SONOMA COUNTY SOLID WASTE MANAGEMENT ALTERNATIVES ANALYSIS PROJECT FINAL REPORT

Prepared for:
Sonoma County Department of Transportation and Public Works

Prepared by:
SCS Engineers

December 29, 2000

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FINAL REPORT

Prepared for:

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ACKNOWLEDGEMENTS

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This report is dedicated to the memory of Carol Chase, City of Cloverdale.

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LIST OF ACRONYMS

LIST OF ACRONYMS

Acronym	Meaning
AB 939	California Integrated Waste Management Act of 1989
ADC	Alternative Daily Cover
BOS	Board of Supervisors
CEQA	California Environmental Quality Act
CIWMB	California Integrated Waste Management Board
CoIWMP	Countywide Integrated Waste Management Plan
EIR	Environmental Impact Report
ICI	Industrial, Commercial and Institutional
JPA	Joint Powers Authority
LCRS	Leachate Collection and Recovery System
LFG	Landfill Gas
LTF	Local Task Force
MRF	Materials Recovery Facility
MSL	Mean Sea Level
MSW	Municipal Solid Waste
SCWMA	Sonoma County Waste Management Agency
TPD	Tons Per Day
TPY	Tons Per Year
TS	Transfer Station

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EXECUTIVE SUMMARY

INTRODUCTION

The purpose of the Solid Waste Management Alternatives Analysis is to produce a long-term, integrated waste management strategy for Sonoma County to assure adequate future capacity for the disposed portion of the waste stream. SCS Engineers (SCS) was retained by the Sonoma County Department of Transportation and Public Works to define and evaluate options for the County's Solid Waste Management System for the years 2015 through 2050. This planning period was selected based on a number of assumptions as defined below:

- The existing, permitted capacity of the Central Landfill will expire in 2015.
- The countywide diversion rate will reach 50% by the year 2005, and although it may increase, at a worse case it will remain at that level through the planning period. Diversion programs and policies currently under development and consideration by the LTF will contribute to the 50% diversion rate by 2005.
- New solid waste management policies and programs will be implemented between 2000 and 2015, prior to the beginning of the Alternatives Project planning period. This will further impact the types of programs and policies evaluated and selected as part of this project.
- Large-scale facilities require longer lead time for design, permitting, and construction; therefore, the impact of timing must be considered in the evaluation and selection process.

From its inception through completion, the Solid Waste Management Alternatives Analysis Project was a collaborative process between the Department of Transportation and Public Works and the Sonoma County AB 939 Local Task Force (LTF). The monthly LTF meetings provided the forum for review and discussion of project data, and a consensus was sought for each milestone decision. The public was informed of the project through mailings and announcements at City Council meetings. A special evening meeting of the LTF was held in September 2000 to present the prospective management scenarios to the public.

At the conclusion of the 13-month project, the LTF reached a consensus on a strategy to meet Sonoma County's solid waste management goals and needs for the planning period 2015 to 2050. The strategy consists of the following four (4) key elements:

1. Formal agreement among all cities and the County to direct flow of refuse and green waste to a new integrated resource management facility.

2. Mandatory source separation of recyclables from waste for residential, commercial, industrial, and institutional waste generators.

3. Expansion of Central Landfill beyond its current permitted capacity.

4. Siting of an integrated resource management facility to include organics processing (anaerobic digestion or biorefining), green waste composting, and landfilling.

This report presents the process, steps and data analysis that was used to arrive at the recommended strategy. The next step in the process is consideration of the recommended strategy by the County Board of Supervisors. If approved, County staff will be directed to proceed with implementation of the strategy. Implementation would begin with incorporation of the strategy into the Countywide Integrated Waste Management Plan, and adoption of the mandatory policies for flow control and recycling. Subsequent steps would then lead to expansion of Central Landfill and development of the Integrated Resource Management Facility.

A brief overview of the major project tasks, results and conclusions is provided in this Executive Summary. Detailed data on all aspects of the project is included in the sections that follow.

EXISTING SOLID WASTE SYSTEM

The first step in the project was to define the existing solid waste management conditions in the County. By knowing what infrastructure exists to collect and dispose of solid waste, options for the future could be selected that would integrate more readily into the existing system. It was also important to identify the types and quantities of wastes that are presently generated. This includes wastes that are disposed and recycled.

The existing system is made up of a mix of public and private collection, recycling and disposal facilities. Collection in the County is provided by private haulers, through a system of franchise agreements in the incorporated cities, and licenses in the County unincorporated areas. The County owns five transfer stations and one landfill, which includes a power plant, a green waste composting facility, and a recycling/reuse center. There are also recycling and reuse operations at the transfer stations.

Of the total disposed waste, 60% is taken directly to Central Landfill; the remaining tonnage passes through the transfer stations. Presently, the County transfer stations adequately serve the existing waste management system. The majority of the disposed waste stream is comprised of organic materials. Although much of the yard wastes are composted at the County's green waste composting operation at Central Landfill, approximately 40% of the waste stream disposed in the landfill consists of organic materials such as food, wood, textiles and paper.

Processing infrastructure in the County for recyclables includes several intermediate facilities for pre-processing and secondary processing of recyclable materials. However, there is no end-use processing in the County, except for the organics portion of the waste stream.

FUTURE CONDITIONS

In order to identify the types and capacities of facilities that will be necessary to handle the County's future disposal needs, it was necessary to determine the quantity of materials that would be generated and require disposal during the planning period. Therefore, assumptions regarding population growth and diversion were adopted. The waste generation projections highlight the inter-relationship between three critical factors: population growth, diversion rate, and disposed tonnage.

A model was developed to quantify waste generation based on these critical factors. Two population estimates were selected--the County General Plan, with extrapolation out to the 2050 planning period, and the State Department of Finance data. For each population estimate, two different diversion rates were assumed, thus producing two scenarios of waste disposal, diversion, and generation per population estimate. The first scenario assumed that diversion would remain constant at the 1998 rate of 39%. The second scenario assumed that diversion increased to 50% by the year 2005, and remained constant after that. For both, generation increased in relation to the projected population growth. The model did not assume an increase in the per capita waste generation rate. In order to account for adopted urban growth limits and other measures that may impact the quantity of wastes generated in the County, the population projections were adjusted downwards. Therefore, beginning in 2011 and through the end of the project planning period (2050), the population growth rates were reduced by 50%. Based on discussion, the LTF agreed to incorporate a range of population growth estimates and a 50% diversion rate by 2005. The results identified that by 2050, the quantity of material requiring disposal through landfilling and/or an alternative disposal technology or facility will range from 568,000 tons to 573,000 tons in 2050, which is approximately 16% greater than the 1998 disposal tonnage.

IDENTIFICATION OF ALTERNATIVES

The next step of the project was to identify and analyze waste management alternatives that are appropriate to the future projections of solid waste anticipated in the County. The alternatives are designed to contribute to long-term stability and flexibility, and provide cost-effective and efficient services and programs, environmental protection, and improvements to the waste management infrastructure.

The proposed alternatives were grouped under three general headings: Policies and Programs; Alternative Technologies; and Landfills. Program and policy options to implement the selected alternatives that were analyzed included mandatory recycling, mandatory collection service, strategies to support end-users of recyclables, flow control, and requirements to process all waste prior to disposal. The alternative technologies included such options as municipal solid waste (MSW) composting, MSW combustion, thermal transformation, anaerobic digestion, biorefining, and different types of material recovery facilities (MRFs). The Landfill Alternatives included both in-County and out-of-County options, and expansion of Central Landfill. A complete description of each of the proposed alternatives was prepared, including the major features and characteristics, target material types and quantities (as applicable), and other relevant characteristics.

EVALUATION AND SELECTION CRITERIA

Since the pool of alternatives was large, decisions had to be made about which ones to include and exclude in developing a preferred waste management strategy. To insure a thorough alternatives review, a two-step evaluation process was developed, similar to the one used in the County's AB 939 Siting Element (1996). The process combines quantitative information and qualitative analysis to yield a coherent strategy consisting of a logical arrangement of the priority alternatives. Evaluation criteria that encompass a range of perspectives (environmental, financial, political, institutional, and technical) provided guidance and rationale for selecting alternatives that would constitute the overall strategy.

The first step, the preliminary screening criteria stage, eliminated options that were clearly not feasible or effective for the County, given current and anticipated solid waste management conditions. This was accomplished through the application of ten preliminary screening criteria, and a scoring system that was used to rank the alternatives for acceptance or rejection. The second evaluation step was a more rigorously detailed and analytic examination of the comparative features, advantages/disadvantages, and impacts of the remaining options.

SELECTION OF ALTERNATIVES

Each of the technology and landfill alternatives was reviewed by the LTF, and following these discussions, the policy and program options were evaluated for integration with the management alternatives. The analysis concluded with LTF recommendations and supporting rationale regarding which alternatives were determined to be the priority selections for combining into the long-term, integrated waste management strategy. The selected alternatives included:

- Policies and Programs - Flow control, mandatory recycling, processing of all waste, and wet/dry collection.

- Processing technologies - MRFs and organics processing technologies (biorefining or anaerobic digestion).

- Disposal - Expansion of Central Landfill, out-of-county landfill, and a new in-county landfill.

This step of the analysis also resulted in the elimination of alternatives that were considered not feasible or politically acceptable. These included thermal transformation, MSW combustion, and MSW composting. Although eliminated from further consideration in this process, both thermal transformation and MSW composting will be kept on a "watch list" for possible future consideration, if these technologies are further refined and improved.

MANAGEMENT SCENARIOS

The remaining disposal and processing technology alternatives, and supportive policies and programs, were then combined in different ways to produce a variety of comprehensive scenarios for managing the County's waste stream during the period 2015 to 2050. A total of nine

scenarios were derived that configured the alternatives into strategies ranging from simple solutions (use of existing transfer stations, and disposal of all waste at an out-of-county landfill) to more complex (expansion of Central Landfill, construction of a new landfill, and development of organics processing technologies with policies to support diversion and control over the waste stream). The scenarios varied considerably in key areas:

- The magnitude and types of changes to the current waste management system.
- The relative emphasis on generator source separation versus material processing technologies for recyclables.
- The level of control exercised by the County and the cities.
- The use of special technologies for processing the organic portion of the waste stream.
- The use of a new facility (or facilities), in addition to current private operations, for processing recyclables.

A cost model was also developed that incorporated the relative costs associated with each of the alternatives included in the nine scenarios. The model produced a cost projection for each scenario expressed in cost per ton. The projected costs ranged from a low of $30 per ton for the scenario that used existing or new transfer stations, with all wastes disposed at a new in-county landfill, to a high of over $60 per ton for the scenario that incorporated a MRF to process all waste, an organics processing facility, and disposal at an expanded Central Landfill.

SCENARIO EVALUATION PROCESS

The final stage of the analysis involved evaluation of the nine scenarios for relative risk (technological, environmental and economic), cost per ton, impacts on diversion and disposal quantities, local control, and resource efficiency. The objective was to narrow down the selection to three preferred scenarios. This element of the process involved a vote by the LTF members, and each member selected three top scenarios. The process resulted in three scenarios receiving a majority of the votes, with the remaining scenarios each receiving two or less votes.

The three scenarios all contained flow control policy and organics processing technologies, and eliminated the option to send waste out of the County. The decision to not send wastes out of the County for disposal emphasized the commitment to be responsible for the wastes generated/disposed in the County. The scenarios differed in terms of requirements for processing all waste versus mandatory source separation of recyclables, which emphasizes generator responsibility versus reliance on technologies for diversion. There were also differences in selection of expanding Central Landfill versus development of a new in-county landfill. This again reemphasized the County's commitment to final disposition of the waste, but indicated some differences in whether the disposal should be at the existing site, or a new location.

SELECTION OF PREFERRED SCENARIO

Following the selection of the three final scenarios, the LTF was tasked with identifying the preferred scenario to be recommended to the County Board of Supervisors (BOS). On October 12, 2000, the LTF reached a consensus on a strategy to meet Sonoma County's solid waste management goals and needs for the planning period 2015 to 2050. The key elements of the strategy, as detailed on page one of this summary, consist of policies to direct the flow and separation of the wastes; expansion of the existing landfill to provide short to medium-term disposal capacity; and siting and development of a new facility that will combine in one location the existing green waste composting operation, a new organics processing facility, and a new landfill for long-term disposal needs.

