration facilities in Montana, Idaho, Washington and Oregon were built in the late 1980s and early 1990s. The 550 TPD WTE facility in Marion County, Oregon was constructed in 1985 at a cost of about $40 million.

A small (about 4 TPD) incineration only (not WTE) facility was built in Bridgewater, New Hampshire in 2005 for about $2 million (Milnes). Advanced Combustion Systems (ACS), a Bellingham, Washington manufacturer, provided the incinerator, air pollution control equipment, controls and air emissions monitoring equipment. Besides the equipment and the usual incineration site improvements, the $2 million cost included closing / capping a small existing landfill and providing propane storage (natural gas was not available as an auxiliary fuel). It is not clear whether the town already owned the land, or had to purchase it for this project. The costs for Bridgewater are indicative of the range and types of capital costs for incineration facilities, but are not strictly comparable with Juneau which would require a large capacity installation.

Developing an accurate engineering cost estimate for an MSW incinerator in the CBJ is made extremely difficult by the following factors:

1. There are no current "comparables." We have been unable to identify a single incinerator in the Pacific Northwest installed within the last two years, much less a facility of a relatively similar size (approximately 75 TPD).

2. For the last three years or more, construction costs have escalated at rates far in excess of historical rates. The cost of basic building materials (cement, steel, etc.) has escalated between 15 and 50%. So many projects are currently under construction that contractors have difficulty finding qualified subcontractors to perform various trade work such as concrete, plumbing, etc. This labor shortage tends to drive up prices. The combination of volatile material costs and a shortage of experienced labor have made it very difficult to accurately predict what it will cost to construct a project.

3. The "premium" for work in Alaska due to overall higher construction costs, partly due to higher freight and shipping costs, adds another degree of complexity to the cost estimating.

4. Permitting costs are a huge uncertainty. Regulatory agencies generally wait until they see a detailed facility proposal before they develop their specific list of permit requirements. For example, an agency may wait to gauge the public's reaction to a proposed incinerator before requiring a health risk assessment to examine potential health impacts to humans in the vicinity of an incinerator. Experience has shown that as opposition grows, agencies tend to request increasing amounts of technical documentation to demonstrate that the facility will not harm humans or the environment.

5. No site has been selected and no drawings or layouts have been developed for use in calculating quantities of materials.

6. It is tempting to accept an unsolicited cost proposal from a developer or equipment supplier as independent and reliable. The equipment costs may be reasonably accurate

and up-to-date, but equipment is only one major component of the total project cost. It is unlikely that the buildings and site infrastructure have been engineered to the level of detail necessary to provide an accurate construction cost estimate. In addition, developers may assume that there will be minimal opposition and few environmental hurdles. This is often not the case, and permitting costs can easily be underestimated.

In light of the factors discussed above, a very preliminary planning – level estimate of project costs (engineering, permitting, construction, emissions testing and startup) for an incineration – only plant could range from about $7 to 12 million, excluding land purchase. Upgrading to WTE could add another $2 to 3 million. To get more precise cost estimates one must develop a specific project scope and solicit bids.

b. What order-of-magnitude / planning level <u>operating</u> costs should be expected?

Operating costs depend on a variety of factors, including:

- Labor (scale attendant, plant operators, equipment drivers, maintenance personnel, bookkeeper, plant manager, etc.). Labor rates and customary fringe benefits vary widely between geographic areas and public/private sectors.
- Insurance (liability, fire, property damage, environmental pollution, etc.).
- Utilities (water, sewer, electricity, stormwater disposal, phone, Internet).
- Permits and fees (solid waste, sewer, air pollution, etc.).
- Periodic air emissions testing.
- Ash disposal (assume that 1 ton of MSW produces about 0.2 tons of ash). Cost of ash disposal can vary quite significantly depending upon the mode in which it must be disposed. If ash fails the TCLP test and is classified as hazardous waste, it will have to be shipped to a permitted hazardous waste handling and disposal facility.
- Equipment maintenance.
- Sinking fund to pay for major refurbishment of equipment (e.g. every 5 years).
- Site and building maintenance.
- Emergency fund.

Operating costs in the range of $60 to $100 per ton (2006) could be expected. Many costs (some labor, insurance, permits, some utilities, sinking fund, building maintenance, and emergency fund) will be relatively constant, provided a certain threshold amount of waste is burned each year. However, some costs will vary in proportion to the amount of waste burned (ash disposal, electricity).

c. What factors contribute to a financially successful incineration facility?

- Adequate tipping fee to cover capital and operating costs, plus a sinking fund to cover periodic major maintenance, overhaul, and upgrade.
- A reliable, long – term waste supply.
- A stable regulatory environment and citizens that support the facility rather than continually trying to shut it down.

d. What impact would attracting more (or other) types of waste have on incineration economics?

Modular incinerators are used to burn medical waste in the U.S., although other methods of disposing of medical waste are becoming more popular. While operating parameters (e.g. amount of combustion air, process control, etc.) may be slightly different for solid waste and medical waste, it is technically feasible to burn both types of waste in the same modular incinerator. However, there may be regulatory requirements that limit or prohibit burning of medical wastes in the same incinerator. Regulations may require the two wastes to be burned at separate times. In the 1990s this was the case in Ferndale, Washington where an incinerator burned medical waste exclusively during certain hours each week, and solid waste the remainder of the time. Burning medical wastes in the same incinerator used for solid waste could provide additional income to the facility and help dispose of a difficult waste.

9. POLICY CONSIDERATIONS

a. What is the compatibility of incineration with an emphasis on waste reduction/recycling (diversion)?

Recycling materials such as newspaper, cardboard, office paper, and plastics will reduce the amount of combustible material going to the incinerator. This will lower the average heating value of the waste and make it more difficult to burn, since wet wastes such as food scraps will make up a larger percentage of the waste.

On the other hand, recycling glass and metal containers will reduce the amount of non-combustibles in the waste stream and thus increase its average heating value, making it burn more easily. Removal of glass and metal, which are abrasive and damage the refractory lining of the incinerator, helps reduce wear and damage to the incinerator and slagging of the air pollution control system.

If Juneau signed a long – term “put or pay agreement” to deliver a specified amount of MSW to an incinerator, it would assure an adequate supply of waste going to the facility and make the system more stable economically. Would that run counter to maximizing diversion from disposal? Some recyclables (paper, plastics) are burnable and others (metals, glass) are not. Juneau’s population and disposed trash growth rates are relatively flat. It is not expected there will be significant increases in either category. If there is an aggressive waste reduction / recycling program it may draw tonnage away from an incinerator, thus raising the cost per ton.

10. CONCLUSION AND RATIONALE

a. Considering the technical, economic, environmental, and public acceptance factors and risks associated with an incineration facility, would incineration be feasible in the CBJ?

While incineration is technically feasible, a basic hurdle is financial feasibility, especially in comparison to continued use of the Waste Management Landfill. The most reliable way to obtain accurate cost information regarding incineration is a staged procurement process:

- Develop a preliminary project summary (for example, waste flow, site, permit conditions, range of proposed tip fees, potential CBJ construction and operating budget).
- Request letters of interest and qualifications from equipment vendors and facility operators.
- Based on the quality of responses and range of preliminary costs, determine whether a formal Request-for-Proposals (RFP) is justified.
- If the CBJ determines that incineration could be economically feasible, develop a detailed RFP and draft contract, and advertise for bids.
- Evaluate bids and select a suitable proposal.

b. Is incineration a recommended disposal alternative for the CBJ to pursue in the short – term (1 to 5 years)?

No. It is unlikely that the economics will be favorable.

PLEASE NOTE: The table at the end of this appendix presents estimated costs for incineration in Juneau.

REFERENCES

EnviroMech, *Waste-to-Energy Feasibility Study* for Coos County, Oregon, 2002

Communication with Milnes, Mike. Advanced Combustion Systems, Bellingham, WA, July 27, 2006.

Communication with Jim Baumgartner, Alaska Department of Environmental Conservation (ADEC), August 8, 2007; 907 / 465 – 5108

Communication with Karin Hendrickson, ADEC, August 9, 2007; 907 / 269 – 7626

Planning Level Cost Estimate for Incineration

Annual tons of municipal solid waste (MSW)	24,000	
Daily MSW tons (burn 250 days / year)	96	
A / Fixed Costs		**Notes**
Land (need at least 10 acres)	1,500,000	**A**
Roadway to the facility	300,000	**B**
Utilities	100,000	**C**
Building Construction (10,000 sq. foot bldg. @ $200 / sq. foot)	2,000,000	**D**
Permitting	100,000	**E**
Sort Line Equipment	750,000	**F**
Estimated Incinerator / Air Pollution System & Installation	6,575,000	**G**
Total Land, Building, & Incinerator	11,325,000	**H**
Monthly principal (P) & interest (I) @ 6% for 10 years	125,731	**I**
Fixed Cost Per Ton (Monthly P & I of $125,731 x 12 months / 24,000 MSW tons)	**$ 62.87**	
B / Variable Costs		
Labor (assume 9.5 people for continuous burn incinerator)	950,000	**J**
Equipment & Building Maintenance plus Repairs	125,000	**K**
Diesel Fuel @ $4 per gallon (13 gallons per hour to burn)	648,960	**L**
Utilities	50,000	**M**
Operating Supplies & Equipment	100,000	**N**
Regular Air Emissions & Ash Testing	100,000	**O**
Overhead Costs @ 15% of Costs	176,250	**P**
Insurance	50,000	**Q**
Sinking Fund for Major Maintenance / Replacements	100,000	**R**
Ash Disposal	720,000	**S**
Total Variable Costs	3,020,210	**T**
Variable Cost Per Ton (Total Variable Costs / 24,000 MSW tons)	**$ 125.84**	
C / Estimated Cost per Ton for Incineration (Total Fixed Cost per ton + Total Variable Cost per ton)	**$ 189**	

Incinerator Staffing

- 2 operators at 3 shifts per day, 5 days / week:	6
- 1 supervisor at 40 hours / week:	1
- 1 scale house operator at 40 hours / week:	1
- 1 administrative / clerical position, 40 hours / week:	1
- .25 FTE mechanic / .25 FTE electrician:	.50
Total Staffing	**9.5**

Notes

A: Current sale price of industrial land across the street from the existing Juneau landfill

B: Construct a road to the facility

C: Bring electricity, water, and sewer service to the facility

D: Construct a 10,000 square foot industrial building to sort waste and house the incinerator

E: Facility siting study, public involvement program, solid waste and air pollution permits

F: Equipment for removing recyclable materials from the waste stream prior to incineration and to remove metals from the ash

G: Two 50 + ton / day and one 20 ton / day incinerators to provide operating flexibility and partial backup capacity; air pollution control (APC) equipment; control system; installation, startup, and air emissions source test

H: Total of items A through G

I: Monthly payment on a note for $10,750,000 over a ten year period @ 6% interest

J: Projected labor cost of $100,000 per person (including benefits); see text above for labor description

K: Repair and routine maintenance for the building, site, and equipment

L: One incinerator burns 12.9 gallons of diesel per hour. Two incinerators will burn continuous for 24 hours a day, 5 days a week for 50 weeks a year. Each incinerator will be shut down for an annual two – week period for routine maintenance.

M: Approximate annual cost of electricity, water, and sewer

N: Approximate annual supply cost

O: Approximate cost of compliance

P: Overhead cost to maintain the operations

Q: Assumed cost of insurance

R: Annual amount set aside for major repair and replacement, excluding items covered in Note K

S: Ash weight is approximately 20% of the 24,000 tons of MSW, times a tip fee of $150 per ton. Ash may be disposed at the Waste Management Landfill in Juneau. Incineration will reduce the quantity of disposed waste handled at the landfill. To compensate for this loss of revenue it is assumed Waste Management would increase the tipping fee to $150 / ton for the ash from the current rate of $ 120 / ton for municipal solid waste.

T: The sum of items J through S

Planning level estimated costs are based on prior project experience and industry inquiries.

Appendix C

Landfilling of

Municipal Solid Waste

LANDFILLING

The purpose of this appendix is to generally describe the elements of permitting, design, and construction necessary to develop a modern municipal solid waste landfill. The target facility is one capable of managing and disposing approximately 24,000 tons of municipal solid waste (MSW) annually from Juneau, Alaska. Included is a general description of the permitting / design / construction process and estimated costs associated with each element of the process.

A / Terms

Terms used in this appendix have the following definitions:

"Active life" means the period of operation beginning with the first receipt of solid waste and ending at completion of closure activities.

"Alaska Department of Environmental Conservation" (ADEC). State regulatory authority having jurisdiction over solid waste management in the State of Alaska.

"Airport" means a public-use airport open to the public without prior permission and without restrictions within the physical capacities of available facilities.

"Aquifer" means a geological formation, group of formations, or portion of a formation capable of yielding significant quantities of groundwater to wells or springs.

"Aquifer of resource value" means an area beneath the ground that is used as a drinking water supply source, has a reasonable potential to be used as a drinking water supply source, or has some other potential use for which uncontaminated water might be important.

"Asbestos" means the asbestiform varieties of serpentine (chyrsotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite.

"Biosolids" means solid, semi-solid, or liquid residue generated during treatment of domestic sewage in a treatment works plant; "biosolids" includes domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and material derived from biosolids; "biosolids" does not include ash

generated during the firing of biosolids in a biosolids incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works plant.

"Closed portion" means that part of a facility or unit that has been closed in accordance with ADEC requirements.

"Closure" means those actions taken by the owner or operator of a MSWLF (municipal solid waste landfill) unit or facility to cease disposal operations and to ensure that a MSWLF unit or facility is closed in conformance with applicable regulations at the time of such closures and to prepare the site for the post-closure period. Closure is considered part of operation.

"Containment structure" means a type of waste management area in which an arrangement of dikes, walls, barrier berms, pits, ice storage pits, liners, pads, cover material, and other similar constructs are used to hold solid waste and to prevent the escape, seepage, or discharge of solid waste and leachate from, or infiltration of water or precipitation into, the waste management area.

"Composite liner" is a system consisting of two components; the upper component must consist of a minimum of 60 mil thickness high-density polyethylene (HDPE) geomembrane. The lower component must consist of at least a two-foot (60 cm) layer of compacted soil with limited hydraulic conductivity. The geomembrane must be installed in direct and uniform contact with the compacted soil component. In some cases a geosynthetic clay liner can be substituted for the compacted soil.

"Construction quality assurance" means a planned system of activities that provide assurance that a facility is constructed as specified in the design and that the materials used in construction are manufactured according to specifications. Construction quality assurance includes inspections, verifications, audits, and evaluations of materials and workmanship necessary to determine and document the quality of the constructed facility.