These four elements are designed to support each other in achieving a countywide, integrated materials management strategy for the 35-year planning period that begins when the current permitted capacity of Central Landfill is reached.

The strategy elements fulfill priorities established by the LTF, as explained below:

- Fully utilize existing waste management resources and infrastructure in both the public and private sectors. This maintains local control over the costs and environmental impacts of disposal, and facilitates further development of in-county recycling collection/processing capabilities. Relevant strategy elements are Central Landfill expansion, flow control policy, and mandatory recycling policy.

- Maximize waste diversion/resource utilization at a reasonable cost on the principle of generator responsibility. This will extend the useful life of an expanded Central Landfill, while minimizing the size a new landfill in the County or need to contract with an out-of-county landfill operator for waste disposal. Relevant strategy elements are mandatory recycling and the integrated resource management facility incorporating organics processing and green waste composting.

- Complement existing and planned private sector operations for collection/processing of both refuse and recyclables. This recognizes and enhances the historically accepted role in the County that the private sector has fulfilled in providing waste management services under municipal/County licenses or franchises. Relevant strategy elements are Central Landfill expansion, flow control policy, and mandatory recycling policy.

On October 16, the Policy Advisory Committee (PAC) approved this strategy for recommendation to the Board of Supervisors.

IMPLEMENTATION TIMELINE AND GUIDELINES

The final step in the strategy development process was to prepare an implementation timeline and set of guidelines for the selected strategy. The implementation period was established as 2001 to 2014. The implementation schedule for each strategy element consists of the activities, milestones, and decision points related to securing the resources, permits, agreements and

associated actions required for strategy implementation. The parties involved in implementation activities, and their role/responsibility in the process, were also identified. For each element of the selected strategy, a description of the decision steps and activities, milestones and involved parties was prepared, along with the estimated time frame for each step. A schedule showing the interrelationships of the different scenario elements was developed to aid in short-term and long-term planning. The timeline established a total timeframe of approximately 12 years from inception to completion. This incorporates adoption of the selected policies, review and analysis by County and other agencies, and initial development of the integrated resource management facility.

CONCLUSIONS

The Solid Waste Management Alternatives Analysis Project encompassed a 13-month process that addressed scientific, economic, and political issues while integrating a diverse range of interests and concerns. The results of the study was the recommendation to implement a strategy that builds on the existing solid waste infrastructure, while recognizing that new emerging technologies can play an important role in the future solid waste management system.

Historically, solid waste management in the County has been a balanced partnership arrangement where private, for-profit firms deliver services that in part, are a response to regulatory and legislative requirements that public agencies and entities are responsible for meeting. Assuming that maintaining this partnership is necessary and desirable, commitment to maintaining County ownership and operation of landfill capacity is an important factor in the long-term strategy recommended for the County. In examining the feasibility of out-of-county disposal alternatives, the LTF balanced the issue of reduced liability and favorable long-term rates through "put or pay" arrangements versus the impact of reduced responsibility and potential disincentives for waste reduction. Ultimately, the decision was made to maintain in-county disposal capacity while upgrading the County's diversion programs and infrastructure, and thereby maintaining control over the County's waste management system. The incorporation of a County flow control policy will enable the County and cities to have control over the destination of the waste steam. This allows the County to plan for facilities to handle these wastes.

The scenario recommended by the LTF represents a long-term, integrated waste management strategy for Sonoma County. The strategy consists of a coherent combination of the most feasible and effective alternatives to assure adequate future capacity of the disposed portion of the waste stream.

SECTION 1

EXISTING SOLID WASTE CONDITIONS

WASTE MANAGEMENT INFRASTRUCTURE

The existing solid waste management system in Sonoma County includes a mix of public and private sector haulers, facilities, and facility operators. Solid waste transfer and disposal facilities are owned by the County, and serve the cities and unincorporated portions of the County. These include five transfer stations, the Central Disposal Site, and the Sonoma Compost Facility, which is located at the Central Disposal Site. The County system is managed by the Sonoma County Integrated Waste Division of the Department of Transportation and Public Works. The locations of the existing solid waste facilities in the County are indicated on Exhibit 1. A brief description of the landfill and compost operation is provided below, and data on the transfer stations are included in Table 1.

Central Landfill

The Central Landfill, within the Central Disposal Site, is the only operating landfill within Sonoma County. The landfill is owned by the County, and is permitted to accept up to 2,500 tons per day (tpd) of non-hazardous municipal solid waste, including residential and commercial wastes, agricultural and demolition wastes, and wastewater treatment plant sludge. Presently, only wastes from within the County are disposed at the facility. In 1999, the average daily tonnage was 1,300 tons, and the landfill accepted a total of 480,000 tons. The Disposal Site also includes the recycling facility operated by Garbage Reincarnation, Inc. Known as Recycletown, this facility collects and stores recyclables and reusable items for resale to the general public.

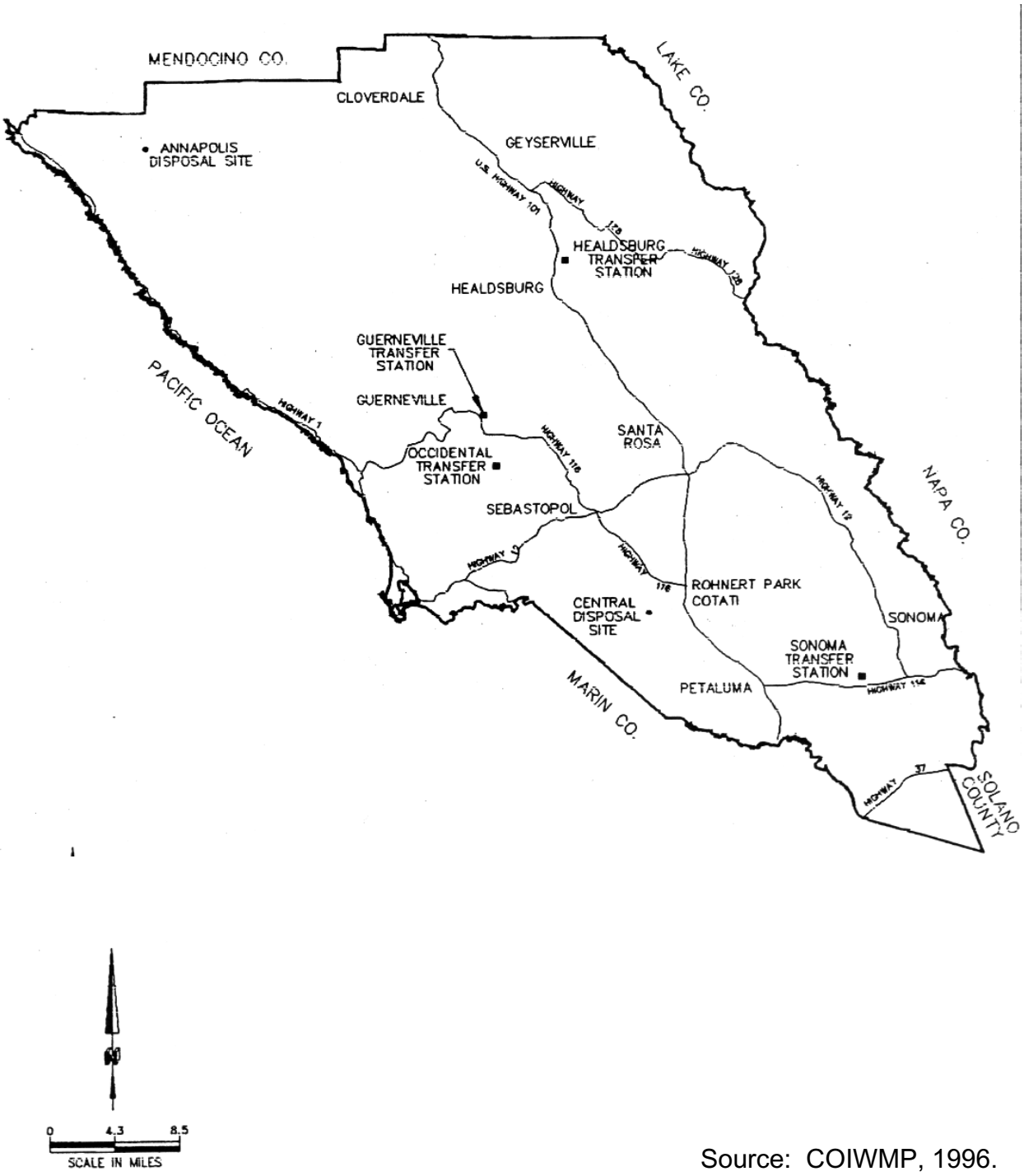
In 1998, the County approved an expansion plan for the landfill, which includes over 3,000,000 tons of additional capacity. This additional capacity will allow the landfill to remain open until 2015. The expansion plan includes reconfiguration of the recycling and self-haul drop-off areas. At the present rate of use, the site is scheduled to reach capacity in 2015.

Sonoma Compost Facility

The Sonoma Compost Facility is located at the Central Disposal Site. The facility is operated by Sonoma Compost Company on land owned by the County. The facility is permitted to take in 300 tpd. In 1999, 55,300 tons were delivered to the compost site for diversion. Incoming green material and wood are accepted from commercial haulers and self-haulers. There are four products sold at the site: path mulch (wood only), compost, screened mulch, and unscreened mulch (all from yard waste). The finished product is sold directly to the public.

Transfer Stations

All five transfer stations are owned by the County and operated by West Sonoma County Disposal, Inc. A brief description of each facility is provided in Table 1.



Source: COIWMP, 1996.

Exhibit 1. Sonoma County Landfill and Transfer Stations.

Table 1. Sonoma County Transfer Facilities

FACILITY NAME	CAPACITY/THROUGHPUT			SERVICE AREA	FEATURES
	PERMITTED (TONS PER DAY)	1998 AVERAGE (TONS PER DAY)	1998 TOTAL (TONS)		
Annapolis	50 tons per day	10.1 tons	2,300 tons	• Northwest Unincorporated County • Community of Annapolis • Community of Sea Ranch	• Recycle area • Yard debris/wood waste processing area
Guerneville	85 tons per day	53.8 tons	19,300 tons	• Russian River Area Unincorporated County • Community of Guerneville • Community of Monte Rio	• Recycle area • Yard debris/wood waste processing area
Healdsburg	450 tons per day	199.2 tons	71,500 tons	• Northern Unincorporated County • City of Cloverdale • City of Healdsburg • Town of Windsor • Community of Geyserville	• Recycle area • Yard debris/wood waste processing area
Occidental	60 tons per day	10.6 tons	2,700 tons	• Limited Western Unincorporated County • Community of Occidental	• Limited recycle area
Sonoma	380 tons per day	209.8 tons	75,330 tons	• Southeast Unincorporated County • City of Sonoma	• Recycle area • Yard debris/wood waste processing area

PUBLIC AND PRIVATE SECTOR ROLES/RESPONSIBILITIES

As discussed earlier, the County owns all of the existing solid waste transfer and disposal facilities. The County manages the unincorporated County portion of the solid waste stream through licensed haulers who collect and dispose of solid waste in the unincorporated areas of the County. Through an ordinance adopted in February 1999, the County required the licensed haulers serving the unincorporated areas to commit to deliver refuse and yard debris to the County disposal sites. The County has licensed eight haulers, which are assigned specific territories within the unincorporated areas. The collector service areas and the license expiration dates are indicated in Table 2.

All of the incorporated cities have agreements with private companies for exclusive collection of residential refuse. A summary of franchise agreements in the incorporated cities is included in Table 3. The terms of the service agreements between individual cities and haulers vary. Only Windsor, Healdsburg, and Santa Rosa include contractual arrangements to control waste disposal. Cotati has an informal agreement with its hauler, Larry's Sanitary Service, owned by Waste Management, Inc. (WMI), to deliver wastes to the County's facilities. Commercial refuse is collected through exclusive and non-exclusive agreements between the individual city and their collector, depending on the jurisdiction.