"Cover material" means a natural or synthetic material, or combination of materials, used to cover solid waste disposed of at a solid waste disposal facility or unit.

"Demonstrate" means to make a showing of fact to a public agency; unless a different standard is established on a case-by-case basis, a "demonstration" required by regulation must show the asserted conclusion by a preponderance of evidence.

"Disposal" means the deposit of a solid or liquid waste into or onto the water or land of the state, whether the waste is contained or uncontained, by discharging, injecting, dumping, spilling, leaking, placing, discarding, or abandoning the waste so that the waste or any part or byproduct of the waste might enter the environment.

"Fault" means a fracture or a zone of fractures in any material along which strata on one side have been displaced with respect to that on the other side.

"Floodplain" means the lowland and relatively flat areas adjoining inland and coastal waters; "floodplain" includes flood-prone areas of offshore islands that are inundated by the 100-year flood; for purposes of this appendix, "100-year flood" means a flood that has a one percent or greater chance of recurring in any given year or a flood of a magnitude equaled or exceeded once in 100 years on the average over a significantly long period.

"Groundwater" means water below the land surface in the zone of saturation.

"Holocene" means the most recent epoch of the Quaternary period, extending from the end of the Pleistocene Epoch to the present; "Holocene" is generally considered to be 10,000 years.

"Inert waste" means solid waste that has a low potential to pollute air or water, and that does not normally attract wildlife; "inert waste" includes coal power plant ash, scrap metal, auto fluff, construction and demolition waste, and pavement rubble; "inert waste" does not include asphalt material that contains asbestos.

"Landfill" means an area of land or an excavation in which solid wastes are placed for permanent disposal, and that is not an application site, injection well, reserve pit, or waste pile.

"Leachate" means liquid that has passed through or emerged from solid waste and contains soluble or suspended materials removed from the wastes.

"Leachate collection and removal system" (LCRS) means a system or device installed immediately above a liner that is designed, constructed, maintained, and operated to collect and remove leachate from a landfill.

"Municipal solid waste landfill" and **"MSWLF"** mean an area of land or an excavation that receives household and commercial waste, and that is not an application site, surface impoundment, injection well, or waste pile; "municipal solid waste landfill" includes a new MSWLF, an existing MSWLF, and / or a lateral expansion of an existing MSWLF.

"Operator" means the person or persons responsible for the overall operation of a facility.

"Owner" means the person or persons who own a facility; unless expressly excluded in a particular section, "owner or operator" includes the holder of a permit issued by the ADEC regardless of whether the permittee otherwise fits within the definitions given of those terms.

"Recycling" means the process by which a material that would otherwise be destined for disposal is collected, reprocessed, and then remanufactured or reused.

"Run-off" means rainwater, leachate, or other liquid that drains over land from any part of a facility.

"Run-on" means rainwater, leachate, or other liquid that drains over land onto any part of a facility.

"Seismic impact zone" means an area with a 10 percent or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a decimal fraction of the earth's gravitational pull, will exceed 0.10g in 250 years.

"Unstable area" means a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of a landfill's structural components responsible for preventing releases from the landfill; "unstable area" includes poor foundation conditions, areas susceptible to mass movements, earthquake-induced failures, and areas underlain by permafrost.

"Uppermost aquifer" means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within, or immediately downgradient of, the facility's boundary.

"Waste disposal permit" means a permit issued by the ADEC.

"Wetlands" has the meaning given in 40 C.F.R. 232.2, revised as of July 1, 1997.

"Post-closure period" means the time period following closure of a facility during which monitoring or care of the facility is required; if a closure report or certification is required, the post-closure period begins when the report or certification requirement is satisfied and ends when the site can be certified as stable.

B / Municipal Solid Waste Landfill Basics

By law, modern municipal solid waste landfills (MSWLF) and construction and demolition (C&D) waste landfills must be designed and operated to prevent impacts to air quality, groundwater quality, and surface water quality. Generally this is accomplished by placing MSW and C&D waste into containment areas commonly called cells. In general these cells are lined with a composite liner system that separates waste placed in the cell from groundwater. The composite liner is covered with a leachate collection and removal system (LCRS) that removes leachate captured by the composite liner system. The collected leachate must then be treated, and in a wet climate environment like Juneau, Alaska this treatment would typically be accomplished in a wastewater treatment plant before it is discharged. As waste is placed into cells, interim and final cover systems are placed over the waste to prevent surface water and rain water from contacting the waste. In some cases systems are installed to remove landfill gases generated in the waste so that air quality is protected.

A separately permitted, designed and constructed facility can be developed for disposal of C&D wastes only. In the State of Alaska, a C&D landfill may be permitted without a liner and leachate collection system. But it is likely that waste placed into the unlined landfill would be limited to inert wastes, which are noncombustible, and to non-dangerous solid wastes that are likely to retain their physical and chemical structure under expected conditions of disposal, including resistance to biological attack and chemical attack from acidic rain water. Examples include asphalt and concrete.

However, if the inert wastes include organic waste such as wood and sheet rock, or others products that are not likely to retain their physical and chemical structure, then it is common practice to mix or commingle the C&D waste with MSW in a composite-lined facility.

The permitting, design, and construction process leading up to eventual operation of a new MSWLF and/or C&D landfill is complex. The process generally includes the following steps:

- Site selection;
- Preparing a solid waste management plan;
- A fatal flaw analysis of the selected site or sites;
- Site characterization including geologic, hydrogeologic and geotechnical investigations;
- Land use permitting such as a conditional use permit;
- Wetlands mitigation permitting, where applicable;
- Wastewater treatment plant permitting, design and construction, if none are available to serve the new facility;
- Air quality permits such as new source performance standards (NSPS) permits and Title V permits;
- Solid waste operating permits;
- General building permits and other permitting related to utilities and supporting infrastructure;
- Preparation of construction documents;
- Bidding and award of a construction contract;
- Construction itself;
- Construction management, construction quality assurance, and construction certification.

C / Landfill Permitting, Design and Construction Process

1 / SITE SELECTION

It is understood that the City of Juneau is considering two potential sites for developing a single new MSWLF and C&D Landfill. Consideration of these two sites should take into account the complex and potentially costly nature of permitting, designing, constructing and operating a modern solid waste disposal facility. The following information is a general synopsis of what may be involved in this process.

2 / SOLID WASTE MANAGEMENT PLAN

Alaska solid waste regulations require that an applicant for a solid waste permit demonstrate that all reasonable solid waste management options have been considered, and that the permit would be consistent with the waste management hierarchy established in AS 46.06.021. The permit application information must be accurate and complete and ensure that the applicant is proposing a waste management system consistent with the hierarchy of waste source reduction, recycling, treatment, and disposal wherever economically feasible. If the solid waste management plan includes a proposal for a new landfill, the solid waste management plan must be submitted to and approved by the ADEC before a landfill permit application will be considered complete under Alaska Administrative Code 18 AAC 60.210.

3 / LAND USE PERMIT APPLICATION

Permitting a solid waste landfill typically includes a land use permitting process, such as the process to receive a conditional use permit, or some similar type of land use permit. The land use permitting process will require a relatively detailed description of how the land will be used. For this reason, much of the information prepared to obtain a solid waste disposal permit (hydrogeologic report, design report, design drawings, operating plans, closure plans) can also be utilized to apply for and obtain a land use permit. Due to this common use of information, the land use permitting and waste disposal permitting processes can often proceed on a parallel path.

Both the solid waste permitting and land use processes include public participation. Public reaction to a new landfill is difficult to predict, but history indicates that some form of negative response can be expected. Because of this negative response, a plan for

public awareness and education regarding the design and operation of landfills may be just as important to the process as the design itself. The land use permitting process may require participation of a public affairs consultant and land use attorney.

4 / WASTE DISPOSAL PERMIT APPLICATION

Fatal Flaw Analysis

The first step in obtaining a waste disposal permit from the ADEC is typically a fatal flaw analysis of the selected site or sites. This work should be accomplished immediately following site selection, and before significant time and effort are spent on permitting efforts.

By law solid waste landfills cannot be sited where the following location restrictions exist:

- located within 10,000 feet of an airport runway used by turbojet aircraft or within 5,000 feet of any airport runway end used by only piston-type aircraft;
- located in a 100-year flood plain;
- located within a wetland;
- located within 200 feet of a fault visible at the surface or shown on a published topographical or geological map, that has had displacement in Holocene time;
- located in a seismic impact zone;
- located in an unstable area that more likely than not will result in differential settling or ground failure under static conditions or during an earthquake, thus posing a potential risk to the integrity of containment structures.

Although procedures exist to mitigate against these location restrictions, one or all of them could stop a solid waste permitting process for any given site. Therefore, completing this analysis very early in the process is essential.

Site Characterization and Hydrogeologic Report

Typically the next step in the solid waste permitting process is a thorough site characterization process. This includes a combination of records research and site-specific subsurface investigations. The goal of the work is to characterize the geologic, hydrogeologic, and geotechnical aspects of the site with respect to the site's compatibility with MSWLF design standards. The work commonly involves the installation of groundwater monitoring wells that are utilized to define aquifer conditions at a given site, and background groundwater quality. In Juneau this effort may include the determination on whether or not an aquifer of resource value exists at the site. Assuming one does, then a groundwater monitoring system must be installed. Sampling and analysis must then be performed over an eight-quarter period (2 years) to determine background water quality and groundwater gradient conditions.

Subsurface investigations are also performed to determine the geotechnical aspects of the site. These conditions include soil and bedrock stability, soil and bedrock characteristics, foundation characteristics, and the availability of materials that can be utilized to construct, operate and close the landfill.

Design Report

The design report provides critical design information regarding site analysis, landfill design, and landfill closure. Its primary purpose is to document design methodology and design results that demonstrate the proposed landfill meets all design standards of the applicable solid waste regulations. Critical elements and components of the landfill that would be described in the design report may include:

- a demonstration regarding compliance with location restrictions;
- climate conditions at the site;
- the proposed site classification;
- a summary of the hydrogeologic and geotechnical aspects of the site;
- a foundation analysis related to subsurface conditions at the site;
- landfill design capacity, and site life information;
- site soil balance;

- composite liner design;
- composite liner stability analysis;
- leachate collection and removal system design;
- HELP modeling;
- leachate treatment design;
- a phasing plan for site development and closure;
- closure design;
- final cover stability analysis;
- landfill gas collection and treatment design;
- stormwater run-on and run-off control designs;
- general operational guidelines;
- waste types that are accepted.

Design Drawings

Design drawings are prepared that complement results of the design report. They graphically present how the landfill will be constructed, operated and closed. Typical drawings included in a permit application include:

- cover sheet;
- regional site plan, and vicinity plan;
- site plan, and current topographic information;
- a landfill subgrade plan indicating the base grades of the entire proposed landfill footprint before composite liner construction;
- a composite liner and LCRS (leachate collection and removal system) plan indicating the limits of composite liner and components of the LCRS;
- landfill cross sections indicating the relationship between original ground surface, groundwater contours, composite liner surface, and final cover surface;
- a landfill phasing plan that indicates the sequence of cell development, waste fill placement, and final closure over the entire life of the landfill;
- sections and details for the composite liner, LCRS, final cover, and landfill gas collection and control system; and

- sections and details of the stormwater management systems.

Construction Quality Control and Quality Assurance (QC / QA) Plan

The purpose of the Construction QC / QA Plan is to guide third party observation, testing, and documentation during construction. The goal is to have a plan in place demonstrating that the landfill is constructed and closed in accordance with the design report, design drawings and permit conditions.

Contents of a typical Construction QC / QA Plan include the following information:

- an introduction that defines the format of the document and provides definitions specific to terms used in the document;
- a definition of personnel and organizations that will be implementing the plan and their roles;
- information regarding various project-related meetings;
- a definition of general QC and QA procedures including items such as project reporting, data collection, record-keeping, project filing, etc.;
- a testing program specific to interface shear testing related to composite liner and final cover system components;
- QC / QA procedures related to earthwork construction;
- QC / QA procedures related to geosynthetics manufacturing and installation;
- QC / QA procedures for mechanical construction such as leachate pumping and piping systems, and landfill gas collection systems.

Plan of Operation

The Plan of Operation defines how the landfill will be operated over the life of the facility. Elements of the plan can include:

- a description of personnel and equipment necessary to operate the facility;
- site access controls, and systems for accepting and/or rejecting waste that arrives at the facility;
- procedures for placing the various types of waste accepted at the landfill;

- procedures for placing special wastes such as biosolids, asbestos, medical waste, or industrial wastes;
- procedures for constructing and maintaining temporary stormwater and snow management systems;
- procedures for controlling odor, dust, litter, noise, vectors, birds;
- operating procedures during severe weather events;
- emergency and site safety procedures;
- procedures for operating, inspecting, maintaining and repairing the LCRS;
- procedures for operating, inspecting, maintaining and repairing interim landfill gas collection and control systems;
- procedures for inspecting, maintaining and repairing final cover systems that are sequentially installed while other portions of the landfill remain active;
- procedures for operating, inspecting, maintaining and repairing leachate treatment systems;
- record-keeping procedures.

Closure, Post-Closure Plan and Financial Assurance Plan

The Closure and Post-Closure Plan (C/PCP) presents plans to close, perform post-closure monitoring and maintenance, and provide closure and post-closure financial assurance for a MSWLF.

The closure plan contains a planned approach to close the landfill and incorporates design information provided in the design report.

The post-closure plan describes tasks that will be performed during the post-closure period including environmental monitoring, plans to perform post-closure inspections, maintenance, and repair, and procedures for decommissioning leachate treatment systems.

The financial assurance plan describes how the owner will fund future closure and post-closure activities.

5 / RELATED PERMITTING REQUIREMENTS

In addition to land use and solid waste permit applications, many other permits may be required to construct and operate landfill systems and support infrastructure. For example, a landfill is considered a new emission source under federal and state air quality regulations, and for that reason air quality permitting may be required.

If a new leachate treatment system is required, then the permitting requirements for a wastewater treatment facility, which by themselves can be complex, would be required.

If an existing wastewater treatment system were used to treat landfill leachate, upgrades and additional permitting for an existing system may be required.

Support infrastructure such as buildings, roads, and utilities all have a level of design and permitting that must be completed.

6 / CONSTRUCTION DOCUMENTS

Once all design and permitting efforts are complete, then construction documents are prepared. These documents will define construction of the initial cell development, and any support infrastructure necessary to bring the landfill on line. Construction documents include bidding requirements, contract forms, contract conditions, technical specifications, and drawings. Design information provided in the design report is used to prepare project- specific technical specifications and construction drawings for each phase of development, including the initial phase.

7 / CONSTRUCTION, CONSTRUCTION MANAGEMENT AND QC / QA

This first phase of construction for a new landfill is typically the most diverse and expensive phase of development, because in addition to constructing the first lined landfill cell, support infrastructure, much of which will be in place for the entire life of the landfill, must also be constructed.

In addition to retaining a contractor to build the facility, consultants must be retained to assist the owner with construction management and QC / QA services.

D / Landfill Permitting, Design and Construction Cost Estimates

1 / PERMITTING, DESIGN AND CONSTRUCTION COSTS

The cost to permit, design and construct a new MSWLF can vary dramatically from site to site. On the permitting side two factors tend to drive the costs, 1) complexity of site conditions, and 2) public acceptance of the facility.

Design costs are typically driven by site conditions. For example, if groundwater is very deep below ground surface, then the cost of installing a monitoring system may be quite high. If the site is located in an exceptionally severe climate, designs to control storm water and to minimize leachate production are emphasized and become costly. If new leachate treatment systems are required, then a whole new set of design problems exist, which bring their own set of engineering costs.

Construction costs are generally driven by the complexity of the site and geographic location. For example, if a double liner system is required the cost of the liner system would double. While the unit costs of installing composite liner and leachate collection systems components can be reasonably estimated, costs for leachate treatment are difficult to estimate until designs are nearly complete. The geographic location of a site also impacts expenses as it relates to local labor costs, costs to mobilize equipment, and costs to ship materials.

Given these cost variables, developing a new MSWLF in Juneau, Alaska is likely to cost much more than other MSWLFs. Factors that may lead to these high costs include the following:

- public perception;
- site characterization costs;
- complexity of site conditions and terrain;
- severe weather conditions;
- leachate treatment;
- geographic location.

Table 1 summarizes an estimated range of costs to complete the permitting, design and construction of a new MSWLF in Juneau, Alaska. Costs are summarized by the major elements described above. These costs are those that would be incurred to permit, design and construct an operating MSWLF with an initial, approximate five years of disposal capacity for 24,000 tons annually of MSW. It is emphasized that **beyond the five years, additional engineering and construction costs would be required to expand the lined area of the landfill and its operating life.**

Table 1 shows the costs for establishing the first cell of a new Juneau landfill. Table 1 does not include operating costs.

Table 1: Preliminary Costs Estimates
Permitting, Design, Construction for New CBJ Landfill
- 4 – Acre Lined Cell -

PROCESS ELEMENT	LOW $ ESTIMATE		HIGH $ ESTIMATE
Permit Costs (A through E)			
A/ Preliminary Site Selection Process	25,000		50,000
B/ Prepare Solid Waste Management Plan	85,000		200,000
C/ Prepare Land Use Permit Application	150,000		700,000
D/ Prepare Waste Disposal Permit Application	395,000		850,000
E/ Related Permit Applications	50,000		400,000
Build Costs (F through J)			
F/ Landfill Construction Documents	50,000		105,000
G/ Leachate Treatment System Construction Documents	60,000		120,000
H/ Other Infrastructure Construction Documents	30,000		60,000
I/ Cell Construction (4 – acre lined cell)	3,500,000		7,000,000
J/ Construction Management & Monitoring	140,000		285,000
K/ Leachate Treatment System Construction	500,000		2,000,000
TOTAL	**$4,985,000**		**$11,770,000**

Part of the operating cost for a new landfill is treatment of the leachate that is generated. However, in the absence of even a conceptual leachate treatment system design, the leachate treatment cost estimate is limited to estimating leachate production, and estimating treatment costs on a per gallon basis. Leachate production estimates are based on a 4 – acre active cell, and either 50 percent of precipitation hitting the cell

becoming leachate, or 90 percent of precipitation hitting the cell becoming leachate. An average precipitation figure for Juneau of approximately 57 inches annually was used. Based on 50 percent of the annual precipitation hitting the 4 – acre landfill and becoming leachate, annual leachate production would be approximately 3,095,556 gallons. If 90 percent of the precipitation hitting the 4 – acre cell became leachate, annual leachate production would be 5,572,001 gallons.

The table below summarizes the projected cost to treat leachate in a fully compliant lined landfill:

Leachate Conversion Factors

- 1 acre equals 43,560 square feet
- 1 acre equals 6,272,640 square inches
- 1 gallon of water equals 7.48 cubic feet
- 1 gallon of water equals 231 cubic inches
- 1 inch of rain per acre yields 27,154 gallons of water

Table 2: Leachate Treatment Costs

Assumed Treatment Cost Per Gallon	Leachate Production	Seepage Percentage	Annual Cost
Treatment Cost @ $.05 per Gallon	3,095,556 gallons	@ 50 %	$ 154,778
Treatment Cost @ $.05 per Gallon	5,572,001 gallons	@ 90 %	$ 278,600
Treatment Cost @ $0.15 per Gallon	3,095,556 gallons	@ 50 %	$ 464,333
Treatment Cost @ $0.15 per Gallon	5,572,001 gallons	@ 90 %	$ 835,800

To determine the total estimated cost to permit, design, construct, and operate the landfill on a per ton basis, costs from Tables 1 and 2 are aggregated and converted into annual figures. To determine the Disposal Costs per Ton, the annual costs for establishing and operating the landfill are divided by 24,000 tons of refuse disposed annually.

Table 3: Combined Costs and Cost Per Ton

Landfill Fixed & Operating Costs (High Estimate)	2007 $	Annual $
Permit Costs (20 years @ 6%)	2,200,000	189,138
Build Costs (5 years @ 6%)	7,570,000	1,756,192
Leachate Treatment System Costs (20 years @ 6%)	2,000,000	171,943
Closure Costs (per acre)	250,000	250,000
Leachate Treatment Operations Costs	835,800	835,800
Disposal Costs per Ton		
Permit Costs	7.88	
Build Costs (1st cell @ 5 year life)	73.17	
Leachate Treatment System Costs	7.16	
Closure Costs	10.42	
Leachate Treatment Operations Costs	34.83	
Other Operational Costs	65.00	
Total Projected Tip Fee per Ton	**$198.46**	

Appendix D

Barge / Rail Transport of Municipal Solid Waste

Waste Export / Waste – by – Barge

Preliminary transportation and disposal pricing for MSW and incinerator ash were secured from various interested disposal companies. The pricing was based on shipping the municipal solid waste or ash from Juneau to privately operated regional landfills in either Eastern Oregon or Washington.

The price range is being provided for planning and informational purposes only. A price quotation should not be construed as enforceable or binding on any of the disposal companies that provided price ranges unless and until a written agreement has been executed and signed by all parties. If a particular jurisdiction solicits price quotes for solid waste management services from qualified vendors through a procurement process, the disposal companies reserve the right to base their official price quotes on the specific parameters of that procurement process. The disposal firms and the contacts that provided price quotations used in determining the planning price range are listed below.

1 / Costing Parameters / Assumptions

- 24,000 tons per year of MSW (municipal solid waste). The MSW tonnage excludes construction and demolition debris (inert wastes or C & D debris), which would be direct landfilled locally.
- Neither MSW nor incinerator ash are compacted when placed in shipping containers.
- Assumes 23 ton payload per container of MSW and 20 ton payload for ash.
- The cost for intermodal shipping containers is included.
- The cost also includes truck drayage from a transfer station, barge loading at origin, barge transportation to Seattle, container off – loading, drayage to a rail yard in Seattle, rail transportation to one of the regional landfills in Eastern Oregon or Washington, and disposal.
- A tipping fee at the landfill site of $22 per ton for MSW and $29 per ton for incinerator ash is used.
- Approximate bundled transportation and disposal cost for municipal solid waste is $150 per ton.

PLEASE NOTE: The table at the end of this appendix provides detailed cost data.

2 / Disposal Company Contact Information

Disposal Company	Contact	Position	Phone Number
Allied Waste	Joe Casalini	Business Development	206-255-4070
Waste Connections	Eddie Westmoreland	Division Vice President	253-414-0349
Waste Management	Eric Vance	District Manager – Local / Primary Contact	907-780-7801
	Ken Gimpel	Municipal Relations – Regional / Secondary Contact	509-435-6961

3 / Logistical Process Description

The following description outlines the primary steps involved in a typical waste – by – barge scenario from Alaska to one of the large, privately – held, rail – served regional landfills in either Oregon or Washington.

1. A private hauler picks up refuse locally from the curb or dumpster and loads it into a garbage truck. Alternatively, some people "self – haul" their own garbage to a transfer station or rural drop box location.

2. The private hauler takes the garbage to a local solid waste transfer station or MRF (Material Recovery Facility) from the curb or rural drop box location.

3. At the transfer station the garbage is dumped (tipped) on the floor, is sorted for recyclables and contaminants, and is then top loaded into an open – top, intermodal container. The payload of the garbage in the container is approximately 25 tons (non – compacted).

4. The intermodal container is then covered, sealed, and trucked to a local marine terminal for loading onto a barge. The barging of the intermodal container(s) takes approximately five days from Alaska to the marine terminal in Seattle.

5. Once the intermodal container arrives in Seattle it is removed from the barge, trucked to a local railroad yard, and loaded onto a rail car for shipping to the landfill.

6. Trainloads of waste are shipped daily to the regional, rail – served landfill, approximately 350 miles away. This trip takes about 12 hours.

7. At the landfill the intermodal containers are lifted from the rail car and placed on trucks which deliver them and their contents to the landfill's "working face" for unloading and disposal.

8. Once emptied, the container is returned to the landfill's rail yard and placed back on the rail car to complete the return trip to Seattle and then to Alaska, where the intermodal container is returned for re – use and the cycle described above begins again.

Note Regarding Cost Details for Waste – by – Barge Disposal Option on the following page: The projected price per ton is comprised of a fixed cost of $19.07 for MSW and $22.62 for ash. This is 13% of the total projected cost of $149.33 for MSW and $166.76 for ash. The remaining 87% in each case are variable costs that will fluctuate with inflation and the cost of fuel throughout the term of the contract. These costs are difficult to predict but likely to rise over time, therefore increasing the risk of higher overall disposal rates for this method of disposal for MSW or ash.

Cost Details for Waste – by – Barge Disposal Option [5]

Waste Origin	CBJ - Juneau	CBJ - Juneau
Destination Landfill	Oregon / Washington	Oregon / Washington
Waste Type	Mun. Solid Waste	Incinerator Ash
Landfill Owner	Privately Owned	Privately Owned
1 / Assumptions		
Transportation Method (Combination of Modes)	Truck/Barge/Rail	Truck/Barge/Rail
Transfer Station Location	Juneau	Juneau
Container Loading Method	Top Load	Top Load
Compacted Container Loads	No	No
Annual Tons	24,000	10,000
Backhaul Opportunity	no	no
Days Worked Per Week (5.5 days/wk = 286 days/year)	5.5	5.5
Tons Per Container	23	20
Containers Needed Daily	3.65	1.75
2 / Origin Transfer Station Equipment Capital Costs		
Rubber Tired Waste Handler Loader – Primary	$350,000	$350,000
Back – up Loader – Secondary Back – up	$150,000	$150,000
Container Tarping Station	$100,000	$100,000
Transfer Station Equipment Capital Needed	$600,000	$600,000
3 / Intermodal Container Capital Costs		
Number of Containers Filled Per Day	3.65	1.75
Container Turnaround Time – Roundtrip (Days)	25.0	26.0
Base Containers Required (286 workdays/year)	84	44
Container Spare Ratio	210	154
Total Containers Required	294	198
Capital Cost Per Container (48' and 20' respectively)	$11,500	$7,500
Rail Container Capital Needed	$3,381,000	$1,485,000
Interest @ 9%	$175,849	$77,236
4 / Total Equipment Required	$4,156,849	$2,162,236
Annual Capital Depreciation (10 years)	$415,685	$216,224
Effective Cost per Ton	$17.32	$21.62
Container Maintenance (cost per ton)	$1.75	$1.00
Total Cost per Ton	$19.07	$22.62
5 / Transport Costs (per container)		
Local Drayage and Barge Transportation	$1,521	$1,430
Barge Fuel Surcharge (August 2007 = 16.5%)	$251	$236
Rail Transportation from Seattle to Eastern WA or OR	$550	$480
Container Handling Fee (Loading)	$40	$40
Container Handling Fee (Unloading)	$40	$40
Rail Fuel Surcharge (August 2007 = 16%)	$88	$77
Local Drayage from Ramp to Landfill	$0	$0
Total Transportation Cost (per container)	$2,490	$2,303
Effective Cost Per Ton	$108.26	$115.14
6 / Landfill Tip Fee	$22.00	$29.00
Total Transfer, Transport, & Disposal Cost Per Ton	**MSW @ $149.33**	**Ash @ $166.76**

[5] Cost Sources: WM of Oregon, Allied Waste, UP RR, BNSF RR, AML Barge Lines, and prior WIH projects

Appendix E

Detailed Discussion of Residential Refuse and Recycling Program Recommendations

Detailed Discussion:
Residential Refuse and Recycling Program Recommendations

1 / Residential Trash Collection

The existing manual method of residential garbage 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 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. Roll carts with a capacity of 96 gallons are dumped by way of a cart tipping mechanism affixed to the rear of the truck.

Moving to an updated collection system with the ability to add recycling services entails the acquisition of new equipment – trucks and carts – and thus capital expenditures. While theoretically Arrow Refuse could move ahead with these expenditures, from a practical business perspective existing conditions do not offer a strong motivation to do so and would likely result in markedly higher rates within a short timeframe. Without "mandatory" or universal service requirements for all generators, and absent the stability provided by a long – term contract, capital and operating expenses associated with more modern residential refuse collection plus curbside recycling would have to be absorbed by the present rate base and recovered as soon as possible.

An alternative and more favorable scenario is formed through the combination of Recommendations # 3 (Adopt a policy on universal [mandatory] trash and recycling collection service for all generators), # 4 (Transfer Arrow Refuse RCA certificate to CBJ) and # 5 (Form two – way, long – term contractual partnerships between the CBJ and Arrow Refuse and CBJ and Waste Management, Inc. for a minimum period of 10 years). Recommendation # 3 establishes the broadest possible rate base. Under Recommendation # 4, once the RCA Certificate of Public Convenience and Necessity is transferred to the CBJ then the CBJ can contract directly with Arrow Refuse for a variety of solid waste and recycling services. Finally, a contract term of 10 years as proposed in Recommendation # 5 makes system innovations more economically feasible by amortizing the costs over several years with incremental rather than substantial annual rate adjustments.