WASTE GENERATION AND FLOW

Solid waste is generated from a mix of residential, commercial, and industrial sources in the County. It is estimated that, in 1999, approximately 790,000 tons of solid waste were generated in the County. Thirty-nine percent of the solid waste generated in the County was diverted from landfilling through recycling, composting, and other waste diversion methods. Nearly all of the remainder of the wastestream was disposed at the Central Landfill, with a small portion disposed out of the County.

The County transfer facilities and Central Landfill receive wastes from the unincorporated areas and incorporated cities via franchised haulers, via licensed haulers serving the unincorporated and commercial areas of the County, and by self-haul. The amount of wastes received at each facility, and relative percent of the total waste disposed during 1998, is indicated in Table 4.

The flow of waste in the County is dependent for the most part on geographical considerations. A graphical depiction of where wastes originate and the transfer/disposal facilities to which they are taken is included as Exhibit 2. Recent factors have affected the flow of waste within and, to a small extent, out of the County. The traffic conditions on Highway 101 have caused some haulers to use facilities that are not necessarily the closest in terms of mileage, but require shorter driving times. For example, a portion of waste collected in Petaluma is now taken to the Sonoma Transfer Station, instead of directly to the Central Landfill. Similarly, some waste in areas north of Highway 12 are being transferred north to Healdsburg Transfer Station, instead of being transported south along the 101 corridor.

Table 2. Unincorporated County Area Licensed Haulers Service Areas and Terms

SERVICE AREA	HAULER	EXPIRATION DATES	FLOW CONTROL
North Central County	Cloverdale Disposal	May 19, 2004	Yes
East County	Empire Waste Management (WMI)	June 17, 2008	Yes
North West-Central County	Industrial Carting	August 26, 2006	Yes
South West County	Larry's Sanitary Disposal (WMI)	December 20, 2006	Yes
North Coastal County	Pacific Coast Disposal	April 22, 2007	Yes
Near City of Sonoma	Sonoma Garbage Collector	June 24, 2008	Yes
West Central County	Sunrise Garbage Service	April 22, 2007	Yes
West South-Central County	West Sonoma County Disposal	April 22, 2007	Yes

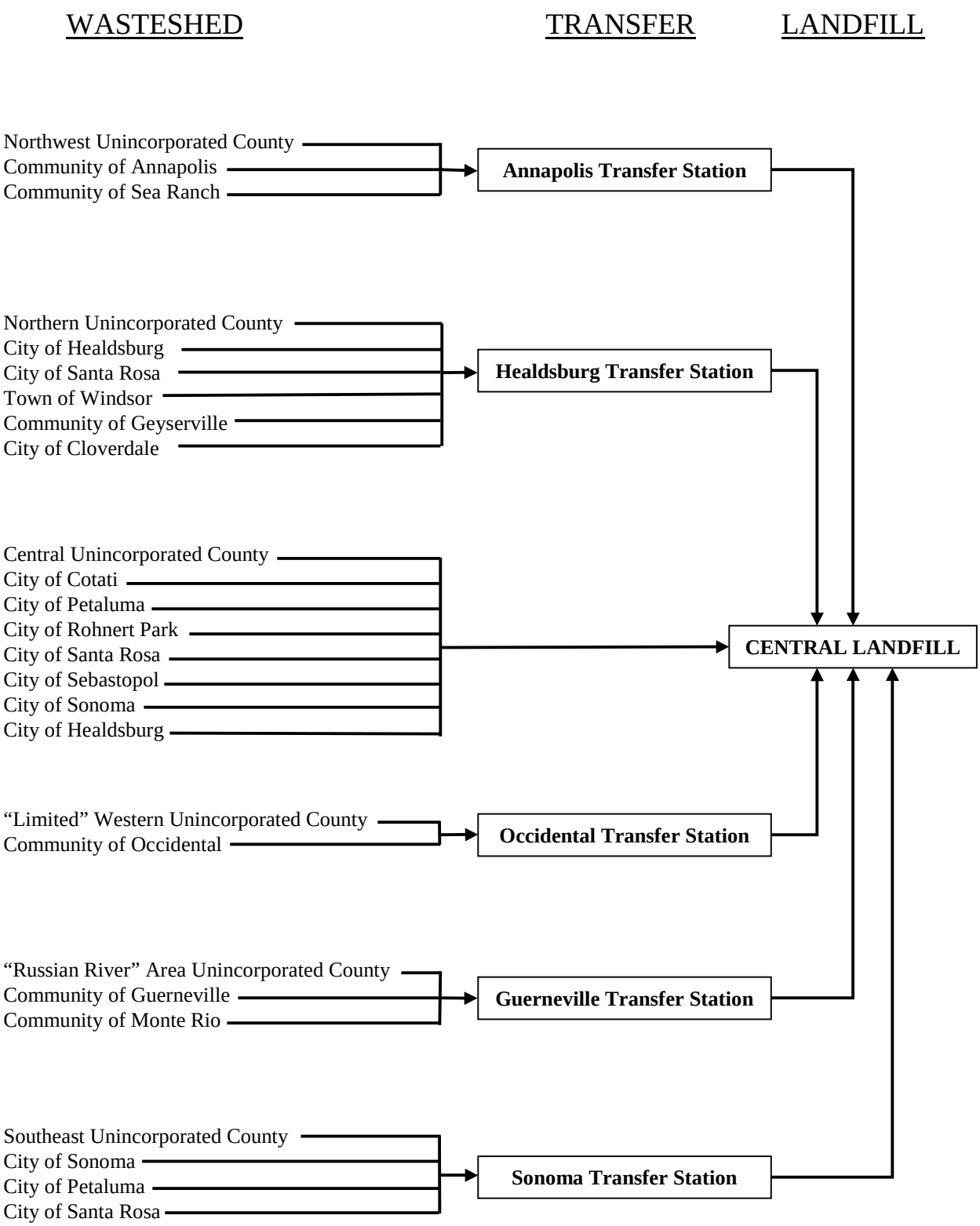
Table 3. Incorporated City Franchise Agreements

CITY	HAULER	EXPIRATION DATE	FLOW CONTROL
Healdsburg	Empire Waste Management (WMI)	July 2000	Yes
Rohnert Park	Empire Waste Management (WMI)	June 2001	No
Sebastopol	Larry's Sanitary Service	November, 2008	No
Town of Windsor	West Sonoma County Disposal	December 2008	Yes
Santa Rosa	Empire Waste Management (WMI)	February 2006	Yes
Cloverdale	Cloverdale Disposal	November 1998 (10 year evergreen)	No
Cotati	Larry's Sanitary Service	June 2005	Yes (informal agreement)
Petaluma	Empire Waste Management (WMI)	June 2004	No
Sonoma	Sonoma Garbage Collector	May 2007	Yes

Table 4. Geographical Distribution of In-County Waste Disposal

DISPOSAL LOCATION	1998 TONNAGE	% OF TOTAL
Annapolis Transfer Station	2,300	0.5%
Guerneville Transfer Station	19,300	4.2%
Healdsburg Transfer Station	71,500	15.6%
Sonoma Transfer Station	75,330	16.4%
Occidental Transfer Station	2,700	0.6%
Transferred Total	*171,130*	37.3%
Central Landfill - Direct Haul	287,470	62.7%
Total Disposed at Central LF	**458,600**	**100%**

Exhibit 2. Current Waste Stream Configuration



Source: 1998 Source Tonnage Report, Refuse Disposal Information System, Sonoma County

The consolidation of hauling companies is another factor affecting not only the flow of waste, but service options and choices for the cities. In the case of Petaluma, a portion of this waste is now being transported outside the County for disposal at the Redwood Landfill in Marin County, which is owned and operated by WMI. Empire Waste, Petaluma's franchised hauler, is a subsidiary of WMI.

The five transfer stations and Central Landfill receive waste generated from within the County only. No municipal solid waste (MSW) is presently imported from outside Sonoma County to these sites. As indicated above, a small portion of MSW was disposed out of the County at the Redwood Landfill in Marin County.

The amount of waste that is brought to the facilities for disposal is not tracked by the jurisdiction of origin on a regular basis. Therefore, in order to estimate the quantity of wastes disposed by each jurisdiction, an estimate was made based on the percent of the County population in each jurisdiction, and in the unincorporated County areas. These data are included in Exhibit 2. As indicated, the unincorporated areas account for the largest percentage of disposed waste (34.7%), and the City of Santa Rosa accounts for the largest percentage of the incorporated cities.

Waste Generation by Sector

Waste generated in the County comes from the residential, commercial, or mixed residential/commercial sectors. According to the 1996 Waste Characterization Study (conducted by Cascadia Consulting Group in May 1996), the residential sector accounts for the largest single percentage of waste in the county (39%). A breakdown of the sectors and their respective percentages of wastes is included as Exhibit 3. As indicated in Exhibit 3, the self-haul portion of the waste stream represents over 20% of the waste stream. It is also a large portion of the incoming wastes at Central Landfill. This attribute of the existing solid waste system is important in terms of future planning for disposal and transfer capacities, and policies regarding voluntary or mandatory collection service, particularly in the unincorporated areas.

Material Types and Quantities

The quantities and types of materials disposed in the County are an important aspect of planning for future disposal needs. By knowing what types and quantities of materials are presently disposed, the County can identify and plan the appropriate facilities and programs to divert and dispose of these materials. The countywide waste characterization information is presented in Exhibit 4.

According to the most recent waste characterization study of disposed waste in the County, organic materials accounted for approximately 40% of the disposed waste stream. Although a greenwaste composting program operates throughout the County, the organic category includes materials other than green waste for which disposal or diversion alternatives must be identified in the long-term planning period.

Exhibit 3 (Solid Waste Disposal Quantities by Sector)

Exhibit 4 (County Disposal Waste Characterization)

RECYCLING PROGRAMS AND WASTE DIVERSION FACILITIES

For the public sector, Sonoma County and the incorporated jurisdictions have implemented many programs and policies for recycling, composting, and other diversion efforts. Countywide, according to the 1999 AB 939 Annual Report prepared by the Sonoma County Waste Management Agency, these efforts have resulted in a 39% diversion rate. This rate is calculated based on the quantity of material disposed in 1990 compared to the amount disposed in 1999. The County and jurisdictions continue to identify and implement diversion programs, and are working together on the LTF Diversion Program Recommendations, which has established a list of program recommendations and assigns responsibilities and schedules for implementation.

In the private sector, recyclables are collected by local haulers, drop-off/buy-back operations, and material reuse/recovery programs. Garbage Reincarnation, Inc., operates recycling facilities at the Healdsburg Transfer Station and at Central Landfill. Both facilities are used for collection and re-sale of recyclables and reusables to the general public. The existing Healdsburg operation is at capacity, and there is little, if any, room for expansion.

West Sonoma County Disposal operates small recyclables processing facilities in Petaluma and Santa Rosa. The facilities process approximately 4,000 tons per month (75% at the Santa Rosa location), or an estimated 48,000 tons per year. Empire Waste Management, Larry's Sanitary Service, and Cloverdale Disposal Service (WMI) operate residential and commercial recycling programs, and process the recyclable materials at WMI's Intermediate Processing Center in Santa Rosa. In 1998, the programs operated by WMI collected approximately 46,000 tons of recyclables in the County. Sonoma Garbage Collector collects recyclables from the residential and commercial sectors. In 1998, Sonoma Garbage collected approximately 2,000 tons of recyclables. The company also conducts recycling activities at the Sonoma Transfer Station.

A few companies, including Industrial Carting and West Coast Metals, conduct other commercial recycling. Recyclables collected in the County are transported to larger facilities outside the County, and are sold to both domestic and overseas end-use markets.

REGIONAL CONSIDERATIONS

As part of the background information for this Solid Waste Management Alternatives Analysis Project, SCS conducted a general assessment of the solid waste systems in the surrounding counties. This information was gathered to assess the existing regional solid waste disposal, transfer, and recycling facilities. The information will be used in identifying potential options outside of Sonoma County for future solid waste disposal and diversion.