The objective for the future residential collection system is to implement methods that are safe, reliable, efficient, and would give the CBJ the ability to add recycling services such as curbside collection of recyclables and potentially yard debris. In this regard two collection approaches are presented for consideration and discussed below: semi-automated and fully automated.

A / Semi-Automated Approach

Trash is collected using standardized roll carts and a dumped into the truck with a hydraulic cart tipper. Carts range in volume from 20 gallons up to 96 gallons. 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 and the 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.

B / Fully Automated Approach

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. The latter is measured by the number of carts collected and / or residences served. 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 in comparison to a semi-automated or manual route.

The major reasons for moving to fully automated collection are stated below:

- **Standardized Collection Carts:** Increases customer convenience and reduces litter and garbage in the streets.

- **Rate Stability:** Collection rates over the long-term (5 to 10 years) fluctuate less for fully automated when compared to other methods of collection.

- **Future Services:** Fully automated collection trucks can pick up carts designated for residential recyclables and yard debris, so the CBJ can add additional services in the future at a lower cost due to fleet / cart standardization.

- **Commercial Collection Tubs:** Automated trucks can also be fitted with universal arm gripper to collect 300 and 450 gallon commercial collection tubs.[6]

A concern with moving to a fully automated system would be the use of collection carts that are not resistant to bears. The CBJ has to weigh the additional costs of providing all customers with bear-resistant carts and the additional time necessary to pick up the carts versus the increased efficiency of automated collection. The CBJ will examine the issue more fully, working to balance the need to keep garbage away from bears and the need to efficiently collect trash.

C / Summary of Residential Waste Collection Approaches

The table below compares and contrasts various operational, cost, and productivity factors or parameters between the three collection systems described previously.

Table 1: Refuse Collection System Costs

	Program Factor or Parameter	Manual	Semi-Auto	Full Auto
A	Cans/Carts Collected per Hour	70	55	70
B	Crew Size	2	1	1
C	Truck Cost	$ 175,000	$ 200,000	$ 235,000
D	Required Trucks	3	4	3
E	Total Cart Cost ($75 each)	$ 0	$ 676,500	$ 676,500
F	Labor Cost per Hour	$ 80	$ 40	$ 40
G	Truck Cost per Hour	$ 16	$ 18	$ 21
H	Truck Operational Costs per Hour	$ 25	$ 30	$ 35
I	Other Operational Costs per Hour	$ 10	$ 10	$ 10
J	Collection Cost per Hour	$ 131	$ 98	$ 106
K	Weekly Collection Hours	117	149	117
L	Weekly Collection Cost	$ 15,315	$ 14,609	$ 12,433
M	Annual Collection Cost	$ 796,370	$ 759,644	$ 646,491
N	Annual Cost per Customer	$ 97.12	$ 92.64	$ 78.84
O	**Monthly Cost per Customer**	**$ 8.09**	**$ 7.72**	**$ 6.57**

[6] 300 gallon tub is equal to 1.5 yard container and a 450 gallon tub is equal to a 2.25 yard container.

Assumption Notes

Total Can / Cart customers: 8,200 (7,750 residential and 450 commercial)

Table Notes

A. Cans/Carts Collected per Hour: Collection industry standards
B. Crew Size: As described previously
C. Truck Cost: Approximate cost per truck
D. Required Trucks: 8,200 customers divided by Can/Carts per hour divided by 40 hours per work week
E. Total Cart Costs: $75 per cart multiplied by 110% of customer count (9,020 customers)
F. Labor Cost per Hour is assumed $40 per driver
G. Truck Cost per Hour: Truck Cost plus 8% interest (principle and interest) divided by a 7 year life and then divided by 2,080 annual collection hours (40 hour work week)
H. Truck Operational Costs per Hour: Average of prior rate reviews
I. Other Operational Costs per Hour: Includes costs such as road tax and insurance
J. Collection Cost per Hour is the sum of columns F to I
K. Weekly Collection Hours: Customer count divided by Can/Carts per Hour (A)
L. Weekly Collection Cost: Collection Cost per Hour multiplied by the Weekly Collection Hours
M. Annual Collection Cost: Weekly Collection Cost multiplied by 52 weeks
N. Annual Cost per Customer: Annual collection cost divided by total customer count (8,200)
O. Monthly Cost per Customer: Annual cost per customer divided by 12 months

2 / Residential Recycling Collection

Program performance would be primarily dependant on collection system, rates, frequency of collection, policy, and outreach and education. Jurisdictions with established recycling programs, such as the City of Mercer Island, Washington, report as much as 1,000 pounds per customer annually using a 65 gallon roll cart for storage / set – out of commingled recyclables. The City of Boise reports 214 pounds

per customer annually using a 14-gallon bin for storage / set – out of materials separated into several categories. Each city offers recycling, but all the variable factors contribute to the program performance. The table below gives an indication of the potential material that could be diverted from the estimated 8,200 can and cart customers.

Table 2: Curbside Residential Recycling Performance Levels

Diversion Percentage	0%	5%	10%	15%	20%	25%	30%	35%	40%
Estimated SW Tons	9,594	9,114	8,635	8,115	7,675	7,196	6,716	6,236	5,756
Projected Curbside Recycling Tons	0	480	959	1,439	1,919	2,399	2,878	3,358	3,838
Annual Pounds per Resident	0	117	234	351	468	585	702	819	936

NOTE – Estimated SW Tons = baseline solid waste (SW) tonnage disposed, which will decrease as recycling increases.

To maximize the amount of material collected and to keep truck costs low, the best approach for curbside recycling is to use a cart. Most of the cart recycling programs in Washington and Oregon that utilize carts for collection report annual pounds per customer of over 500 pounds. Other key program elements and factors for Juneau are as follows:

- Collect recyclable materials in a commingled stream with the exception of glass.
- Cart – based recycling programs yield more materials per household than bin programs.
- The same truck used to collect solid waste can also be used to pick up recyclables, resulting in savings on capital equipment costs.
- Carts keep the materials dry and reduce litter.
- The commingled stream would be baled and shipped to a materials recovery facility (MRF) in Seattle for subsequent processing and marketing.
- Collection of recyclables could be either weekly or every other week (EOW).

Using the same approach as in Table 1: Refuse Collection System Costs, the additional collection cost for a curbside residential recycling program is detailed below. The notable exception is the carts per hour are 100 for weekly collection since participation is assumed to be 70% of garbage collection.

Table 3: Curbside Residential Recycling Costs

Program Factor or Parameter	Weekly Collection	EOW Collection
Cans/Carts Collected per Hour	100	88
Crew Size	1	1
Truck Cost	$ 235,000	$ 235,000
Required Trucks	2	1
Cart Costs ($75 each)	$ 676,500	$ 676,500
Labor Cost per Hour	$ 40	$ 40
Truck Cost per Hour	$ 21	$ 21
Truck Operating Cost per Hour	$ 35	$ 35
Other Operating Costs per Hour	$ 10	$ 10
Collection Cost per Hour	$ 106	$ 106
Weekly Collection Hours	82	94
Weekly Collection Cost	$ 8,703	$ 9,946
Annual Collection Cost	$ 452,544	$ 258,597
Annual Cost per Customer	$ 55.19	$ 31.54
Monthly Cost	**$ 4.60**	**$ 2.63**

Annual Cost per Customer is the Annual Collection Cost divided by 8,200 cart customers and the Monthly Cost is simply the Annual Cost per Customer divided by 12 months.

Recyclable materials collected would be baled and processed at a Material Recovery Facility in Seattle. Assuming a 25% diversion rate for residential and small businesses, the following table details the monthly cost per rate payer for processing.

Table 4: Recyclable Material Processing Costs [7]	
Shipping Cost per Ton	$73
Material Revenue per Ton	$(40)
Compactor Cost per Ton	$8
Compactor R&M Cost per Ton	$4
Processing Cost per Ton	$70
Total Net Processing Cost per Ton	$115
Annual Pounds per Resident	585
Recycling Cost per pound	$0.06
Monthly Recycling cost per resident	$2.81

The processing cost of $70 / ton is paid from a portion of the monthly utility fee collected by the CBJ for operation of the Recycling Center at the landfill and is not currently reflected in the solid waste service rates.

3 / Estimated Collection Rates

After the collection cost, the disposal component of the collection rate is calculated based on the size of the can or cart. Assuming the average set-out weight for a 35 gallon cart is 24 pounds [8] and a 60 gallon cart is 45 pounds, the monthly disposal weight is calculated by multiplying the weekly set-out weight by 4.33 (52 weeks divided by 12 months). The next step is to divide the monthly weight by 2,000 (pounds in one ton) and multiply by the per ton disposal rate of $120/ton at the Waste Management Landfill. The details for the 35 and 60 gallon cart are shown in the table below.

Table 5: Solid Waste Disposal Costs	
Monthly Weight (32 gal. cart @ 24 lbs. per set-out)	104 lbs.
Disposal Cost @ $120 per ton	$6.24
Monthly Weight (60 gal. cart @ 45 lbs. per set-out)	195 lbs.
Disposal Cost @ $120 per ton	$11.69

If the proposed collection system requires carts, the cost of the cart has to be considered as a separate component in the rates. For this projection, the roll cart has an assumed cost of $75 each with a seven -year life. The cost of capital is assumed

[7] Sources: WM, AML, Industry Research, and prior project experience
[8] Weights from the City of Portland Annual Solid Waste Vessel Weight Study for 2003

to be 8% over the seven-year life. The monthly cost per customer computes to $1.17 using these assumptions.

Taking into consideration all the prior costs mentioned, collection rates can be projected. The recommended system for Juneau would be a fully automated system for both garbage and recycling. Collection frequency for garbage is weekly with every-other-week (EOW) collection of recyclables. The table below details the rate components for a 35 and 60 gallon garbage cart and a 60 gallon recycling cart.

It must be noted that these costs are planning level only and actual rates will vary depending on the specific collection services outlined in the contract, various costs including fuel, equipment, and labor, as well as any rate incentives and other program costs partially or fully carried by the contractor such as for promotion/education activities and/or materials.

Table 6: Estimated Monthly Collection Rates with EOW Recycling				
	35 Gallon Refuse Cart	**Manual**	**Semi-Auto**	**Full Auto**
A	Waste Collection	8.09	7.72	6.57
B	Refuse Cart	0	1.17	1.17
C	Waste Disposal	6.24	6.24	6.24
D	Recycling Collection	2.63	2.63	2.63
B	Recycling Cart	1.17	1.17	1.17
E	Recycling Processing Cost	2.81	2.81	2.81
F	Administrative Costs @ 15% of cost	2.72	2.84	2.67
G	Hauler Profit Margin @ 7%	1.46	1.52	1.43
H	City Tax @ 5% of cost	1.12	1.16	1.09
I	CBJ Administrative Cost	0.60	0.60	0.60
J	**Total Estimated Collection Rate**	**$ 27.17**	**$ 28.20**	**$ 26.71**
	60 Gallon Refuse Cart	**Manual**	**Semi-Auto**	**Full Auto**
A	Waste Collection	8.09	7.72	6.57
B	Refuse Cart	0	1.17	1.17
C	Waste Disposal	11.69	11.69	11.69
D	Recycling Collection	2.63	2.63	2.63
B	Recycling Cart	1.17	1.17	1.17
E	Recycling Processing Cost	2.81	2.81	2.81
F	Administrative Costs @ 15% of cost	3.54	3.66	3.48
G	Hauler Profit Margin @ 7%	1.90	1.96	1.87
H	City Tax @ 5% of cost	1.45	1.50	1.43
I	CBJ Administrative Cost	0.60	0.60	0.60
J	**Total Estimated Collection Rate**	**$ 34.22**	**$ 35.25**	**$ 33.76**

Notes

A: Waste Collection: Table 1, item O

B: Refuse Cart: Monthly cost of a roll cart with a price of $75 and interest cost of 8% over 7 years

C: Waste Disposal: From Table 4

D: Recycling Collection: From Table 3

E: Cost of processing the recyclable materials

F: Administrative Costs are assumed to be 15% of the sum of items A to D

G: Hauler Profit Margin: The same amount as allowed by the Alaska RCA

H: City Tax: Juneau charges a 5% tax on all garbage collection service

I: Cost of the administration personnel for the CBJ to administer the programs

J: Total Estimated Collection Rate is the sum of items A through I

Public Works will be the department charged with the administration of the refuse collection and recycling program. The work load of administering this program will necessitate the hiring of a qualified individual. The estimated salary for this position is $75,000 plus the benefit burden at 40% for a total cost of $105,000. Assuming half of this cost will be allocated to residential service, the expected impact on the monthly collection rate is $0.60.

4 / Recycling Processing Costs

After recyclables are picked up they must be taken to a site in Juneau where large, obvious contaminants would be manually removed. Then the mixture of commingled materials is baled for shipment to a materials recovery facility (MRF) in the Seattle region for further sorting, upgrading, processing, and ultimate sale to domestic or export end–use markets. Table 7 below portrays the essential operating and cost features of a basic MRF in Juneau. The Juneau MRF would perform limited processing and mainly function as a location to off-load, bale, and store recyclables before they are eventually shipped to a more sophisticated MRF in the Seattle region.

Assuming the diversion percentages presented above in Table 2, the projected recycling processing costs vary with the amount of material recovered. Table 7 summarizes the projected costs based on the current amount paid by the CBJ to Waste Management for processing of materials from the Recycling Center at the landfill. As noted above, it is assumed the materials collected curbside will not be fully processed in the CBJ but rather compacted and baled for shipment to a materials recovery facility in the Seattle region. Another assumption is the purchase of a compactor / baler for the Juneau MRF capable of consolidating or packaging a commingled mixture of recyclables.

Table 7: Residential Recycling Processing Costs

	Diversion Percentage	0%	5%	10%	15%	20%	25%	30%	35%	40%
	Can / Cart Customers	8,200								
	Estimated Solid Waste Tons	9,594	9,114	8,635	8,155	7,675	7,230	6,716	6,236	5,756
	Projected Curbside Recycling Tons	0	480	959	1,439	1,919	2,364	2,878	3,358	3,838
	Annual Pounds per Resident	0	117	234	351	468	585	702	819	936
Processing Costs										
	Fixed Costs									
A	Annual Compactor / Baler Cost	$20,000								
B	Compactor / Baler Annual R & M	$10,000								
C	Annual Processing Fee	$165,000								
	Variable Costs									
D	Shipping @ $1,600 per container	$1,600								
E	Material tons per container	22								
F	Material value per ton	$(40)								
Processing Costs per Ton										
G	Shipping Cost per Ton	$	73	73	73	73	73	73	73	73
F	Material Revenue per Ton	$	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)
H	Compactor Cost per Ton	$	42	21	14	10	8	7	6	5
I	Compactor R & M Cost per Ton	$	21	10	7	5	4	3	3	3
J	Processing Cost per Ton	$	344	172	115	86	70	57	49	43
K	Total Processing Cost per Ton	$	439	236	168	134	115	100	91	84
L	Total Processing Cost	$	210,699	226,399	242,098	257,797	272,371	289,196	304,895	320,594
M	Avoided Disposal Cost @ $120 ton	$	57,564	115,128	172,692	230,256	283,694	345,384	402,948	460,512

Table Assumptions and Notes

A. Compactor / Baler Cost: $300,000 purchase price with a 15 year life ($300,000 / 15 = $20,000)
B. Compactor / Baler Annual R & M: Cost of annual upkeep
C. Annual Processing: Assumes the amount paid by the CBJ to Waste Management will remain the same with the addition of a commingled stream and a reduction of labor spent at the existing recycling depot
D. Shipping: Cost is approximately $1,300 per container to Seattle
E. Material Tons per Container: The amount of baled materials that can be loaded into a 48 foot intermodal container
F. Material Value per Ton: This is the assumed value of an unsorted bale of commingled curbside materials
G. Shipping Cost per Ton: Assumes $1,600 shipping cost divided by the 22 tons per container
H. Compactor Cost per Ton: Annual compactor cost of $20,000 divided by the Projected Curbside Recycling Tons
I. Compactor R & M Cost per Ton: Compactor Annual R & M of $10,000 divided by the Projected Curbside Recycling Tons
J. Processing Cost per Ton: Annual Processing Cost of $165,000 divided by the Projected Curbside Recycling Tons
K. Total Processing Cost per Ton: Sum of items F through J
L. Total Processing Cost: Total Fixed Costs – A + B + C + [$72 per ton to ship - $40 material value] X the Projected Curbside Recycling Tons
M. Avoided Disposal Cost: Current tip fee per ton X the Projected Curbside Recycling Tons

Capital costs of the land and building for a MRF in Juneau are not included in Table 7.

At approximately 25 % diversion, the cost of the processing equals the avoided landfill disposal cost.

Appendix F

Alaska Department of Environmental Conservation Reports

STATE OF ALASKA

SARAH H. PALIN, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL HEALTH
SOLID WASTE AND PESTICIDES PROGRAM

610 University Avenue
Fairbanks, AK 99709
Phone: (907) 451-2135
Fax: (907) 451-2188
http://www.dec.state.ak.us/

October 17, 2007 via Electronic Mail

Richard Hertzberg, Project Manager
Zia Engineering & Environmental Consultants, LLC
1700 Woodland Terrace
Lake Oswego, Oregon 97034

Re: Information request, Capitol Disposal Landfill, Juneau, Alaska

Dear Mr. Hertzberg:

In response to your request, I am providing following information to summarize the role of the Alaska Department of Environmental Conservation Solid Waste Program (ADEC) in regulating the Capitol Disposal landfill:

- The authority of ADEC to regulate the Capitol Disposal is found in Title 46, Chapter 3 of the Alaska Statutes (AS 46.03). Regulations pertaining to solid waste management are found in Title 18, Chapter 60 of the Alaska Administrative Code (18 AAC 60). The stated goal of these regulations is to protect public health and the environment.
- The landfill is operating under a solid waste disposal permit issued by the ADEC. The permit was last renewed in November 2005. Permits are issued for five years so this permit will need to be renewed in November 2010.
- The disposal permit is based on the solid waste regulations and a comprehensive set of documents provided with the permit application that describe how the landfill will be designed, constructed, operated, monitored and closed as a Class I landfill in compliance with the regulations.
- Formal inspections are held at varying intervals to evaluate how the landfill is complying with the regulations, the specific permit conditions, and the permit application documents. The last formal inspection was performed in July 2005. More recently, ADEC has conducted several informal site visits in response to specific issues or complaints.
- The landfill management has been extremely prompt and effective in responding to complaints.
- As observed in the most recent inspection and site visits, Capitol Disposal landfill is a well-managed facility and it operated in compliance with the regulations and applicable requirements.
- The landfill is located in a very complex hydrologic setting and there are other potential sources of contamination in the area. At present, ADEC is working with Waste Management to revise the landfill's surface water and groundwater monitoring programs to better account for the hydrologic complexity and to more clearly distinguish the landfill from other potential sources of contamination.
- To date, surface water and groundwater monitoring efforts have not identified significant impacts beyond the boundary of the landfill.

In conclusion, ADEC finds that the Capitol Disposal landfill is operated substantially in compliance with the regulations, the permit requirements, and the permit application documents. Waste Management is a good operator, has a good environmental record, and has responded effectively and proactively when concerns are raised. Monitoring at the facility has not identified significant environmental problems outside the landfill boundary that can be clearly linked to the landfill. As such, the monitoring program is being refined to better distinguish environmental impacts that originate at the landfill from those that originate from other sources.

If you have any questions, or require additional information, please feel free to contact Ed Emswiler in our Juneau office at (907) 465-5353.

Sincerely,

Douglas Buteyn

Douglas Buteyn
Northern/Southeastern Program Coordinator
ADEC Solid Waste Program

Encl: Solid Waste Permit SWJUN001198520101MA
Inspection Report from July 20, 2005

cc: Maria Gladziszewski, Special Projects Officer, City & Borough of Juneau, Juneau
Ed Emswiler, ADEC Solid Waste Program, Juneau

STATE OF ALASKA

FRANK H. MURKOWSKI, GOVERNOR
410 Willoughby Ave, Suite 303
Juneau, Alaska 99801
PHONE: (907) 465-5353
FAX: (907) 465-5164
http://www.state.ak.us/dec

DIVISION OF ENVIRONMENTAL HEALTH
SOLID WASTE MANAGEMENT PROGRAM

August 22, 2005

Certified Mail
Return Receipt Requested
 # 7003 1680 2904 7108

Eric Vance, District Manager
Waste Management of Alaska
5600 Tonsgard Court
Juneau, Alaska 99801

Subject: July 20, 2005 Inspection at Capitol Disposal under Solid Waste Permit #0011-BA002

Dear Eric Vance:

On July 28, 2005 I inspected the Capitol Disposal Class I municipal solid waste disposal facility in Juneau, Alaska. Thank you for allowing and participating in this inspection. The purpose of the inspection was to determine if management of the facility meets the Solid Waste Program's regulatory requirements found in Title 18, Chapter 60 of the Alaska Administrative Code (18 AAC 60), the permit and plans. Present at this inspection were yourself and Doug Buteyn, program coordinator for the Alaska Department of Environmental Conservation (ADEC) southeast solid waste program. We found the facility to be well managed and applaud your efforts in making continued improvements. This inspection should help to guide further improvements to the facility and the operational plans you are developing. Enclosed is a copy of the inspection checklist. Please take the time to review it and address areas that need attention. The score for this inspection was 327 out of 350 points possible, or 93%. Below are recommendations from this inspection.

Permits and Approvals

The Stormwater Pollution Prevention Plan General Permit will expire on October 30, 2005. This permit is referenced in the operations plan and further referenced in the solid waste management permit that is due to expire on October 5, 2005. A renewed solid waste management permit in October 2005 will reference the stormwater permit. Please ensure the proper applications and upgrades are made on schedule for both permits. The permit renewal application for the solid waste management permit is due by September 5, 2005.

Bird management and its respective section in your operations plan need to secure Federal Aviation Administration approval. This approval is needed to renew the state solid waste management permit.

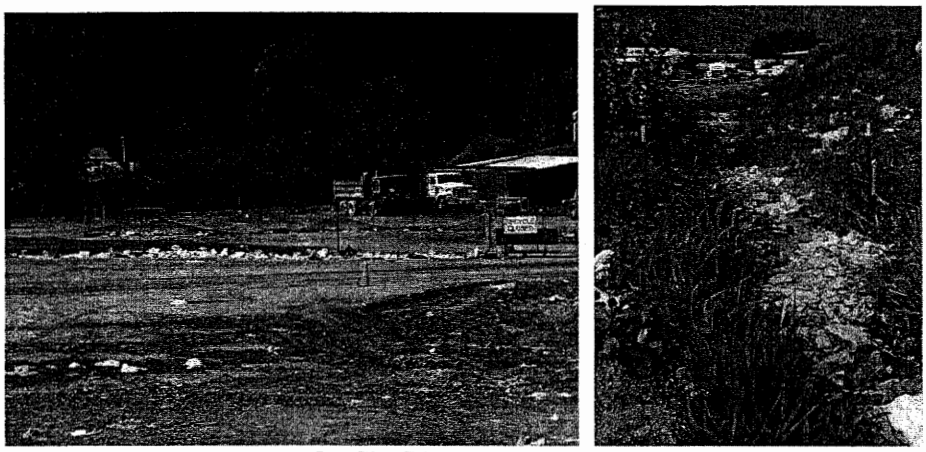
Waste Exclusion and Screening

A video monitor in the scale house for the attendant to observe loads is recommended.

Customers should know where to go to do various disposal/recycling tasks, how to dispose or recycle safely and which types of wastes are unacceptable or require special handling. Signage should be increased and pamphlets instructing customers are recommended.

Litter Control

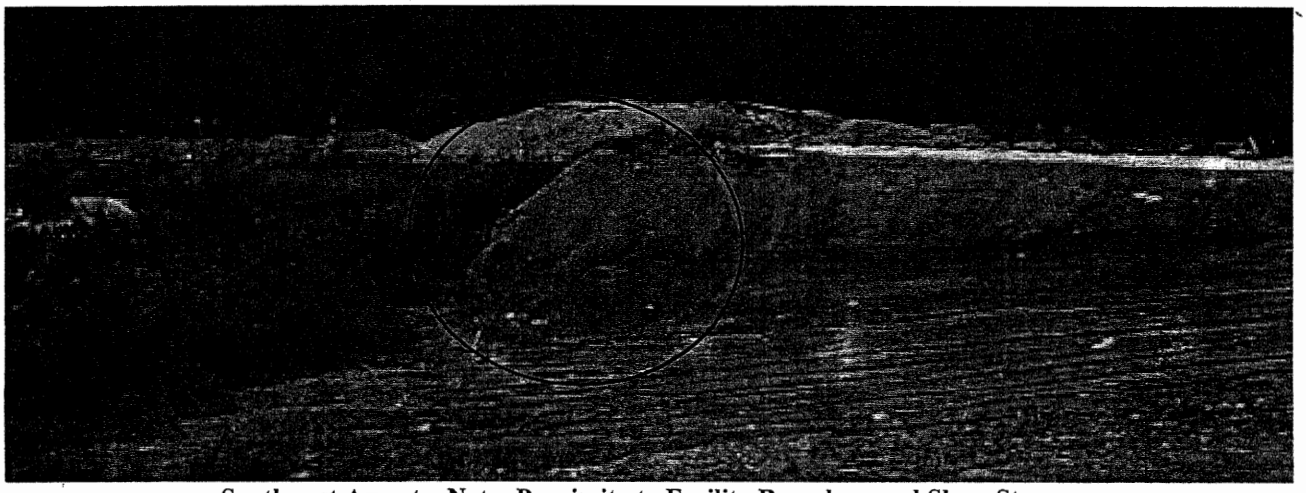
Litter control fencing was present at the southern and northwestern perimeter and internal to the facility. Litter outside the boundary was reported to be picked up by community volunteers and was within acceptable limits. Moveable litter control fencing should be placed closer to the working face to minimize the amount of litter blowing across the site. This may work to further decrease litter at the boundary and the need to collect it.



On-Site Litter and Fencing

Shape of the Landfill Surface

An area of landfilled waste at the southwestern aspect of the facility appeared as though it was placed within 50 feet of the boundary. The slope of the fill was steeper than 3(H):1(V). There was a small leachate seep observed at the toe of the slope. All waste should be placed such that there is no less than 50 feet between the waste management area and the property line. Slopes should be made at no steeper than 3:1. Waste should be covered in a way that prevents leachate. Please make the necessary changes to this area.



Southwest Aspect – Note: Proximity to Facility Boundary and Slope Steepness

Areas of ponded water were observed around the facility. Although considered to be minor, attention to grading is needed whenever ponding of water exists.

Areas of Water Ponding

Fill Sequencing

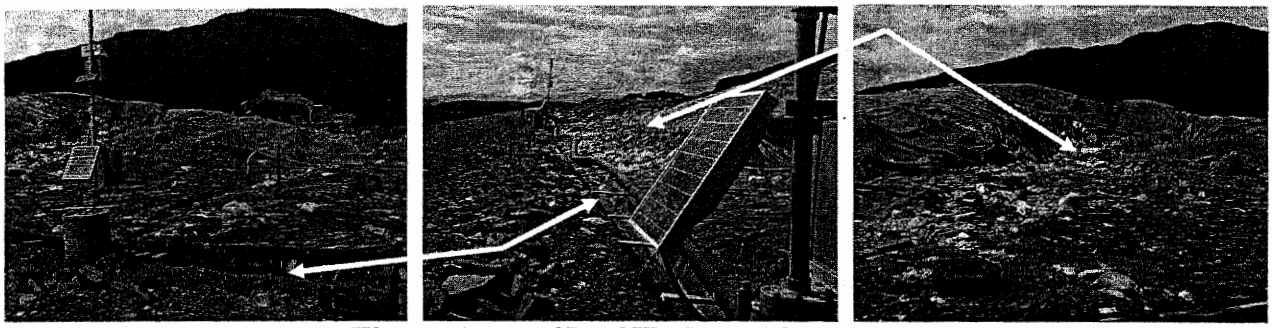
The landfill was being constructed on the western aspect of the facility according to Phase I intermediate grades in the operational plan. You described changes to the fill sequencing plan that differ from the Phase II and Phase III stages of the existing plan. Please update the sequencing plan in the operations plan as necessary and submit this for our approval.

Leachate

A possible leachate seep was observed to flow from landfilled garbage at the western aspect of the landfill toward the center of the landfill. This flow appeared to enter the stormwater collection area where it would be transmitted to the oil/water separator and discharged as stormwater. The operations plan for the landfill says "contact water is currently directed toward the interior of the landfill to be absorbed by the waste, so that it does not mix with noncontact water. Over the long-term plans are to collect and treat leachate."

Leachate should be collected, treated, and disposed separately from stormwater. The operations plan should be modified accordingly to specify how leachate is to be dealt with when it collects at the center of the site.

The possible leachate seep at the central aspect of the landfill appeared to have originated in landfilled garbage at the western portion that was filled according to the Phase I fill sequence. Tarps and grades at the upper western and southern area of this section of the landfill may be contributing to this as indicated by the presence of litter and uncovered areas of waste (see photos). Stormwater collection and cover in this area should be improved to minimize leachate production.