The counties that impact, or are impacted by, Sonoma County in relation to solid waste management include Napa, Marin, Mendocino, Solano, and San Francisco. A list of the disposal facilities in these counties is included as Table 5, along with their expected closure date and permitted daily capacity. The data in this table suggest that the surrounding counties have, or have arranged for, adequate disposal capacity for the next 30 to 40 years. Both Napa and San Francisco Counties export all of their waste out of the county. Although previously Napa's waste was rail hauled out of state, the Napa-Vallejo Waste Management Authority voted to

Table 5. Regional Solid Waste Disposal Facilities

DISPOSAL FACILITY	DISPOSAL SITE LOCATION	CLOSURE DATE	PERMIT (TPD)	CURRENT DISPOSAL (TPD)
Altamont Landfill	Alameda County	2029	11,150	7,000
Keller Canyon Landfill	Contra Costa County	2040-2070	2,750	2,150
Potrero Hills Landfill	Solano County	2015-2063	4,330	1,500
Redwood Sanitary Landfill	Marin County	2039	1,290	1,280
Roosevelt Regional Landfill	Roosevelt, WA	2034	10,000	4,110
East Carbon Landfill	Carbon, UT	2040	25,000	3,200

curtail rail haul to Roosevelt Landfill in Washington, and starting in March 2000, wastes were to be trucked to Keller Canyon Landfill in Contra Costa County. San Francisco City/County does not have any active landfills, and nearly all of the waste is disposed at the Altamont Landfill in Alameda County. This landfill obtained approval in 2000 for a scaled-back expansion, which will extend the life of the facility to approximately 2029.

Also important in terms of regional considerations are transfer stations/MRFs and composting facilities in the surrounding counties. A list of the major existing and proposed facilities is included in Table 6.

In examining the feasibility of out-of-county disposal alternatives, the County is likely to assess privately owned and operated landfills. Typically, such landfills may offer favorable rates over the long term if there is an ability or willingness to deliver tonnage within a specified range, or to pay for such tonnage even if the actual quantities are less. Such "put or pay" arrangements offer the landfill operator a reliable cash flow. For the generator, though, these arrangements can act as a disincentive for waste reduction. Indeed, from the County's perspective, decreasing the amount of refuse transported out-of-county may be viewed favorably, because it would decrease disposal costs and maximize diversion. Thus, maintaining in-county disposal capacity, and upgrading the County's diversion programs and infrastructure, is closely linked to maintaining some measure of control over the County's waste management system.

The existence of flow control arrangements in franchised hauling waste agreements in the incorporated cities, along with provisions for licensed haulers operating in the unincorporated County areas, enables the cities and County to have some control over the destination of the waste steam. Assuming that these arrangements will be maintained throughout the planning period, as well as future similar arrangements in other incorporated cities, the County can plan for facilities to handle these wastes. Without such arrangements, and the coordination and understandings that support them, facility planning on a countywide level becomes difficult, because the County and jurisdictions would not be cooperating in directing the flow of waste generated in the County. Instead, each jurisdiction, as well as the County, could conceivably undertake contractual agreements with haulers that would direct waste to several disposal sites, thus undermining the effort to plan for the integrated management of the County's total waste stream.

Table 6. Regional Recycling and Composting Facilities (outside Sonoma County)

FACILITY	LOCATION	TYPE	REGULATORY STATUS	OPERATIONAL STATUS	PERMITTED THROUGHPUT (TPD)	CURRENT THROUGHPUT (TPD)
Marin Sanitary Service Transfer Station	Marin County	MRF	Permitted	Active	2,640	500-600
Redwood L.F., Biosolids Co-Composting		Composting Facility (Other)	Permitted	Active	1,000	200
Redwood Sanitary Landfill		Composting Facility (GW)	Permitted	Active	10,000 yd^3 *	5,000 yd^3*
Cold Creek Compost, Inc.	Mendocino County	Composting Facility (Mixed)	Permitted	Active	200	100
Devlin Road TS	Napa County	Lg. Vol. Transfer/Proc. Fac.	Permitted	Active	1,440	600
Napa Garbage Service MRF		MRF	Permitted	Active	360	64
Napa Garbage Service Composting Facility		Composting Facility (GW)	Permitted	Active	200	50 - 100
Upper Valley Recycling and Disposal Service		Composting Operation (GW)	Permitted	Active	17,500 tpy**	13,500 tpy**
SF Solid Waste Transfer & Recycling Center	San Francisco County	Lg. Vol. Transfer/Proc. Fac.	Permitted	Active	5,000	2,000
Goodyear Road Compost Facility	Solano County	Composting Facility (GW)	Permitted	Active	30,000 yd^3 *	10,000 yd^3 *
Potrero Hills Compost Facility		Composting Facility (GW)	Permitted	Active	60,000 yd^3 *	7,000 yd^3 *

Notes:

* Total quantity allowed/stored on site at any one time. Quantities are estimates only.
** Facility operates seasonally only during the grape harvest. Amounts are for the entire season.
TS – Transfer Station
MRF – Materials Recovery Facility
GW – Green Waste

SECTION 2

WASTE GENERATION PROJECTIONS

The projection of how much waste will be generated in the County in the planning period 2015 to 2050 is based on two key variables: the assumed population growth rate and the assumed diversion rate.

POPULATION GROWTH RATE

Three different population growth estimates were reviewed for this study: the Sonoma County General Plan; the California State Department of Finance; and the Association of Bay Area Governments (ABAG). The ABAG projection was eliminated from further analysis, as it was felt that this projection did not accurately reflect the anticipated growth in the County. A comparison of the population estimates is shown on Exhibit 5. As indicated, the Department of Finance data show the greatest population growth for the County, while the County General Plan extrapolation shows a slower population growth rate. The population estimates prepared by these agencies are based on historic growth patterns, adopted plans and policies, and infrastructure assumptions, including regional wastewater system capacity and transportation capacity in the Highway 101 corridor. The County General Plan policies are geared toward ensuring that adequate public services and infrastructure are available to serve the projected population. In order to account for adopted urban growth limits and other measures that may impact the quantity of wastes generated in the County, the population projections from both the County General Plan and Department of Finance were adjusted downwards. Therefore, beginning in 2011 and through the end of the project planning period (2050), the population growth rates were reduced by 50%. Comparisons of the original and adjusted population growth projections are shown on Exhibit 5. The resulting population projections are indicated on Table 7, presented in 5-year increments for the project planning period 2015 to 2050.

DIVERSION RATE

Presently, approximately 39% of the County's waste stream is diverted through existing source reduction, recycling, and composting programs. Based on a review of the existing and planned programs, it was determined that the diversion rate will rise over the next 5 years at a rate of approximately 1.5% per year, to a maximum of 50% diversion in the year 2005. For purposes of the project, it was then determined that the diversion rate would remain constant at 50% through the remainder of the planning period. The waste generation projections for the planning period 2015 to 2050 are indicated on Table 7. As indicated, total waste generation increases in relation to the projected population growth. It should be emphasized that the model does not assume an increase in the per capita waste generation rate. Factors that may affect this rate, such as societal trends, changes in packaging and distribution technology, or overall economic growth, are too variable to predict within the scope of this study. The adjustment in the population growth is

Exhibit 5 (Population Estimates)

Table 7 (Future Solid Waste Generation Projections)

assumed to provide adequate compensation for any likely increase in the per capita waste generation rate.

From Table 7, it can be concluded that the effect of utilizing a range of population projections does not greatly impact the quantity of waste projected to be generated in the County. In fact, the difference is less than 2%. By 2050, the total quantity of waste generated in the County will range from 30 to 31% higher than the 1998 quantity of waste generated. The quantity of material requiring disposal through landfilling and/or an alternative disposal technology or facility will range from 568,000 tons to 573,000 tons in 2050. This is approximately 90,000 to 94,000 tons, or 16% greater than the 1998 disposal tonnage.

WASTE TYPES

Another critical factor in the development of waste generation projections is the identification of the types of wastes to be generated and, relative to this, the types of wastes to be diverted and disposed. This information is vital for determining what kinds of disposal options will be applicable to the County wastestream in the planning period. At this point, it is assumed the wastestream components identified in the County's waste characterization study will remain constant over the planning period. However, as new information becomes available, it may be necessary to revise the projections of waste stream types and quantities for the planning period.

Based on the projections, the "other organic" portion of the disposed waste stream accounts for the greatest percentage of wastes that will require management in the future planning period. This material type includes food, yard and landscape materials, wood, manures, and textiles. Paper is another major portion of the waste stream.

One effect of an increase in population will be increases in employment opportunities to meet the needs of a larger population. Accompanying this may be a shift in the employment type. Some projections indicate a shift from resource production to "new technology" industries, retail trade, and service jobs. Despite this statistical trend towards new technology employment, the existing agricultural industries in the County are projected to continue to be a major factor in the County's economy. Recent local waste characterization studies conducted in the Silicon Valley area and national studies conducted by the U.S. EPA do not indicate a dramatic change in waste types as a result of shifts in employment. Therefore, employment trends are not anticipated to significantly impact the waste stream characteristics in the County.

WASTE GENERATION BY SECTOR

Waste generated in the County comes from the residential, commercial, or mixed residential/commercial sectors. According to the County's 1996 Waste Characterization Study, the residential sector accounts for the largest single percentage of waste in the County (39 %). It is assumed that this breakdown will remain the same during the planning period. This assumption is based on the General Plan projection that additional job opportunities will be provided in the County to meet the needs of a larger population. Similarly, some residents will continue to work elsewhere in the Bay Area.

The projected sources of solid waste are important in terms of future planning for disposal and transfer capacities, the location and size of facilities, and policies regarding voluntary or mandatory collection service, particularly in the unincorporated areas. The County General Plan projects an increase in the percentage of the population that lives in the incorporated cities. According to the General Plan, the nine cities will contain approximately 68 percent of the population by 2005. This factor will significantly affect the quantity of waste that is controlled by franchised agreements in the incorporated cities. As discussed in Section 1, some franchise agreements include arrangements for flow control. This enables the cities to designate where the waste will be disposed. The quantity of wastes that are controlled through these types of arrangements is important when planning for future, long-term disposal options. Typically, a decision whether to site a new facility, expand an existing one, or enter into contractual arrangement for disposal includes estimates of the quantity of material to be handled or contracted. Therefore, it is imperative to accurately account for the quantity of wastes that will be included in the long-range planning process.

SOLID WASTE FACILITIES

Sonoma County Facilities

The Central Landfill will reach its permitted capacity in 2015. At that time, the County will have the opportunity to either expand or terminate the operations at the site, including the compost operation and Recycletown. Another possibility for continuing use of the site may be the siting of a large regional transfer station/materials recovery facility (MRF).

Presently, the County transfer stations adequately serve the existing waste management system. Two of the transfer stations, Healdsburg and Sonoma, receive 86% of the total disposed tonnage that moves through the transfer station system. This suggests that any growth in either the residential or commercial sectors in the areas served by those facilities may require upgrading or expansion of the transfer or recycling opportunities at these transfer stations. Similarly, changes in transportation access, particularly along the Highway 101 corridor, will affect the potential use of individual transfer stations. Furthermore, continued operations at the other County transfer stations will be evaluated, in light of decisions made regarding disposal options.

Regional Facilities

As part of the background information for this Solid Waste Management Alternatives Analysis Project, information was gathered on the future capacities and plans for regional solid waste disposal, transfer, and recycling facilities. This information was used to identify potential options outside of Sonoma County for future solid waste disposal and diversion. Disposal facilities in these counties that may be considered for use by the County in the alternatives analysis are listed on Table 5. Data in this table include the expected closure date and permitted daily capacity, suggesting that there is available disposal capacity in the region surrounding Sonoma County for the next 30 to 40 years.

Also important in terms of regional considerations are transfer stations/MRFs and composting facilities in the surrounding counties. A list of the major existing and proposed facilities that have potential capacity to handle a portion of the Sonoma County wastestream in the future planning period is included in Table 6. Again, capacity may be available at these facilities for consideration by the County in the alternatives analysis.

SECTION 3

IDENTIFICATION AND REVIEW OF ALTERNATIVES

The alternatives that are selected for implementation in the County are designed to contribute to long-term stability and flexibility, and to provide cost-effective and efficient services and programs, environmental protection, and improvements to the waste management infrastructure.

Because the integrated waste management strategy being developed through the Solid Waste Management Alternatives Analysis project will be implemented in the planning period from 2015 to 2050, a number of inherent assumptions in developing and evaluating the proposed alternatives were established, as outlined below:

- Large-scale facilities require longer lead time for design, permitting, and construction; therefore, the impact of timing must be considered in the evaluation and selection process.