Western Aspect of Landfill – Phase 1 Sequencing Area
Note: Stormwater Collection, Slope, Litter & Uncovered Waste

Landfill Gas

Statements in the operations plan appear to conflict with information presented in the landfill gas plans. The operations plan refers to the O&M manual for the Landfill Gas Collection & Control System, dated November 2004. The landfill gas plan in November 2004 indicates the use of horizontal LFG collectors installed in the landfill waste approximately 4 feet below the ground surface. The system as observed at this inspection reveal this not to be the case as the landfill is fitted with vertical wells connected to horizontal header pipes. Please update and correct for inconsistencies in the two plans and submit this for our approval.

The gas monitoring plan should be updated to include routine measurements of landfill gas at the facility boundary. Owners or operators of all Municipal Solid Waste Landfill (MSWLF) units should ensure that the concentration of methane gas generated by the facility does not exceed 25 percent of the lower explosive limit for methane (1.25 percent by volume methane in air) in facility structures (excluding gas control or recovery system components) and that the concentration of methane gas does not exceed the lower explosive limit for methane (5 percent by volume methane in air) at the facility property boundary.

Training

The operational plan needs a section that details staff training. The section should specify the training needed, how often it is to be accomplished, and other details. All training should be documented and records kept.

You reported that e-training in waste acceptance and screening was given to site personnel on October 15, 2004 by SWANA. Waste screening and acceptance training was given by Waste Management Inc. on the same day. This training is to be at least an annual event. This is necessary to give operations personnel instruction on how to recognize hazardous and unapproved waste, how hazardous waste is regulated, types of asbestos, random load inspections, and procedures for obtaining a waste profile.

Only one person is currently trained in Hazardous Waste Operations and Emergency Response (HAZWOPER). All operational staff should be HAZWPR trained. This is needed so that operational staff knows how to react in the case of a spill.

You reported there were two personnel trained in Manager of Landfill Operations. Operational personnel were reported to be recently trained in safety and CPR. Records were reported to be kept.

Visual Monitoring

Visual monitoring was performed. Both visual monitoring in the operations plan and the visual monitoring checklist need to be modified to show compliance with 18 AAC 800 and the inspection scoresheet.

Again, thank you Eric for allowing and participating in this inspection. If you have any questions, or require any additional information, please do not hesitate to contact me at (907) 465-5353.

Sincerely,

Ed Emswiler
Solid Waste Program

cc: Doug Buteyn, ADEC Southeast Solid Waste Program Coordinator

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF ENVIRONMENTAL HEALTH
SOLID WASTE AND PESTICIDES PROGRAM

FRANK MURKOWSKI, GOVERNOR

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Fairbanks, AK 99709
Phone: (907) 451-2108
Fax: (907) 451-2188
http://www.dec.state.ak.us/

Certified Mail #7004 1160 0000 0734 4704
Return Receipt Requested

November 23, 2005

Eric Vance, District Manager
Capitol Disposal
5600 Tonsgard Court
Juneau, Alaska 99801

RE: Solid Waste Permit No. SWJUN001198520101MA, Capitol Disposal Landfill, Juneau, Alaska

Dear Mr. Vance:

The Alaska Department of Environmental Conservation (ADEC) has completed its evaluation of your permit renewal application for the above mentioned Class I municipal solid waste landfill facility at the Capitol Disposal Landfill a wholly owned subsidiary of Waste Management of Alaska, Inc., 5600 Tonsgard Court, Juneau, Alaska 99801, T.41S, R.67E, S.1/2 of Section 34, Copper River Meridian. Please review the conditions and stipulations in the permit and ensure that they are understood. This permit is being issued in accordance with Alaska Statute (AS) 46.03; Title 18, Chapter 15 of the Alaska Administrative Code (18 AAC 15); and the Solid Waste Regulations (18 AAC 60).

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 - 18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. **Informal review requests** must be delivered to the Division Director, Alaska Department of Environmental Conservation, 555 Cordova Street, Anchorage, AK 99501 within 15 days of the permit decision. **Adjudicatory hearing requests** must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99801, within 30 days of the permit decision. If a hearing is not requested within 30 days, the right to appeal is waived. Even if an adjudicatory hearing has been requested and granted, all permit conditions remain in effect unless a stay has been granted.

If you have any questions, or require any additional information, please do not hesitate to contact me at (907) 451-2135.

Sincerely,

Douglas Buteyn
Southeast Solid Waste Program Coordinator

Attachment: Permit # SWJUN001198520101MA, expiring on November 23, 2010

STATE OF ALASKA
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
610 University Avenue
Fairbanks, AK 99709

SOLID WASTE DISPOSAL PERMIT

Permit No. SWJUN001198520101MA

Date Issued: November 23, 2005
Date Expires: November 23, 2010

The Alaska Department of Environmental Conservation (ADEC), under authority of AS 46.03 and 18 AAC 60, issues a solid waste disposal permit to:

Eric Vance, District Manager
Capitol Disposal
5600 Tonsgard Court
Juneau, AK 99801

and designated representatives for the operation of a Class I municipal solid waste landfill facility. It authorizes the disposal of more than 20 tons per day of domestic and commercial refuse based on an annual average. It authorizes the disposal and/or operation of:

- unincinerated municipal solid waste (MSW), including special wastes and putrescibles;
- construction and demolition debris, which may include non-regulated asbestos waste, mud and stumps; and
- a recycling program that manages household and commercial recyclables, such as paper, plastic, metal, glass, scrap vehicles, white goods, batteries, and used oil. Scrap vehicles, white goods, and batteries, collected for the purpose of recycling are not disposed of at the site.

The landfill is located on a 40-acre site at 5600 Tonsgard Court, Juneau, Alaska 99801, T.41S, R.67E, S.1/2 of Section 34, Copper River Meridian.

The permit holder shall manage and operate the facility in accordance with 18 AAC 60 and the permit application materials dated August 26, 2005 and as updated October 28, 2005. In addition, the following permit specific conditions and stipulations are required:

General Conditions

1. Access and inspection - The Permittee shall allow the Commissioner or his representative access to the permitted facilities at reasonable times to conduct scheduled or unscheduled inspections or tests to determine compliance with this permit, State laws, and regulations.

2. Information access - Except for information relating to confidential processes or methods of manufacture, all records and reports submitted in accordance with the terms of this permit shall be available for public inspection at the State of Alaska, Department of Environmental Conservation, 555 Cordova Street, Anchorage, AK 99501.

3. Civil and criminal liability - Nothing in this permit shall relieve the Permittee from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond his control, including, but not limited to, accidents, equipment breakdowns, or labor disputes.

4. Availability - The Permittee shall post or maintain a copy of this permit available to the public at the disposal facility.

5. Adverse impact - The Permittee shall take all necessary means to minimize any adverse impacts to the receiving waters or lands resulting from noncompliance with any limitation specified in this permit, including any additional monitoring needed to determine the nature and impact of the noncomplying activity. The Permittee shall clean up and restore all areas adversely impacted by the noncompliance.

6. Cultural or paleontological resources - Should cultural or paleontological resources be discovered as a result of this activity, work which would disturb such resources is to be stopped, and the State Historic Preservation Office, Division of Parks and Outdoor Recreation, Department of Natural Resources, is to be notified immediately (907-269-8721).

7. Applications for renewal - In accordance with 18 AAC 15.100(d), applications for renewal or amendment of this permit must be made no later than 30 days before the expiration date of the permit or the planned effective date of the amendment.

8. Other legal obligations - The requirements, duties, and obligations set forth in this permit are in addition to any requirements, duties, or obligations contained in any permit that the Alaska Department of Environmental Conservation or the U.S. Environmental Protection Agency has issued or may issue to the Permittee. This permit does not relieve the Permittee from the duty to obtain any and all necessary permits and to comply with the requirements contained in any such permit or with applicable state and federal laws and regulations. All activities conducted by the Permittee pursuant to the terms of this permit and all plans implemented by the Permittee pursuant to the terms of this permit shall comply with all applicable state and federal laws and regulations.

9. Pollution prevention - In order to prevent and minimize present and future pollution, when making management decisions that affect waste generation, the Permittee shall consider the following order of priority options: waste source reduction; recycling of waste; waste treatment; and waste disposal.

Prohibitions and Limitations:

The permittee shall:

1. prohibit the disposal of scrap vehicles and refrigeration units containing chloroflourocarbons (CFCs) or other wastes which have not been drained of fluids such as gasoline, antifreeze, and crankcase oil;

2. prohibit the disposal of regulated asbestos containing material;

3. prohibit placement or disposal of polluted soil in unlined areas of the landfill;

4. prohibit the disposal of hazardous waste, as defined by Title 40, Part 261 of the Code of Federal Regulations (40 CFR Part 261); and,

5. prohibit the disposal of liquid petroleum products, waste oil, septage, untreated sewage, unincinerated medical waste, lead-acid batteries, regulated polychlorinated biphenyl (PCB) fluids, and explosives unless approval for such disposal is obtained from ADEC or otherwise approved by this permit.

This permit expires on November 23, 2010 and may be revoked or amended in accordance with 18 AAC 60.260. The permit can be renewed if the facility will operate beyond this date. To avoid expiration of this permit, a renewal application must be submitted to ADEC at least 30 days before the expiration date, as set forth in 18 AAC 15.110.

Douglas Buteyn
Southeast Solid Waste Program Coordinator

Appendix G

Setting Rates

MSW Magazine, 2006

Preserving the Benefits of Your Bargain: Rate Adjustment Options

from MSW Magazine, 2006 "Elements" Issue, Volume 15, No. 4

By Constance Hornig

This is the fourth in a series of articles that identify issues frequently raised in procuring, negotiating, and drafting MSW service contracts. Collectively, these articles will constitute a practical contracts manual that describes approaches that MSW service providers and local governments can take to share risk and reward—and reach a mutually satisfactory agreement. The first article can be accessed at Sharing and Minimizing Labor Risks; the second at Money Talks: Financial (Dis)incentives for Performance and the third at Variable Can Pricing: Generator Diversion.Hauler Disposal Incentive.

Much blood and sweat, and maybe many tears are expended on competitively procuring or intensely negotiating MSW service fees for collection, recyclable materials, or greenwaste processing, transfer, and disposal. But whether those fees remain fair compensation over the term of the agreement depends largely on how they are adjusted (if at all) annually, for pass-through costs (such as disposal tipping fees) or for specified extraordinary circumstances (like changes in regulation).

This article identifies options for compensation adjustment:

I. No adjustment
II. Cost-based adjustment
III. Index-based adjustment
IV. Pass-through costs adjustment
V. Hybrid cost-based/index-based adjustment
VI. Industry-standards adjustment

This article asks you questions about your operations, policies, and goals to help you determine which methodology is best for you, and discusses the ramifications of each option.

I. No Adjustment

Your first option is to disallow adjustments. Disallowance could range from merely precluding automatic annual adjustments to comprehensively precluding even occasional adjustments for cost increases beyond your contractors' control, such as disposal tipping

fees that otherwise might be passed through to the ratepayer. (Although cost increases beyond contractors' control are often referred to colloquially as "extraordinary," this term is a misnomer and not necessarily apt. Those cost increases—such as increases in tipping or regulatory fees—can be anticipated. You and your contractors can expect them to change with some degree of certainty. But the amount of those cost increases cannot be easily quantified. The only difficulty is projecting them with any certainty.)

(1) *How long is the term of your agreement?* A 20-year bond will bear a higher interest rate than a money market fund because over the long term there is greater risk that you will lose your investment due to unforeseen adverse events. You are rewarded with greater return for assuming larger risk.

Similarly, the longer your contract term, the more likely that costs will change or new costs will be imposed. Costs outside the control of your contractors may increase: Tipping fees at disposal facilities may rise, the price of fuel may go up, insurance premiums may skyrocket, and regulatory changes may require additional capital investment (such as retrofitting vehicles for cleaner emissions). For example, if you disallow annual adjustment, then acting as reasonable businesspersons' contractors will look at the average inflation over a period equal to the proposed term and build projected inflation into their initial proposed rate. As another example, if you disallow tipping fees as pass-through costs, contractors will review the history of tipping fee increases, consider pending regulatory reform (such as new liner requirements), survey local disposal capacity (such as whether the local landfill can secure an expansion or renewal permit), and project tipping fee increases over the proposed contract term. Contractors will include their projected cost increases in their proposed initial rates, since without a rate adjustment clause, they cannot add them at a later date if projected increases actually occur.

The longer the term of your contract, the greater the risk of cost increases, and the higher the initial rates to hedge against the unknown liabilities. The shorter your term, the smaller the risk of cost increases, and the lower the initial rate.

(2) *Do you expect keen competition?* If you anticipate that numerous contractors will submit bids or proposals on your contract, be eager for your business, and sharpen their pencils, then your rates may not be thickly padded to comfortably cushion the contractors against unknown cost increases. If competition is keen, contractors may either conservatively project inflation, tipping fee, fuel, etc., cost increases over the term or assume greater risk of increases by building in smaller margins for their under-estimates.

Alternatively, if you anticipate that few contractors are interested in bidding or proposing on your contract, then your rates may be higher to better protect contractors against uncertainty.

Lastly, absent rate adjustments, contractors may feel the risk of cost increases is not worth the potential contract revenue, and refuse to propose or bid. You may hold a party and no one will come.

(3) *Which do you value most: no rate adjustment but stable rates, or rate adjustment and initially lower rates?* If you must place every rate increase before your elected officials for a vote, receive much public comment, or stir up divisive public controversy, then you may prefer slightly higher rates as a tradeoff for more stable ones and disallow or limit rate adjustments. If you do not need official approval (which is often the case with index-based rate adjustments) and your rates are sufficiently low to avoid customer complaint at annual, incremental changes, then you may choose to secure theoretically lower rates that inch upward over the term of the agreement as they are adjusted annually or to incorporate pass-through costs.

(4) *Do you expect program or regulatory changes?* Consider that without a rate adjustment methodology that requires maintenance of prescribed cost data and describes how cost increases translate into rate increases, it may be more difficult to negotiate program and rate changes mid-term. When your contractor has already inked the agreement, you have very little negotiating leverage. In a competitive procurement, you may be able to secure a favorable dispute resolution protocol, such as contractor's appeal of a public works director's rate increase determination to the mayor or city manager or county CAO, and/or a second appeal to the elected body that is empowered to make a binding and conclusive determination.