- The countywide diversion rate will reach a maximum of 50% by the year 2005. Diversion programs and policies currently under development and consideration by the LTF will contribute to the 50% diversion rate by 2005.

- New solid waste management policies and programs will be implemented between 2000 and 2015, prior to the beginning of the Alternatives Project planning period. This will further impact the types of programs and policies evaluated and selected as part of this project.

The proposed alternatives were grouped under the general headings of:

- Program and Policy Options.
- Alternative Technologies.
- Landfill Alternatives.

Each of the proposed alternatives, including the major features and characteristics, target material types and quantities (as applicable), and other relevant comments, is described on the following pages.

CATEGORY: Supporting Program and Policies

TITLE: Mandatory refuse/recycling service for single-family residences in County unincorporated areas.

MAJOR FEATURES AND CHARACTERISTICS: Designated households currently not receiving regular, weekly refuse/recycling service, including separate yard waste collection, would have such service through exclusive franchise agreements arranged by the County's Transportation and Public Works Department.

The targeted households would be charged for the service regardless of whether or not it is used. Franchise agreements for the County unincorporated areas could use jurisdictional agreements as models for appropriate language, terms, conditions, service standards, payment formulas, and other relevant content.

The alternative could also include not accepting normally generated quantities of residential refuse, recyclables, or yard waste at the five transfer stations or Central Landfill. Larger quantities of refuse or yard waste would continue to be accepted at Central Landfill, along with wood waste, appliances, tires, and items typically directed to Recycletown, such as toilets, furniture, clothing, mattresses, and books.

TARGETED MATERIALS: Residential refuse, yard waste, newspapers, cardboard, magazines, office paper (white and colored), scrap paper, glass containers, tin cans, aluminum cans, scrap metals.

COMMENTS: Presently, about one half of the 55,000 households in the County unincorporated areas do not have regular, weekly curbside collection of refuse, recyclables, or yard waste. These households transport materials to one of the six disposal sites in the County. The alternative is intended to provide more direct management of the targeted wastestream, particularly for purposes of waste diversion. The alternative would extend the basic waste collection and diversion program options found in the jurisdictions to the County unincorporated areas, thus promoting consistency in service standards and levels for the single-family residential sector throughout the County.

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CATEGORY: Supporting Program and Policies

TITLE: Mandatory source separation of recyclables from residential, commercial, industrial, and institutional waste generators.

MAJOR FEATURES AND CHARACTERISTICS: Residential, commercial, industrial, and institutional generators would be required to keep all recyclables out of the waste stream. The requirement could come through enactment of ordinances by the cities and County, prohibiting recyclables to be mixed with disposed wastes.

TARGETED MATERIALS: Residential, commercial, industrial, and institutional recyclables, including yard waste, newspapers, cardboard, magazines, office paper (white and colored), scrap paper, glass containers, tin cans, aluminum cans, scrap metals.

COMMENTS: The alternative places an emphasis on recycling any secondary material that can be easily and economically recycled. The alternative could also include penalties for placement of recyclables in disposed wastes.

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CATEGORY: Supporting Program and Policies

TITLE: Processing of all generated waste prior to disposal.

MAJOR FEATURES AND CHARACTERISTICS: This policy is intended to be a primary principle for waste management activities in the County conducted by both the public and private sectors. The purpose is to take advantage of current and emerging technologies for recovering reusable or recyclable materials to minimize the quantity/volume of refuse to be disposed. There may be one or more facilities located in and/or out of the County to accomplish the above-stated purpose. Regardless, all waste generated in-county would be directed through different processing operations, depending on the nature of the waste materials. Some of these operations may be ongoing, while others would have to be identified or constructed. From a planning perspective, the wastestream may be divided into sub-wastestream components to insure that processing capability is available.

TARGETED MATERIALS: All waste generated in the County.

COMMENTS: The operational requirements of this policy necessitate a review of current and anticipated private sector materials processing infrastructure to determine what portions of the wastestream can be handled through existing processing sites, and what needs there are for expanded or additional processing capability (for example, see MRF alternative).

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CATEGORY: Supporting Program and Policies

TITLE: Common waste service contractual language and flow control authority for the Sonoma County Waste Management Agency (SCWMA).

MAJOR FEATURES AND CHARACTERISTICS: To cost effectively increase waste diversion and undertake the most economically beneficial waste disposal alternative(s), the County and jurisdictions must be in the strongest "bargaining position" possible. This is accomplished by cooperative control over the flow of waste within the County, as is now achieved in part with "flow control" provisions in franchise agreements.

This alternative proposes adoption by the County and jurisdictions of common terms and stipulations for all new, renewed, or extended refuse service franchises/contracts. Such terms and stipulations would direct the flow of disposed waste to one or more disposal sites as cooperatively designated by the County and jurisdictions.

TARGETED MATERIALS: All disposed waste.

COMMENTS: This alternative may require an amendment to the Joint Powers Authority between the County and jurisdictions to direct the flow of disposed waste as deemed appropriate and desirable. The amendment would also empower the JPA to enter into a contractual arrangement with a public or private entity for the disposal of waste generated in the County.

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CATEGORY: Supporting Program and Policies

TITLE: Strategy to support end-users of recyclables in the County.

MAJOR FEATURES AND CHARACTERISTICS: A mixture of economic and institutional incentives can be formulated to facilitate the location of one or more businesses/industries that utilize recyclable materials. Incentives that could comprise a locally based market development strategy include provision of public land for siting a manufacturing/production plant, low-interest or no-interest loans, tax abatements, shared risk financing arrangements, zoning and permitting assistance, and other similar instruments.

Potential end-use industry targets could be a major facility such as a paper mill or a group of smaller scale entrepreneurial reuse and remanufacturing operations clustered together in close proximity to create a "business park" environment similar to the one being developed in Berkeley, California. Part of the end-user support strategy could be to expand in-county utilization of materials that already have some markets, such as the agricultural application of compost and other products derived from the processing of yard or wood waste.

TARGETED MATERIALS: To be determined.

COMMENTS: Determining which materials to target for market development may be based on the waste generation forecasts covering the period 2015 through 2050.

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CATEGORY: Alternative Technology

TITLE: MSW composting.

MAJOR FEATURES AND CHARACTERISTICS: MSW composting involves the decomposition of large organic molecules through the action of microorganisms and higher order invertebrates. The two major approaches are aerobic, which uses oxygen, and anaerobic, which does not.

The essential operational characteristics for effective composting include:

- Achieving and maintaining elevated temperatures so that the proper microorganisms can thrive and accomplish decomposition.
- Aeration (for aerobic systems) of the material to prevent growth of anaerobic organisms.
- Adequate residence time to achieve compost maturity as measured by stabilization of the compost process and the proper carbon/nitrogen ratio.

The primary objective is to produce an evenly and thoroughly composted material, and to assure complete destruction of weed seeds and pathogens.

Composting includes both enclosed (in-vessel) and open systems. Open systems commonly use windrows that can either be static piles with forced aeration, or piles that are turned to expose the material to air. In-vessel systems, though higher capital cost, provide the best physical and biological control of the composting process.

Another form of composting, called vermicomposting, uses worms to digest organic materials. Organic material is converted into worm biomass and feces, which can be readily separated from inert residue. An advantage of vermicomposting is that the worms will not ingest inert or contaminated material, so that the final compost product is very fine and high quality.

TARGET MATERIALS: Composting systems receive and process the organic fraction of MSW. This fraction can be delivered in different forms:

- Unsegregated MSW, without any previous source separation of recyclable or undesirable (e.g., household hazardous wastes) materials.
- After source separation of recyclable or undesirable materials.
- The wet (organic) fraction from a wet-dry collection system.
- Source-separated organics.

The most compatible materials for MSW composting are food waste, greenwaste, woody material, paper, and other organics. Approximately 59% of the generated wastestream would be compatible feedstock for MSW composting.

COMMENTS: Products include primarily soil amendments used in agriculture or landscaping. The quality of the compost is sensitive to both the process and the degree to which undesirable material has been excluded from the waste. A wastestream with an industrial component, or one in which household hazardous wastes have not been separated, can result in contaminated compost. MSW composting is fully commercialized and widely implemented, especially in Europe.

A primary problem faced by compost facilities is odor. Decomposition always generates odor, and many facilities have been shut down due to odor problems. It has been demonstrated that compost facilities can be operated with a minimum of off-site odor, but this requires good implementation of both technology and management. With in-vessel systems, the exhaust air can be more easily cleaned, thus eliminating odors.

Composting is a net consumer of energy, since it produces no energy in a usable form to offset the process energy. Also, if the feedstock includes hazardous materials, they could end up as contaminants in the final compost, although this concern is reduced if the composting system is anaerobic.

Different sources conflict over comparative emissions of carbon from composting versus anaerobic digestion. Composting is thought to generate somewhat less global warming gases than landfilling due to the avoidance of methane emissions; however, this is offset by the fact that woody material does not degrade fully in a landfill, thereby sequestering carbon. Greenhouse gas emissions from composting are approximately the same as incineration. An additional benefit of diverting organic materials is the reduction in landfill gas and leachate caused when they are landfilled.

Programs needed to support this alternative may include front-end separation and increased support and use of household hazardous waste collection programs.

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CATEGORY: Alternative Technologies

TYPE: Anaerobic digestion.

MAJOR FEATURES AND CHARACTERISTICS: Digestion entails the breakdown of large organic molecules through the action of microorganisms. The process occurs in the absence of oxygen facilitated by containing it in an airtight vessel, called a reactor or digester. A different set of microorganisms is involved than occurs in aerobic composting.

Several different digester technologies have been implemented. Most common are cylindrical vessels with a vertical or horizontal turbine to mix and move the material. Following the anaerobic process, the solids may be cured in standard composting type systems.

The digestion process occurs through the combined action of a consortium of various microorganisms, which attack organic molecules at different stages in the breakdown, and under different environmental conditions.

TARGET MATERIALS: Anaerobic digestion targets the same materials as MSW composting. Approximately 59% of the generated wastestream would be compatible feedstock for digestion.

COMMENTS: The useful products of anaerobic digestion include biogas-methane (between 50% and 60% of the product) and carbon dioxide. It can also produce a stabilized compost product.

Anaerobic digestion has several advantages over aerobic digestion, or composting:

- A high degree of reduction of organic matter is achieved with a relatively small amount of bacterial biomass.
- The biogas produced can be used as an energy source.
- Reduction of xenobiotic compounds by direct or co-metabolic processes.

Also, the solid end product of anaerobic digestion (digestate) can be matured into a compost product, which is reported to have higher nitrogen content than compost, since ammonia is not consumed in the process. However, more thorough testing is required.

Anaerobic digestion of wastes entails creating and managing a microbial ecological system. As such, it is highly sensitive to the feedstock and a variety of environmental factors. Mixed solid wastes can be difficult to digest, due to their heterogeneity and toxic chemicals (xenobiotics).

The process is fully commercialized in use for sewage sludge, livestock or agricultural waste, and, less commonly, for food waste. A substantially greater capital investment is required than for composting, but the net costs per ton are approximately the same, and about half those of incineration.

Treatment of MSW is a relatively new application of the technology, and poses special considerations. There are over 115 full-scale plants digesting MSW worldwide in operation or under construction, with 5 million tons of installed capacity. In the United States, new firms are arising with the intent to commercialize anaerobic systems.

From an environmental perspective, since all gases are contained in anaerobic digestion, they are available for use and are not emitted into the atmosphere. In addition, biogas can reduce society's dependency on fossil fuels. The biomass contained in MSW was, for the most part, originally produced by photosynthesis of carbon dioxide from the atmosphere. Its return to the atmosphere from the combustion of MSW-generated biogas does not therefore add a net atmospheric carbon load.

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CATEGORY: Alternative Technology

TITLE: Biorefining.

MAJOR FEATURES AND CHARACTERISTICS: Biorefining involves the breakdown of large organic molecules in waste through hydrolysis by acids, enzymes, or steam. Biorefining is used here to distinguish processes that utilize physical and/or chemical reactions for the initial decomposition of waste, as distinct from composting and anaerobic digestion, which use microorganisms.

In application, biorefineries may also use microorganisms for fermentation of sugars after the initial decomposition. The most common process is:

- To hydrolyze cellulose into glucose.
- Then, to ferment the glucose into alcohol.