II. Cost-Based Adjustment

If you determine against holding contractors to their proposed price, without subsequent adjustment, you must next decide what sort of rate adjustment methodology you will choose: cost, indexed, or hybrid rate. You might ask yourself these questions:

(1) *Is the length of your agreement mid- to long-term?* Cost-based adjustment is preferable for mid- to long-term agreements. Index-based adjustment methodology is more suitable for short- to mid-term agreements. The longer the agreement, the more likely that indices will result in rates that do not relate to service costs and correspondingly exceed competitive market rates. Although in theory this could work to the disadvantage of the contractor, in practice it probably works to the disadvantage of the ratepayer, since we routinely experience inflation and rate increases, not deflation and rate decreases.

In addition, the longer the agreement, the more likely that you will want to make service program changes or that new regulations will increase the cost of performance. If you use index-based rate adjustment methodology, you do not have a cost basis for renegotiating rate changes consequent on additional capital investment or operating costs. Again, renegotiation of an executed agreement with no termination for convenience clause or a buyout amount that is economically infeasible to pay may be difficult. The local government has little or no negotiating leverage, and a contractual protocol for resolving rate adjustment disputes can determine whether the program implementation is successful or stymied. By contrast, if you use a cost-based rate adjustment methodology, you have access to data supporting the cost of the program changes and a pre-agreed protocol for translating those costs into rates. (Like index-based rate adjustment methodologies, cost-based rate adjustment methodologies also should incorporate dispute resolution protocol.

In fact, it may be more likely that you and your contractor will disagree over (dis)allowable or reasonable and necessary costs and cost allocations that are somewhat subjective and judgmental than that you will argue over application of indexed escalators, which is more formulaic.)

(2) *What is the rate impact of contractors' cost of complying with a cost-based rate review*? Contractors argue that cost-based rate reviews raise rates, since contractors incur greater record-keeping, auditing, and administrative costs than they would with index-based adjustments. A cost-based rate adjustment methodology usually requires that contractors maintain itemized data in prescribed categories and allocations. For example, contractors may need to characterize and segregate allowable and disallowable costs or costs that are passed through but not subject to markup for profit or rate of return. They may need to create financial records exclusively for your contract service, even though as a corporate entity they service other communities and contracts. They incur the cost of securing audited financial statements that otherwise might be merely compiled or reviewed. (This is true not only of small haulers, but also of larger haulers whose component divisions or operations might not prepare standalone, audited financial statements.) And lastly, they have to budget significant amounts of staff time to compile data in rate review applications and meet and confer with the local government and local government's rate consultants to clarify rate adjustment applications and reach an agreement on the ultimate rate adjustment.

By contrast, an index-based rate adjustment methodology should have little rate impact, since financial record-keeping requirements are likely to be less detailed or prescriptive. (Often audited financials are only required if a program change that will increase rates is being negotiated.) Although some index-based rate adjustment methodologies may solicit categories of actual costs (labor, vehicle maintenance, vehicle replacement, fuel, etc.) for application of different indices, often those categories may be a pre-agreed percentage and generally contractors do not need to budget any significant amount of staff time to prepare annual indexed rate adjustment requests. Contractors argue that index-based rate reviews have much lower administrative costs—and, consequently, rates—than do cost-based rate reviews.

(3) *Do you have sufficient staff and budget to perform rate reviews/hire consultants?* Just as contractors must budget time and money to prepare for and conduct rate reviews, so do you. Consider whether you have the necessary staff and/or budget allocation. Especially if you are not enterprise funded, your hauler may collect rates from generator/customers and you may not have a revenue stream to fund rate reviews. Nevertheless, where funding is not insurmountable, some solid waste agencies feel that administering a cost-based rate adjustment methodology is worth the time and effort because it gives a local government valuable insight into the operations of its contractors. Those local governments may budget for full-time MSW contract managers.

(4) *How large is your contract service base and volume of gross receipts?* Economies of scale dictate that the larger the number of contract service customers or volume of gross receipts, the cheaper a rate review on a per-customer basis. While cost-based rate reviews

may not be economically viable for a 5,000-home residential collection agreement, they may be eminently desirable for 200,000 homes.

(5) *Can you secure competitive rates of return/guarantied profit?* Cost-based rate adjustment methodologies generally establish allowable costs and then add profit expressed as operating ratios, profit margins, or rates of return. (An operating ratio, or OR, is used in utility regulation and is expressed as total costs/total revenues; inversely, profit margins are total revenues/total costs. Rates of return measure profitability of investments, expressed as profit/net assets. (See www.mlb.ilstu.edu/ressubj/subject/business/ratio.htm#guides for a discussion of financial ratios.) Cost-based rate adjustments are therefore usually synonymous with "cost plus." If you competitively secure your agreement, each contractor's OR can be proposed or bid and factored into a life-cycle cost comparison. However, if you are negotiating your agreement on a sole source basis, you may or may not have accurate cost data to determine whether a rate of return is competitive. As an alternative, you might default to comparative industry standard financial ratios for MSW service companies of comparable sizes, prepared by MSW analysts, such as the Risk Management Association at www.rmahq.org/.

(6) *Does your cost-plus methodology encourage efficient operations?*

i. Disallowable costs. A common criticism of cost-plus rate adjustment methodologies is that they discourage efficient operations. Allowable costs are included in required revenues on which the rate is based, so running an extra route or incurring overtime is fully compensated. If you use a cost-based rate adjustment methodology, pay close attention to the list and definition of dis-allowable costs, such as business development, lobbying, fines and penalties, judicial or contractual damages, charitable or political donations, litigation costs, merger and acquisition costs, etc.

ii. Allowable costs without markup. Another common criticism of cost-plus rate adjustment methodologies is that they may not only discourage efficiencies, but actually also encourage inefficiencies. Since the OR is applied on top of the pass-through costs, the greater the costs, the greater the markup. In order to minimize this efficiency disincentive, your methodology might distinguish between totally dis-allowable costs and those costs that are passed through without markup.

iii. Necessary and reasonable costs. In addition, some cost-plus methodologies strive to curb inefficiencies by allowing only "necessary and reasonable" expenses. However, what is necessary and reasonable involves somewhat subjective judgment and opinions and can open the door to argument and deadlock in the rate review process. Arguably, to ensure that costs are necessary and reasonable, an agreement with a cost-plus rate adjustment methodology must contain a far greater level of detail on operations specifications than an agreement that uses indexed adjustments. In cost-plus agreements, detailed operational obligations not only set performance standards that protect health and safety or ensure quality customer service, but also help contain costs. Yet with a

greater level of prescribed operational detail, you may become embroiled in micromanaging and second-guessing your contractor's operations.

iv. Shared cost-savings incentives. Lastly, cost-plus agreements may provide incentives for efficient operations in the form of shared savings. For example, if the contractor implements savings over a specified amount in any year, half of those savings will nevertheless be included in costs. The contractor keeps half of the savings, and the ratepayer gets the second half through lower costs.

(7) *Are you confident that you can analyze true costs?* Even though you may require contractors to provide audited financials of segregated contract services, you never will understand their numbers as well as they do.

i. Can you secure audited financials for your contract service? Contractors are understandably loath to provide financials that competitors may use to contractors' disadvantage. Under the terms of many public information laws across the country, local governments may not be able to assure contractors that financial information will be kept proprietary. This is true not only for privately held companies who do not file public financial statements, but also for divisions or subsidiaries of larger companies whose financials are not public information either, although the financials of their ultimate parent company are filed with the SEC in their quarterly 10Q and annual 10K reports. In the context of a competitively secured agreement, you might have greater success in securing audited financials in sole source procurements because proposing contractors do not want to lose evaluative points for taking exceptions to the terms of your proposed contract and business deal.

ii. Is cost allocation among your contract service and other operations fair? Your contractor may service other communities, and it is difficult to corroborate that cost allocations are made fairly. For example, a route supervisor may double-count his time among multiple contracts, resulting in perhaps each of five contracts paying for 50% of his time for a total cost compensation of 250%. Your agreement can contain representations and warranties as to fair allocation that become defaults if breached.

iii. Is compensation of principals and attribution of parent corporation overhead and service support costs fair? Your methodology must protect against potential abuses in salary payments to company principals and intercompany transfers. One example is compensating a parent corporation for risk management, legal, and other central office administration services. Another is leasing or purchasing goods or services from affiliates at higher-than-market rates. In both examples, the transfers may not reflect market costs, thereby inflating profit.

iv. Are allowable and disallowable costs clear? As in litigation, it can be surprising how contractors and local governments can construe definitions differently. Detail and examples based on hard experience can help forestall disputes.

v. Are projected depreciation expenses adjusted for actual expenditures? In many rate methodologies, depreciation expenses are projected for the next rate year. At the end of that year, when rate adjustment for the next succeeding rate year is made, the projected depreciation may not have occurred. Acquisition unit prices for new vehicles, carts, or other equipment may have been lower than was anticipated, for example, or a contractor may have acquired fewer than anticipated number of units of vehicles, carts, or other equipment. That inaccuracy may be compounded where the operating ratio is calculated on that excessive depreciation cost. Whereas high or low projections of other operating costs are more likely to even out over time, errors of high or low projections of depreciation costs will not only be perpetuated but also be exaggerated over time, if not reconciled with actual costs.

III. Index-Based Adjustment

If neither the no-adjustment model nor the cost-based adjustment methodology meets your needs, then you might turn to an index-based adjustment methodology. Ask yourself these questions:

(1) *Is the length of your agreement short- to mid-term?* The opposite of the considerations for cost-based adjustment applies here. Over a short term (e.g., five years or less), there is less likelihood that your rates will escalate significantly out of relation to actual costs than over the long term.

(2) *Was the initial base rate competitively procured?* If the base rate being adjusted by index was not initially set through competitive procurement, you may not have assurance that you began with the best market rate possible. Many—perhaps most—sole source negotiations are conducted without contractors' cost data, and local governments look to similar services in similar communities for comparative rate verification. Sole source negotiations may leave an uncorroborated amount of money lying on the table. If the base rate is not competitive, subsequent escalation will only exacerbate the overstatement.

(3) *What index or bundle of indices best represent your contractor's costs?* This section uses the example of collection services, but the analysis applies equally well to other integrated waste management services and facility operations.

i. Are you familiar with the goods and services included in the Consumer Price Index/new chained CPI? Have you compared the history of possible applicable indices? See the Bureau of Labor Statistics' Web site at www.bls.gov/ for in-depth information about the consumer price index (CPI) and producer price indices (PPIs). According to the US Department of Labor, "The CPI is the best measure for adjusting payments to consumers when the intent is to allow them to purchase at today's prices, a market basket of goods and services equivalent to one that they could purchase in an earlier period." The bundle of over 200 consumers' goods and services in the CPI comprises housing, 42%; transportation, 17%; food/beverages, 15%; medical care, 6%; recreation, 6%; and education and communication, 6%. This bundle may not well reflect contractors' operating costs.

The new chained CPI index (C-CPI-U) better reflects consumers' substitution of goods and services as prices rise, thereby lowering the inflation rate (e.g., 2001 CPI-U 2.8 / C-CPI-U 2.3; 2002 1.6 / 1.2, 2003 3.2 / 2.0). For example, as blueberries pass out of season you may switch to buying less-expensive grapes. If you are entering into a new agreement, you should probably try to use the C-CPI-U as your CPI index of choice. You might compare the historical inflation of assorted possible indices (e.g., national, regional) that could apply to your geographical area to determine which would be most favorable to you.

ii. Consider other indices for a portion of your contractor's rate and the weighting factor for cost categories (e.g., labor, fuel, vehicle replacement, vehicle maintenance, other). Although the bundle of goods and services in the CPI can be tailored, some contracts use different indices for different cost categories to more closely track actual costs with indexed adjustment. Examples include the following BLS data from the PPI and CPI, which can be copied and pasted directly into BLS hyperlink http://data.bls.gov/cgi-bin/srgate to create annual adjustments on spreadsheets:

1. Labor: Series ID ECS 12102i Service Producing Sanitary Services (or compare Index for Urban Wage Earners)
2. Motor Fuel: Series ID WPU057303 #2 diesel fuel (or compare regional CPIs for motor fuel or diesel fuel to Consumer Customers Index)
3. Vehicle Replacement: Series ID PCU33621113362113 Vehicles on Purchased Chassis (or compare PPI Industrial Commodities)
4. Vehicle Maintenance: Series ID: PCU3339243339243 Parts & Attachments (or compare PPI Industrial Commodities)
5. Other: Monthly Labor Review Series ID: CUURX400 SA0 CPI=All Urban Consumers, All Items West Size Class B/C

Be certain that your contractual language allows for substitution in the event indices are no longer published. For example, this year the Producer Price Index changed from using Standard Industrial Classification (SIC) to a North American Industry Classification System (NAICS), and although many SIC industries were perpetuated as NAICS industries, some SIC industries were recombined to create new NAICS industries.

Example weighting—after removing any pass-through costs—in a collection agreement might be

1. labor, 55%;
2. motor fuel, 5%;
3. vehicle replacement, 5%;
4. vehicle maintenance, 15%; or
5. other, 20%.

These percentages could be prenegotiated and fixed, or you could require your contractor to annually give you new weighting percentages based on historical cost allocations for the past rate year. (In the latter event, however, you might want them to provide audited

financials on a contract service basis, for corroboration. Contractors would argue that the costs of preparing those financials would push up the rates and might reduce one of the advantages of index-based over cost-based adjustment methodologies.)

Remember, only those portions of cost that are subject to escalation should be included in escalation. Rarely will you escalate 100% of your fees. Even if you do not pass through costs such as tipping fees or interest expense, the portion of the fees they represent should not be inflated.

(4) *Can you take a portion of the CPI on a year-to-year basis in order to offset overstated inflation?* CPI indices are overstated. In 1996 the US General Accounting Office's Boskin Commission Report estimated that the CPI index overestimated inflation by 1.1% annually, and even after adjusting the methodology, the GAO believes a 0.73% to 0.9% overestimate persists.

Over the short term, this can be countered by allowing for only a portion of indexed inflation (e.g., 80% to 85% of the CPI). Because of the effect of compounding, if escalation is less than 100% of the index, you are better off calculating escalation on a year-to-year basis than on a year-to–base year basis. For example: Cost2005 = Cost2004 x {1 + 85%[(CPI2005 / CPI2004) -1]}.

(5) *Can you cap inflation?* Additionally, especially in competitive procurements, you may be able to set a ceiling maximum on inflation (e.g., no greater than 5%).

(6) *Can you compare annual average index changes rather than point-to-point index changes?* Use 12-month averages/annual percentage changes for your CPI rather than comparing your CPI for two specific months, point-to-point, since the months could be aberrant and an average would be more representative for the entire year.