Biorefining is being used increasingly on organic wastestreams, especially agricultural wastes, to produce ethanol. However, cheap fossil fuels, combined with efforts by the fossil fuel and automobile industries, have prevented its wide-scale development. Processes are now emerging for producing ethanol from MSW.

TARGET MATERIALS: Biorefineries receive and process the same fraction of MSW as composting and anaerobic digestion. Approximately 59% of the generated wastestream would be compatible feedstock for biorefining.

COMMENTS: Biorefineries produce a wide range of commodities, such as food ingredients, pharmaceuticals, and industrial fibers, adhesives, and other chemicals. The primary products from MSW would be ethanol as an energy source. Alternatively, biodiesel is generally produced from waste cooking oil.

The technology is currently in pre-commercialization or early-commercialization stage for MSW. A plant has been built in New York to process 230,000 tons/year of MSW, and 49,000 tons/year of sewage sludge. The process includes co-collection of recyclables and garbage (in separate bags) and claims 90% landfill reduction. It includes a MRF on the front end to separate recyclables, and an acid hydrolysis/fermentation digester to produce a market-grade ethanol. Methane is also produced, which is used on site for process energy.

Acid hydrolysis is closest to commercialization, though enzymatic hydrolysis, if it can overcome the high cost of purchasing cellulose-decomposing enzymes, also has its proponents. From an environmental perspective, ethanol has definite benefits as a replacement for fossil fuel, from the perspectives of both resource conservation and global climate change. Ethanol can be used as a fuel, or as an anti-knock additive to gasoline to replace lead and MTBE. The biorefining process is reported to be environmentally benign.

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CATEGORY: Alternative Technology

TITLE: MSW combustion.

MAJOR FEATURES AND CHARACTERISTICS: There are two basic technologies within MSW combustion:

- Mass burn, in which MSW is burned as it is received.
- Refuse-derived fuel (RDF), in which MSW is size-reduced before burning and processed into a “fluff” or pellets.

Either of the systems may include a pre-burn MRF that separates recyclable and unburnable materials. RDF systems may separate some recyclable or non-burnable materials mechanically after shredding.

There are three main types of incineration technologies for MSW:

- Mass burn stokers use moving grates to move and agitate the waste.
- Rotary kiln incinerators use a revolving, slightly inclined cylinder to tumble the waste during combustion.
- Fluidized bed incinerators use a heated bed of sand-like material within which RDF is suspended (fluidized) by a rising column of air.

Fluidized bed combustion is considered an improvement for high-moisture content fuels, such as MSW. The scrubbing action of the bed material, which may include lime, increases the rate of combustion and thermal efficiency, minimizes char, and reduces emissions. MSW combustion can reduce waste-to-landfill by up to 90%. Most systems generate hot water and steam, which can drive an electricity-generating turbine. Air pollution control is critical for MSW combustion and can amount to 30% of the system cost. Dust particles are typically trapped in filters and other pollutants are removed in scrubbing units.

TARGET MATERIALS: Incinerators can receive the full MSW stream, though problem materials, such as large appliances, are commonly removed. Attempts may also be made to remove toxic materials, such as occur in electronic equipment, through disposal bans or other means.

COMMENTS: Energy is the primary product of MSW combustion, though some systems recover ferrous and other metals from the ash.

From an environmental perspective, combustion systems produce several pollutants of concern, especially dioxins, furans, carbon monoxide, acid gases, metals, volatile organic compounds and polycyclic aromatic hydrocarbons, and oxides of nitrogen and sulfur. These result from incomplete combustion or characteristics of the combustion environment. They can be cleaned from the combustion air, though this is expensive. Especially for dioxins and furans, which are considered highly toxic in trace quantities, this process may not be complete.

Combustion can also concentrate metals in the ash, possibly requiring disposal as a hazardous waste. Combustion emits large amounts of carbon into the atmosphere. However, except for plastics, most of the carbon in MSW was drawn from the atmosphere by photosynthesis, resulting in only a small net contribution to global warming. If incineration produces energy that replaces fossil fuel consumption, it should result in a net reduction of atmospheric carbon.

CATEGORY: Alternative Technology

TITLE: Thermal transformation.

MAJOR FEATURES AND CHARACTERISTICS: Waste is heated in a controlled oxygen environment to drive off reduced or only partly oxidized gases. A variety of different technologies, all of which drive off biogas from the waste, fall within this group, including:

- Pyrolysis, which heats the waste in the absence of oxygen.
- Gasification, which heats the waste and reacts it with a controlled input of oxygen.
- Plasma arc, which runs high-voltage electricity through the waste, in the absence of oxygen.

Some of the technologies may include vitrification of the residue, in which the residue is transformed into a stable, low-leachability, glassy material. There are many vendors developing somewhat different technologies, but all generate a biogas fuel that is either burned on site or purified and sold. Potentially, these technologies could convert the synthetic gas to hydrogen for utilization in a fuel cell. Some sources claim that these emerging technologies are the advent of a new age in waste processing. Termed "molecular recycling," these technologies are seen as a major alternative to fossil fuel dependency.

TARGET MATERIALS: Thermal transformation processes the organic fraction similar to mass burn, but in some cases the residue may be vitrified. The waste is generally first processed to an RDF. Pyrolysis and other thermal transformation technologies may also be used for tires, auto shredder residues, and sewage sludge.

COMMENTS: The products of thermal transformation are a biogas fuel, and can include energy and a compost product. Plasma arc technology, which is used for hazardous materials and medical waste, has the added advantage that its process results in an inert, vitrified mass, with low leachability of contaminants. Proponents claim that the residue can even be used as a construction material. If so, this would be the only technology that could potentially not require a landfill for residues.

These technologies have certain advantages over combustion:

- The energy conversion efficiencies are higher.
- Less air is used, requiring less pollution problems.
- The synthetic gas can be either used on site or transported.

At present, these technologies are not fully commercialized for MSW in the United States, though some plants are operational in Europe. However, prototypes for MSW are in pre-commercialization or early-commercialization stage. Several of these technologies have been demonstrated at the rate of several tons per hour. It is expected that a number of plants will be

constructed in Europe over the next several years. Capital and operating costs for gasification technologies are generally similar to owner-operated mass burn facilities.

From an environmental perspective, many of the same benefits claimed for anaerobic digestion apply also to thermal processing. Also, they are net producers of energy and operate within a controlled environment that can control potential pollution problems.

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CATEGORY: Alternative Technologies

TITLE: Materials recovery facility (MRF).

MAJOR FEATURES AND CHARACTERISTICS: The MRF would perform recyclables processing operations that are not being done at the present time by the private sector. This could include, but is not limited to, processing mixed commercial refuse, mixed residential refuse, commingled commercial or residential recyclables, source-separated commercial or residential recyclables, yard waste, wood waste, construction and demolition debris, and other waste streams or materials to be determined.

The MRF could incorporate some of the diversion functions/operations now located at Central Landfill, such as the drop-off of tires and appliances and the recycling/reuse areas known as Recycletown. It could also provide land for composting processed yard waste, wood waste, and other organic materials, and serve as an outlet for the finished product(s) resulting from composting. The MRF could be located adjacent to or near an existing or future transfer station, or incorporate a transfer station operation to achieve efficiencies in material transport.

A variety of public/private scenarios for MRF construction/ownership/operation are possible. These include fully public, fully private, and different combinations of public/private such as public construction/ownership on land owned by the County or a jurisdiction with private operation; public construction on public land with joint venture ownership and private operation; and private construction on public land with public ownership/operation.

TARGETED MATERIALS: Residential refuse, commercial refuse, yard waste, newspapers, cardboard, magazines, office paper (white and colored), scrap paper, glass containers, tin cans, aluminum cans, and scrap metals.

COMMENTS: Private sector materials processing operations, in combination with the proposed multi-functional MRF, or some variation of it, would assist the County to implement the overall policy of processing (for reduction, reuse, or recycling) all waste generated in the County prior to disposal.

CATEGORY: Landfill

TITLE: Site, permit, and develop a new MSW landfill in Sonoma County.

The County would elect to site, permit, and develop a new Class III landfill in Sonoma County. The facility would be sited, designed, constructed, operated, and closed under guidelines established in the Sonoma County Solid Waste Siting Element, California Environmental Quality Act (CEQA), County land use policy, and regulatory requirements of CCR Title 27 and Subtitle D. The landfill would provide a long-term disposal site for MSW generated in Sonoma County.

MAJOR FEATURES AND CHARACTERISTICS: Site design and operation features would include measures for slope protection and erosion control; hazardous materials exclusion (load-checking); surface and groundwater quality protection and monitoring; and landfill gas (LFG) control. Refuse cells will be sequentially excavated and constructed with engineered base liners and a Leachate Collection and Recovery System (LCRS) prior to waste placement. Ancillary features to be constructed could include storm water detention basins, leachate treatment or recirculation facilities, an entrance facility and scale house, office building, maintenance building, and an LFG extraction system and blower/flare station. Depending on economics, an LFG-to-energy facility would be constructed for electrical power generation, or conversion of LFG to vehicle fuel/pipeline gas.

Daily site operations would include soil excavation and waste placement. Excavated soils would be used for road construction, liner placement, and daily, intermediate, and final cover. Development of the landfill would be phased so that only portions of the site would be disturbed at any one time.

It is expected that site operations will include future landfill management strategies, including the "bioreactor" technology. This is achieved through controlled additions of liquid and leachate recirculation in lined cells. Liquid recirculation enhances biodegradation and waste decomposition processes. By accelerating waste decomposition, filled cells settle more rapidly and can create additional airspace. Long-term water quality and LFG monitoring and maintenance liabilities can also be reduced. Although the bioreactor technology is not currently common practice in California, it is receiving increasing attention and support from regulatory agencies and the waste industry.

When landfill operations reach permitted final elevations, the site will be formally closed in accordance with state and federal regulatory standards. Closure activities will generally entail final grading, placement of final cover and drainage systems, revegetation of site surfaces, and decommissioning of ancillary structures. Air, water quality, and LFG environmental monitoring programs would be implemented throughout the landfill post-closure period.

Options for this alternative include public ownership and operation, private ownership and operation, or a combination of public/private ownership/operation.

TARGET MATERIALS: The landfill would be permitted to accept between 460,000 to 575,000 tons per year of MSW (non-recyclable residential, commercial, and industrial wastes, construction and demolition debris, inert materials, agricultural/green waste, and street sweepings). Liquids, medical wastes, radioactive materials, and hazardous wastes would not be permitted for disposal. To provide a minimum 35-year site life, the landfill would be sited/designed for an ultimate capacity of 16 to 20 million tons of MSW.

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CATEGORY: Landfill

TITLE: Implement operational alternatives to extend life of Central Landfill.

MAJOR FEATURES AND CHARACTERISTICS: The County would implement various operational alternatives, including expansion of the Central Landfill (beyond the currently permitted fill area and height), to extend site life beyond year 2015. Per the approved County Siting Element, expansion would entail development of a new fill area in the "West Canyon," relocation of existing facilities (LFG-to-energy plant and administrative building), and revision of the maximum fill height to approximately 720 feet MSL. Landfill expansion would be in accordance with the Sonoma County Solid Waste Siting Element, California Environmental Quality Act (CEQA), and regulatory requirements of CCR Title 27 and Subtitle D.

Existing provisions and infrastructure for surface and groundwater quality protection and monitoring, LFG control, and air quality protection and monitoring would be maintained and upgraded, as necessary, to comply with site permits and regulations. Expansion areas would be constructed with an LCRS prior to waste placement. The LFG emissions/migration control system would be expanded into new waste cells. Depending on market conditions, existing LFG-to-energy operations could be enhanced with additional gas generation.

To extend existing permitted site life, day-to-day operational changes could include use of alternative daily cover materials (ADCs), implementation of a bioreactor technology in lined cell areas, dedication of select areas for balefill, or landfill mining for airspace recovery.

TARGET MATERIALS: The Countywide disposal rate is estimated to range between 460,000 to 575,000 tons of MSW per year (non-recyclable residential, commercial and industrial wastes, C&D debris, inert materials, agricultural/green waste, and street sweepings).

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CATEGORY: Landfill

TITLE: Secure out-of-County disposal capacity at an existing or planned/proposed landfill.