(7) *Can you coordinate publication dates with your annual budget process?* The CPI for particular regions may be published monthly, bimonthly, or semiannually, so you need to coordinate your adjustment timing with the publication date of the index used in your area. Most commonly used is the CPI for urban areas (CPI-U) covering 87% of the US population, which can be seasonally adjusted. (MSW agreements generally do not use seasonally adjusted indices.)

Note, too, that there may be a time delay in publication, although with online access, the publication period is decreased. The chained CPI is first published and then subsequently refined, so build time into your annual rate adjustment calendar. For example, to implement new rates on a July 1 fiscal year, you might use the calendar average for the prior year, giving you sufficient time to gather the indices, calculate changes, and adopt and implement the rate adjustment.

(8) *Can you escalate bundled costs, and then allow for profit on their total amount*? You might consider establishing bundles of costs like those previously listed (labor, fuel, vehicle replacement, vehicle maintenance, other) but then further allowing for profit on

those costs (e.g., dividing the total costs by an operating ratio minus the total costs), and lastly adding the pass-through costs. In a competitive procurement, proposers can propose their base bundled costs and operating ratios, which theoretically exerts market pressure to contain profit and avoids escalating a profit component of the costs. In every succeeding year, the proposed base costs are escalated by the appropriate index and the proposed operating ratio is applied to the sum of those total costs.

Note that there may be additional costs (e.g. lease costs, depreciation) that are not subject to an escalation factor but are arguably included in costs subject to markup for profit.

IV. Pass-Through Costs Adjustment

(1) *Does your contractor have costs that should be passed through without escalation or markup?* Whether you use index- or cost-based rate adjustment you are likely to compensate your contractor for certain costs that are subject to changes beyond his or her control. Those costs will be reflected in the rate and "passed through" to the ratepayers. Even in the case where you generally do not adjust rates at all for operation and maintenance costs, you might pass through costs such as disposal, regulatory fees, and interest expense.

(2) *Can you pre-agree on conversion ratios?* Make certain that your agreement contains specified conversion ratios that translate your contractor's cost increases (expressed in gross dollar amounts) into your rate increases (expressed on a unit basis). For example, if a pass-through disposal tipping fee increases by $0.25 per ton, include a pre-agreed conversion factor in pounds/residential gallon capacity (or if not variable can rates, per household), or pounds/commercial or C&D cubic yard.

Alternatively, for administrative simplicity you may agree that a specified percentage of your fees/customer rates are attributable to a given pass-through cost, and the increases are proportionately passed through. For example, you and your haul contractor may agree that 20% of a $10-per-household collection service fee is attributable to disposal. If the tipping fee increases by $0.25 per ton equal to 5% thereof, then 20% of $10 ($2) will be increased by 5% (or $0.10 per household).

(3) *If you contract for refuse disposal separately from collection, can you allocate refuse volume disposal risk to your collection contractor by passing through disposal tipping fees on fixed waste volume?* Many collection contracts include not only collecting recyclables, greenwaste, and refuse, but also processing the recyclables, composting the greenwaste, and disposing of refuse. Frequently, unless the contractor also owns the processing, composting, and/or disposal facilities or has secured subcontracts co-terminus with your collection contract, your collection contract will provide that the collection contractor can pass through facility tipping fees.

However, increasingly, local governments are separately procuring collection and disposal agreements, since the related investments have different capital investments and depreciation demands and consequently potentially different-length terms. They also can retain greater system control and accountability. When you contract directly with a

disposal facility, you can opt to pay disposal fees to your disposal contractor and then allow your collection contractor to deliver waste for a zero tip fee to your contracted disposal facility. But if you worry that your collection contractor will be tempted to commingle other jurisdictions' materials with your own, you may prefer to compensate your collection contractor for disposal fees and let the collection contractor pay tipping fees at your contracted disposal facility. (Your disposal contractor may request a performance bond to secure your collection contractor's payment obligation and provide against the collection contractor's bankruptcy risk.)

However, by separately procuring collection and disposal agreements, the risk of waste volume generation—due to population growth or changing disposal/diversion patterns of generators—is often shifted to the local government. In moving from a single full-service collection-processing-composting-disposal agreement to separate collection and disposal agreements, the risk of waste volume generation and setout rates often shifts from the full-service contractor to you. In a competitive procurement, you may be able to keep the waste volume generation risk on the hauler by requiring it to propose a fixed tonnage on which a pass-through disposal tipping fee will be paid and adjusted when and if the disposal tipping fee changes. (Your collection contractor will continue to receive compensation for the disposal component in the rate paid by new customers.) This has the added benefit of giving your collection contractor incentive to divert refuse from disposal, since for every ton it diverts, it realizes a ton of avoided disposal cost.

V. Hybrid Cost-Based/Index-Based Adjustment

(1) *Can you escalate rates for several years, punctuated by cost-based adjustment?* In order to minimize local governments' contract administration costs of annual cost-based rate review and contractors' cost of cooperating with that rate review, some local governments use an index-based methodology for a period of years (e.g., three, five, etc.) and then conduct a cost-based rate adjustment at the end of every period. Another variation might be conducting the cost-based adjustment at the local government's request not more than a specified number of times during the term. (You might particularly want to conduct a rate review prior to determining whether or not to exercise any extension option that lies in your sole discretion.) Still another variation is to allow either the local government or contractor to request rate review a specified number of times during the term. (Numbered instances of possible review help the contractor estimate in advance the worst-case scenario of costs that it should include in its proposed or negotiated rates.)

VI. Industry-Standards Adjustment

Some communities have developed adjustment protocols that use industry-standard operational costs to adjust their contractor's compensation based on actual operating conditions (number of routes, terrain, type of services) but not on the contractor's actual audited costs. This method is disfavored by contractors whose capital and operating costs are significantly different from the standards selected.

Conclusion

If you don't adjust rates, expect to pay higher rates, reflecting contractors' assumption of

cost-increase risk and/or reduced competition. Consider this option only if you prize rate stability and do not anticipate program or regulatory changes that would increase contractors' costs.

Keep the length of your contract term commensurate with the time that your contractor needs to recover its capital investment.

If your contract term is long (e.g., to recover the contractor's investment in a facility) and your rate base sufficiently large, favor cost-based rate adjustment over index-based rate adjustment. Ensure that your cost-based rate adjustment methodology clearly defines (non)allowable costs, and include sufficient detail of operational obligations to define that they are "reasonable and necessary" costs. Secure audited financials for your contract services only. Be alert to corroborate fair cost allocations among your contract services and others', and to ascertain that compensation paid to principals, affiliates, and parent companies are arm's length. Consider reconciling projected depreciation expenses with actual expenses incurred. Provide a conclusive administrative dispute resolution protocol in the event your contractor objects to your rate adjustment determination.

If your contract term is short and your base rates procured competitively, favor index-based adjustment over cost-based adjustment methodologies. Develop a bundle of weighted indices such as labor, fuel, and equipment replacement/maintenance. For costs that use the CPI, use a percentage of the new chained CPI, comparing average annual changes in the index values from year to prior year and not point-to-point from year to base year. Coordinate index publishing dates with your budget process. Consider capping increases and allowing competitively bid profit/operating ratios on escalated bundled costs.

Whether you use cost- or index-based rate adjustment methodologies, define your pass-through costs carefully. Include specified conversion ratios to translate costs to rates. If possible, keep risk of waste volume on your collection contractor even if you pass through changes in disposal tipping fees.

In longer-term agreements, to reduce cost consider establishing a cycle of several years using index-based rate adjustment punctuated by cost-based adjustment. Even in shorter-term agreements, consider the right to require a specified number of cost-based adjustments at your option.

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Appendix H

Additional Details and Backup Materials Regarding Implementation

Step 1 / Continue to Use Waste Management (WM) Landfill for Disposal

Task 1: Formally inform WM use of landfill is preferred disposal method and advise WM of desire to enter into long–term disposal agreement. Schedule a series of planning and scoping meetings to discuss and agree upon the nature of the services to be provided by WM and the contractual terms.

Task 2: Request a boiler plate contract copy from WM for review by CBJ legal counsel

Task 3: Retain, if necessary, outside counsel for solid waste disposal and collection contracts.

Issues of concern to the CBJ:

a. Operating and safety standards required in accordance with State and Federal laws
b. Importation of waste from outside the CBJ
c. Screening for unpermitted waste
d. Disposal guaranty
e. Right to enter facility and observe operations
f. Closure and post closure plan and financial assurances
g. Litter
h. Smell / Landfill gas
i. Annual Reporting (disposal tons, recycled tons, financial assurance, etc.)
j. CBJ Obligation to WM: Exclusive refuse and disposal services
k. Required insurance
l. Rate adjustment

Task 4: Inform Arrow Refuse of the contract stipulations once an agreement has been reached.

Future contractual considerations:
Material Recovery Facility / Recycling Processing at the landfill
Siting a HHW facility or drop off point at the landfill

Step 2 / Hire Solid Waste Coordinator

Task 1: Prepare description of position
Multiple related job descriptions from jurisdictions are noted below and detailed in the Appendix.

Position	**Jurisdiction**
a. Solid Waste Manager	Chandler, Arizona
b. Solid Waste Coordinator	Tillamook County, Oregon
c. MRF Site Manager	Santa Fe Solid Waste District, NM
d. Waste Outreach Manager	Metro Regional Government, Portland
e. Solid Waste Collections Supervisor	Mesa, Arizona
f. Recycling Coordinator	Salinas Valley SW Authority, California

Task 2: Advertise position in both print media and on trade and organizational list serves

Advertise in the following publications:
- Waste News
- MSW Management
- American City & County
- American Public Works Association

Join and advertise position on industry list serves or other similar online media such as:
- GreenYes@googlegroups.com
- crra_members@yahoogroups.com

Advertise position through executive recruiting firms that specialize in serving the waste and recycling industries:
- Moffitt International - website: www.emoffitt.com
- Kimmel & Associates - website: www.kimmel.com

Task 3: Interview selected candidates

Task 4: Make selection

Step 3 / Adopt Policy on Universal Trash & Recycling Collection Service

Task 1: Prepare general policy statement for adoption by Assembly that all residential & commercial / institutional generators will be provided a basic level of collection service for refuse & specified recyclables.

a. City of Boise, Idaho (Section 8-10-02 for Residential and Section 8-10-03.02) stipulates the requirements for trash collection. (City of Boise SW Ordinance included in the Appendix)
b. Oregon Revised Statures, Chapter 459A details the "Opportunity to Recycle" and defines who is responsible for recycling, the expectations of the state, and the basic level of recycling service. (ORS 459A included in the Appendix)
c. City of Beaverton, Oregon City Code explains the relationship between the collection company and the city

Task 2: Determine the level of service for both residential and commercial customers
1. Residential cart based collection of solid waste and carts for recycling
2. Commercial containers and carts with the opportunity to recycle
3. Rates set at a cost of service to include recycling

Task 3: Hold public hearings to receive comment on proposed policy
1. Amend policies, if necessary, based on public input
2. Inform interested parties that service details are subject to contractual negotiations between CBJ & Arrow Refuse

Task 4: Finalize and approve policy(s)

Step 4 / Transfer Arrow Refuse RCA Certificate to CBJ

Task 1: CBJ counsel will contact appropriate RCA staff to initiate the procedures for certificate transfer

Task 2: Retain, if necessary, outside counsel for solid waste disposal and collection contracts

Task 3: Draft collection contract

Issues of concern for the CBJ:

a. Services Provided to customers of the CBJ (see Step #7)
b. Contract length
c. Performance standards
d. Performance assurance
e. Rate adjustment
f. Indemnification
g. Liability
h. Obligations by both parties

City of Beaverton, Oregon details the level of service to be provided to residential and commercial customers in the solid waste collection rules. (Rules included in the Appendix)

Task 4: Negotiate and execute collection contract

Task 5: Complete, submit application form, with written support from Arrow Refuse

Task 6: Monitor evaluation of application, address any RCA concerns

Step 5 / Form Contractual Partnerships with Arrow Refuse and Waste Management

Refuse delivered to WM Landfill, recyclables taken to MRF

Contract details determined by program & service decisions made re solid waste management strategy Step #7 noted below

Step 7 / Design & Implement Fully Automated Residential Refuse Collection with Variable Rates

Step1: Arrow Refuse will determine the specific service areas and impacted customers based on location in the Borough, waste generated (type and amounts), and accessibility by the collection trucks. (This task would be conducted concurrently with Step #4)

Step 2: Review options on rate structure & differences between levels of service

Step 3: Arrow Refuse would procure trucks, carts, and other related equipment necessary to implement the new collection programs

Step 4: Prepare schedule for initiation of service. Read the Beaverton rollcart program update for the lessons learned by the City of Beaverton and the franchised haulers in the Appendix (May / June is the best time to roll out this program because the weather is good)

Step 5: Hold community meetings, distribute promotion / education materials to inform public about new refuse collection procedures (Samples from Silver City, NM and City of Beaverton, Oregon included in the Appendix)

The following Appendix H

backup materials are available

online at www.juneau.org

or

www.juneau.org/pubworks/projects/SWMS/

Step 2 Data

Job Descriptions:

a. Solid Waste Manager	Chandler, Arizona
b. Solid Waste Coordinator	Tillamook County, Oregon
c. MRF Site Manager	Santa Fe Solid Waste District, New Mexico
d. Waste Outreach Manager	Metro Regional Government, Portland, OR
e. Solid Waste Collections Supervisor	Mesa, Arizona
f. Recycling Coordinator	Salinas Valley SW Authority, California

Step 3 Data

City of Boise SW Ordinance

Oregon Revised Statue 459A

City of Beaverton City Code

Step 4 Data

City of Beaverton SW Rules

Step 7 Data

Beaverton rollcart program update 4-2006

Silver City residential cart collection brochure

City of Beaverton residential cart recycling brochure

Step 2 Data

RE: Hiring a Solid Waste Coordinator

Solid Waste Manager	Chandler, Arizona
Solid Waste Coordinator	Tillamook County, Oregon
MRF Site Manager	Santa Fe Solid Waste District, NM
Waste Outreach Manager	Metro Regional Government, Portland
Solid Waste Collections Supervisor	Mesa, Arizona
Recycling Coordinator	Salinas Valley SW Authority, CA

Step 3 Data

RE: Policies/Ordinances/Statutes

City of Boise SW Ordinance

Oregon Revised Statue 459A

City of Beaverton City Code

Step 4 Data

RE: Transfer of Certificate

City of Beaverton SW Rules

Step 7 Data

RE: Design of Collection System

Beaverton rollcart program update 4-2006

Silver City residential cart collection brochure

City of Beaverton residential cart recycling brochure