The County would identify candidate sites and negotiate disposal capacity at one or more existing or proposed private or publicly owned Class III landfill sites located outside of Sonoma County. At a minimum, the landfill operations would employ environmental protection

standards embodied in Subtitle D and CCR Title 27 regulations (or the equivalent of CCR Title 27 for out-of-state facilities).

MAJOR FEATURES AND CHARACTERISTICS: Site operation features would include measures for surface and groundwater quality protection and monitoring; LFG control; and air quality protection and monitoring. At a minimum, these measures would include engineered base liners, an LCRS, and an LFG emissions/migration control system. Favorable consideration would be given to sites employing landfill management strategies such as bioreactor technology and LFG-to-energy recovery.

TARGET MATERIALS: It would be necessary to secure adequate capacity for disposal of 460,000 to 575,000 tons of MSW per year (non-recyclable residential, commercial and industrial wastes, construction and demolition debris, inert materials, agricultural/green waste, and street sweepings).

COMMENTS: This alternative would likely require expansion of existing in-county transfer stations (to accommodate truck and/or rail transfer) and/or siting, permitting, and development of new transfer/MRF sites in Sonoma County.

SECTION 4

ALTERNATIVES EVALUATION AND SELECTION

SCREENING AND EVALUATION CRITERIA

The pool of alternatives identified for possible inclusion in the preferred solid waste management strategy was large and diverse. Therefore, in order to decide which ones to include and exclude, evaluation criteria that encompass a range of perspectives (environmental, financial, political, institutional, and technical) were needed. To insure a thorough alternatives review, a two-step evaluation process was used, similar to the one used in the County's Solid Waste Siting Element (1996).

The first step screened out alternatives that were clearly not relevant or applicable to conditions in Sonoma County. The second evaluation step was a more rigorously detailed and analytic examination of the comparative features, advantages/disadvantages, and impacts of the remaining options.

County staff and LTF members recommended that SCS use the County's Siting Element as a starting point for defining a method to evaluate the variety of disposal and diversion options. The Siting Element deals partly with criteria for identifying additional disposal capacity to meet projected County waste management needs. The criteria reflect and promote basic principles for solid waste management in the County. Among others, the Siting Element notes the following guiding principles:

- The County will maximize the disposal capacity of its solid waste disposal facilities through waste prevention (source reduction), reuse, composting, and recycling.

- The County's solid waste disposal facilities will be sited and operated in a manner to minimize energy use, conserve natural and financial resources, and protect prime agricultural lands and other environmentally sensitive or culturally sensitive areas.

- The County and/or the cities shall put into policy the long-standing practice in the County of permitting only public ownership of solid waste disposal facilities located in the County which accept any segment of the municipal waste stream.

These three guidelines are significant for what they state and for what they imply. First, a close connection between disposal and diversion is proposed. Disposal facilities are viewed as public resources whose long-term utility should be a priority. Diversion programs and measures help to extend the useful life of disposal sites/operations. Second, environmental and cultural values can be reasons for eliminating an otherwise technically sound site or area from being considered as a location for a new disposal facility or expansion of an existing one. Third, it is emphasized that an in-county disposal facility handling self-haul and commercial MSW, as opposed to one that,

for example, accepts only waste from commercial haulers, should be owned by a public entity or agency. This guideline indicates the importance of a strong County role in waste management to balance the historic prevalence of private sector provision of both disposal and diversion services. Such a role is currently embodied in the County's ownership and operation of the Central Landfill.

However, the landfill is scheduled to close in 2015. A basic question, then, is whether County ownership and/or operation are critical criteria for securing future disposal capacity. This possibility becomes more problematic when out-of-county sites are under review because such facilities would typically be owned/operated either by a private company or a public entity other than Sonoma County.

It is likely that the only way to maintain County ownership and/or operation of future disposal capacity is to locate that capacity in the County. If this proves to be politically or environmentally unacceptable, the question changes to identifying the most viable way to maintain a strong County role in waste management which is equivalent to owning/operating a landfill for the County's municipal solid waste. More fundamentally, does closure of the Central Landfill mean that such a role is no longer necessary, or should the County shift from the disposal arena to the diversion arena?

The Siting Element performs an evaluation of several disposal capacity options, and expresses that evaluation in terms of "advantages" and "disadvantages" associated with each option (Table C-l of the Siting Element is included as Appendix A). Examining how those advantages and disadvantages are stated reveals more specific priorities that act as criteria in evaluating options. The positive features or advantages of a disposal alternative include the following:

- Reduces vulnerability to changes in operating/regulatory requirements.
- Is convenient for self-haulers and private haulers to access.
- Does not withdraw resources from waste reduction/recycling programs.
- Supports the AB 939 integrated waste management hierarchy of waste prevention, recycling, and composting.
- Offers local employment opportunities.

The negative features or disadvantages of a disposal alternative are as follows:

- Reduces revenues to the County.
- Increases environmental impacts due to physical or operational characteristics.
- Acts as a disincentive to the reduce/reuse/recycle ethic.
- Creates an oversupply of disposal capacity, thereby undermining diversion efforts.
- Results in a loss of local control.
- Increases costs.
- Is risky because it relies on an unproven technology.

Preliminary Screening

Each of the alternatives was initially assessed using the ten preliminary screening criteria listed in Table 8. Relevant comments, data, and information were recorded on an evaluation form. In addition, the alternative received a quantitative "point" rating of 3, 2, or 1 on each criterion. A rating of 3 meant that the answer to the question posed by the criteria was "strongly yes," while a rating of 1 meant that the answer was "strongly no." A rating of 2 was reserved for those cases for which there was not a definitively clear "yes" or "no" response. Therefore, the evaluation combined qualitative and quantitative elements. The highest numerical rating an alternative could receive was 30 points, and the lowest rating an alternative could receive was 10 points. Following completion of the ratings, the alternatives were screened for groupings or clustering to determine which alternatives would be subject to further evaluation, and which would be eliminated from further evaluation.

The results of the preliminary screening are presented in Table 9. As indicated, the scoring ranged from a high of 27 points, to a low of 19. From this process, certain alternatives were eliminated from further evaluation. The alternatives that were eliminated, and the reasons for their elimination, are indicated below:

- MSW Combustion - Not considered a part of Sonoma County future solid waste system.
- Thermal Transformation - Considered too risky and not well proven.
- MSW Composting - Existing facilities produce an end-product that was not considered useful or valuable.

Although eliminated from further consideration in this process, the LTF indicated that both thermal transformation and MSW composting should be kept on a "watch list" for future consideration, if these technologies are further refined and improved.

Evaluation and Selection

Once the original list of alternatives was narrowed down, the second assessment compared and contrasted in greater detail the relative characteristics, advantages/disadvantages, and impacts of the remaining alternatives. The analytic categories and selection criteria for the second assessment phase of the overall evaluation methodology included:

- Estimated initial capital costs - Examples are expenses for land, buildings, equipment, infrastructure, and access roads.
- Estimated annual operating costs - Examples are expenses for personnel, fuel, operation and maintenance, administration, and promotion/education.
- Estimated annual cost per ton - Based on the projected quantities of material that the alternative is intended to manage.

Table 8 (Preliminary Screening Criteria - 2 pages)

Table 9 (Preliminary Screening Rating Summary)

- Facility siting, design, permitting, and construction requirements - Legal, regulatory, environmental, planning, and decision-making procedures necessary for facility/program/policy approval.

- Ownership/operation responsibilities - Potential public/private sector arrangements for providing the expertise and resources needed to implement the alternative.

- Environmental impacts - The established or probable environmental impacts resulting from implementation of the alternative on such factors as energy production or utilization, resource conservation, waste volume reduction or elimination, toxic air or water emissions, greenhouse gas emissions, particulate emissions, land use, and community/neighborhood aesthetics.

- Implementation considerations and impacts - What roles the different stakeholders and involved parties would perform in developing the proposed facility, program, or policy, and what consequences these activities are likely to have on the various entities.

Each of the technology and landfill alternatives that passed the preliminary screening criteria was evaluated further using the selection criteria and categories listed above. The results of this analysis are presented in Table 10. Following the review and discussion of the technology and landfill alternatives, the policy and program options were evaluated for integration with the management alternatives. The analysis concluded with recommendations and supporting rationale regarding which alternatives were determined to be the priority selections for combining into the long-term, integrated waste management strategy.

It is important to note that the costs indicated for the landfill alternatives and technology alternatives may not be readily comparable. For example, operating costs for landfills typically may include more than the actual landfill operations, such as subsidies for other program costs. True costs may actually be less than the $35 per ton indicated. Similarly, the costs for the emerging technologies are reported costs from a variety of different sources. Also, for two of the technologies, there is only one facility in North America, and since it is not yet operational, the quoted costs may not be reliable. For some, it is difficult to distinguish at this time what is included and what is not included in these costs, such as processing, transfer, investment costs, subsidies, etc. Costs for the landfill and alternative technologies may also not reflect the revenues from gas production or other energy revenues.

Table 10. Evaluation of Alternatives

MANAGEMENT ALTERNATIVE	Capital Costs	Operating Costs (Annual)	Cost Per Ton	Siting, Design, Permitting and Construction Requirements
ANAEROBIC DIGESTION .	Generic Costs One source cites $260 - $280 per one-ton per year capacity, but said to be rapidly dropping Capital costs are 20% to 50% higher than for aerobic composting. However, net cost per ton are comparable to aerobic composting due to energy revenue. .	Not Available	Generic Cost $35 - $40/ton All tipping fees are very project specific, including consideration of scale, land costs, labor rates, specific feedstock received, financing methods, etc. Larger scale facilities, above 100,000 tpy are reported to potentially have lower tipping fees in the range of $30/ton.	A comprehensive siting study to identify a preferred location could be conducted by either County or vendor. Permit requirements include: Solid waste facility permit Local building and construction permits Land use permit and/or conditional use permit Regional air quality permits Fire, health and business permits and licenses May require a CA composting permit (a tiered permit depending on feedstock processed).
Case Example: CCI organic waste processing facility in Newmarket, Ontario[1]	*$18 - $20 million for 150,000 tpy capacity $120 - $133 per one-ton per year capacity*	*$16 - $20/ton*	*$37/ton*	
Case Example: Pinnacle Biotechnology, based on Stanton, CA pilot facility[2]	*$8 - $9 million for 73,000 tpy facility $110 - $125 per one-ton per year capacity.*	*Not Available*	*Not Available*	
BIOREFINING	Not Available	Not Available	All tipping fees are very project specific, including consideration of scale, land costs, labor rates, specific feedstock received, financing methods, etc.	A comprehensive siting study to identify a preferred location could be conducted by either County or vendor. Permit requirements include: Solid waste facility permit Local building and construction permits Land use review Regional air quality permits Fire, health and business permits and licenses
Case Example: Masada Resource Group integrated biorefining and recycling system and facility in Middletown, NY.[3]	*$150 million for 230,000 tpy capacity. $650 per one-ton per year capacity*	*Not Available However, plant will employ 200 workers*	*$65/ton tip fee will be paid by participating municipalities to the City of Middleton*	
Case Example: Arkenol, Inc.[4]	*$76 million for 260,000 tpy capacity $292 per one-ton per year capacity*	*$45/ton $11.7 million for 260,000 tpy*	*$30/ton tip fee (Assumes selling price of $1.62 per gallon for ethanol)*	

Table 10. Evaluation of Alternatives

MANAGEMENT ALTERNATIVE	Ownership/Operation Responsibilities	Environmental Impacts	Implementation Considerations and Impacts
EXTEND LIFE OF CENTRAL LANDFILL (Vertical expansion + expansion into "west" canyon)	Options include: 1. County own and operate 2. County own and private operate	Expansion will be designed, constructed and operated to minimize environmental impacts. Potential environmental impacts at landfill sites which would be evaluated as part of CEQA could include those to: • Water quality • Air quality and odors • Biological and cultural resources • Public safety • Noise • Traffic • Aesthetics/Visual	No significant departure(s) from current practices and policies expected in the medium term. Expansion alternative may not meet long-term disposal needs unless significant capacity is available via development onto adjacent properties not presently owned by the County. Siting studies as described above for new landfill site would be required.

Table 10. Evaluation of Alternatives

CENTRALIZED MRF	Options include: 1. County own and operate. 2. Private own and operate 3. Public/private construction and ownership: • County-own land, private construction and operation • County-own land, J/V construction and operation • County-own land, private construction with County operation.	Facility will be designed, constructed and operated to minimize environmental impacts. Potential environmental impacts at MRFs and to be evaluated as part of CEQA could include those to: • Water quality • Air quality and odors • Biological and cultural resources • Public safety • Noise • Traffic	May require revision to JPA agreement(s) to ensure sufficient waste flow and funding mechanisms. Supporting policy could include flow control. Depending on haul distance to MRF, may require revisions to collection practices or franchise agreements.

Table 10. Evaluation of Alternatives

MANAGEMENT ALTERNATIVE	Capital Costs	Operating Costs (Annual)	Cost Per Ton	Siting, Design, Permitting and Construction Requirements
ORGANIC (AEROBIC) COMPOSTING	Not Available	Not Available	Generic Cost[6] All tipping fees are very project specific, including consideration of scale, land costs, labor rates, specific feedstock received, financing methods, etc. $20 - 50/ton tipping fee for food waste processing	In addition to the requirements for anaerobic composting, aerobic composting will require a CA composting permit (a tiered permit depending on the type of feedstock processed). Mixed organics, including food waste, require the highest level permit and environmental controls.
Case Example: Guelph, Ontario integrated wet/dry collection and processing system[5]	*$16 million for 125,000 tpy capacity.* *$130 per one-ton per year capacity*	*Net processing cost (1998): Dry: $50/ton; Wet: $46/ton Material revenue (1998) Dry (average): $67/ton; Wet: $18/ton*	*$25/ton tipping fee.*	

Table 10. Evaluation of Alternatives

MANAGEMENT ALTERNATIVE	Ownership/Operation Responsibilities	Environmental Impacts	Implementation Considerations and Impacts
ANAEROBIC DIGESTION	Options include: 1. County owned and private contract operated 2. Private owned and operated Since these are proprietary and only-recently implemented technologies (for MSW), County operation does not seem feasible.	Produces less greenhouse gas emissions than landfilling, open composting, or incineration. Controls toxic emissions in comparison to landfilling or open composting. Methane can be used as an energy source. Potential environmental impacts at MSW processing facilities to evaluate as part of CEQA include: • Water quality • Air quality and odors • Biological and cultural resources • Public safety • Noise • Traffic	May also incorporate sewage sludge and/or grape pomace. May require revision to JPA agreement to ensure sufficient waste flow and funding mechanism. Supporting policy could include flow control. A critical factor is the developing maturity of the technology for MSW. Sonoma County may wish to work cooperatively with the CIWMB in ongoing technology assessment. A potential policy approach would be to identify the County's intention to procure a technology when it has demonstrated a reasonable track record, as defined by X years of commercial-scale implementation in N. America. The CIWMB should be challenged to incorporate the technology into the solid waste hierarchy in recognition of its environmental values.
BIOREFINING	Options include: 1. County owned and private contract operated 2. Private owned and operated Since these are proprietary and only-recently implemented technologies (for MSW), County operation does not seem feasible	Reduces greenhouse gas emissions over landfilling, open composting, or incineration. Controls toxic and NOX emissions in comparison to landfilling or open composting. Ethanol can be used as a fuel or as an anti-knock additive to gasoline to replace lead and MTBE. Potential environmental impacts at MSW processing facilities to evaluate as part of CEQA include: • Water quality • Air quality and odors • Biological and cultural resources • Public safety • Noise • Traffic	May also incorporate sewage sludge and/or grape pomace. May require revision to JP agreement to ensure sufficient waste flow and funding mechanism. Supporting policy could include flow control. A critical factor is the developing maturity of the technology for MSW. Sonoma County may wish to work cooperatively with the CIWMB in ongoing technology assessment. A potential policy approach would be to identify the County's intention to procure a technology when it has demonstrated a reasonable track record, as defined by X years of commercial-scale implementation in N. America. The CIWMB should be challenged to explicitly incorporate the technology into the solid waste hierarchy in recognition of its environmental values

Table 10. Evaluation of Alternatives

MANAGEMENT ALTERNATIVE	Ownership/Operation Responsibilities	Environmental Impacts	Implementation Considerations and Impacts
ORGANIC (AEROBIC) COMPOSTING	Options include: 1. County owned and private contract operated 2. Private owned and operated 3. County owned and operated.	Odor can be a problem. Composting is a net energy consumer, since it utilizes process energy and generates no usable energy itself. Hazardous materials in the feedstock are not degraded. Composting generates somewhat less global warming gases than landfilling and approximately the same as incineration. Potential environmental impacts at MSW processing facilities to evaluate as part of CEQA include: • Water quality • Air quality and odors • Biological and cultural resources • Public safety • Noise • Traffic	May require revision to JP agreement to ensure sufficient waste flow and funding mechanism. Supporting policy could include flow control. The main challenge is to develop an integrated collection/processing system that cost-effectively delivers a clean organics stream. This may require wholesale revamping of recyclables and trash collection in the county.

Table 10. Evaluation of Alternatives

MANAGEMENT ALTERNATIVE	Capital Costs	Operating Costs (Annual)	Cost Per Ton	Siting, Design, Permitting and Construction Requirements
NEW LANDFILL IN SONOMA COUNTY	New cell construction costs = $125,000 to $175,000 per acre. Closure construction costs = $100,000 to $120,000 per acre. (30 to 35 years out) Above costs exclude land acquisition costs. New landfill development will likely require purchase/condemnation of several hundred acres. Above costs are industry averages and exclude environmental review, permitting and post-closure maintenance.	Daily operations costs estimated between $5-$15/ton (for waste placement, compaction and cover only). Excludes environmental monitoring/control system costs. Annual costs could range from $2.8 million (@ 460,000 tons/yr) to $8.6 million (@ 575,000 tons/yr)	March 2000 average for all CA landfills with intake >1,000 tpd) = $35/ton Cost above excludes waste processing or transfer. Current tipping fee at Central Landfill is $45.20/ton (includes costs for non-landfill programs undertaken by the County).	Comprehensive siting study to identify preferred location(s) Preliminary site characterization (site constraints analysis, hydrogeologic investigation, geotechnical study, cultural and biological resource assessments) CEQA evaluation (comprehensive EIR) Detailed site characterization for design Permit Documents: Joint Technical Document (design and operating standards, closure/post-closure plan) Permit Requirements: Solid Waste Facility Permit; Land Use/CUP; Waste Discharge Requirements. Design and construction features will include engineered base liners; leachate collection, treatment and/or recirculation systems; and LFG control/energy recovery.
OUT OF COUNTY LANDFILL	Not Applicable	Not Applicable	March 2000 average for all CA landfills with intake >1000 tpd = $35/Ton. Cost excludes waste processing or transfer. Tip fee could be higher or lower depending on contractual arrangements with owner/operator	Siting, design, permitting, and construction would be responsibility of others. County may be required to conduct CEQA evaluation of impacts related to long-haul disposal

Table 10. Evaluation of Alternatives

MANAGEMENT ALTERNATIVE	Capital Costs	Operating Costs (Annual)	Cost Per Ton	Siting, Design, Permitting and Construction Requirements
EXTEND LIFE OF CENTRAL LANDFILL (Vertical expansion + expansion into "west" canyon)	New cell construction costs not available at this time, but should be comparable to recent bids for new cell construction at Central. Closure construction costs = $100,000 to $120,000 per acre. Above costs exclude land acquisition, environmental review, permitting and post- closure maintenance.	Daily operations costs estimated between $5-$15/ton (for waste placement, compaction and cover only). Annual costs could range from $2.8 million (@ 460,000 tons/yr) to $8.6 million (@ 575,000 tons/yr)	Current tipping fee at Central Landfill is $45.20/ton (includes costs for non-landfill programs undertaken by the County).	Preliminary site characterization for "west canyon" property (site constraints analysis, hydrogeologic investigation, geotechnical study, cultural and biological resource assessments) CEQA evaluation (comprehensive EIR) Detailed site characterization for design Permit Documents: Joint Technical Document (design and operating standards, closure/post-closure plan) and revision to existing Waste Discharge Requirements and Solid Waste Facilities Permit Design and construction features will include engineered base liners; leachate collection, treatment and/or recirculation systems; and LFG control/energy recovery.
CENTRALIZED MRF	Site development and construction cost estimated at $15,000,000 to $25,000,000 (for facility input of 1,300 to 1,600 tpd) Above costs are industry averages and exclude land acquisition and environmental review.	Daily operations costs estimated between $20-$30/ton (for waste processing only, excludes debt service). Annual operating costs could range from $9.2 million (@ 460,000 tons/yr) to $17.3 million (@ 575,000 tons/yr)	$41 / ton (March, 2000 average for all CA TS/MRFs with intake >1000 tpd). Range of costs expected between $35 – $50 /ton. Costs exclude disposal fee for residuals.	Comprehensive siting study to identify preferred location(s) Preliminary site characterization (site constraints analysis, including geotechnical study) CEQA evaluation (comprehensive EIR) Detailed site characterization for design Permit Documents: Report of Site Information Permit Requirements: Solid Waste Facility Permit; Land Use/CUP; Local Building and Construction Permits; Fire Permit; Health Permit; and Business License.

Table 10. Evaluation of Alternatives

MANAGEMENT ALTERNATIVE	Ownership/Operation Responsibilities	Environmental Impacts	Implementation Considerations and Impacts
NEW LANDFILL IN SONOMA COUNTY	Options include: 1. County own and operate 2. Private own and operate 3. County own and private operate	Site will be designed, constructed and operated to minimize environmental impacts. Potential environmental impacts at landfill sites which would be evaluated as part of CEQA would include those to: • Water quality • Air quality and odors • Biological and cultural resources • Public safety • Noise • Traffic • Aesthetics/visual	May require revision to JPA agreement(s) to ensure sufficient waste flow and funding mechanisms. Supporting policy could include flow control. Depending on site location, may require delivery and pre-processing at MRF or transfer station. Depending on haul distance, may require revisions to collection practices or franchise agreements.
OUT OF COUNTY LANDFILL	Private own and operate	Potential environmental impacts would be related to long-haul from MRF/transfer stations in Sonoma County and could include: • Air quality • Traffic	May require revision to JPA agreement(s) to ensure sufficient waste flow. Supporting policy could include flow control. Will require delivery and pre-processing at MRF(s) or transfer station(s). Depending on haul distance to MRF/TS, may require revisions to collection practices or franchise agreements. Implementation steps: • Research to identify potential out-of-county sites and long-term capacity. • Issue RFP, RFB or negotiate for disposal capacity. • Perform environmental, financial and legal due diligence for candidate or selected site(s) • Parties enter into long-term disposal agreement.

Table 10. Evaluation of Alternatives

MANAGEMENT ALTERNATIVE	Ownership/Operation Responsibilities	Environmental Impacts	Implementation Considerations and Impacts
EXTEND LIFE OF CENTRAL LANDFILL (Vertical expansion + expansion into "west" canyon)	Options include: 1. County own and operate 2. County own and private operate	Expansion will be designed, constructed and operated to minimize environmental impacts. Potential environmental impacts at landfill sites which would be evaluated as part of CEQA could include those to: • Water quality • Air quality and odors • Biological and cultural resources • Public safety • Noise • Traffic • Aesthetics/Visual	No significant departure(s) from current practices and policies expected in the medium term. Expansion alternative may not meet long-term disposal needs unless significant capacity is available via development onto adjacent properties not presently owned by the County. Siting studies as described above for new landfill site would be required.

Table 10. Evaluation of Alternatives

CENTRALIZED MRF	Options include: 1. County own and operate. 2. Private own and operate 3. Public/private construction and ownership: • County-own land, private construction and operation • County-own land, J/V construction and operation • County-own land, private construction with County operation.	Facility will be designed, constructed and operated to minimize environmental impacts. Potential environmental impacts at MRFs and to be evaluated as part of CEQA could include those to: • Water quality • Air quality and odors • Biological and cultural resources • Public safety • Noise • Traffic	May require revision to JPA agreement(s) to ensure sufficient waste flow and funding mechanisms. Supporting policy could include flow control. Depending on haul distance to MRF, may require revisions to collection practices or franchise agreements.

Table 10 (Evaluation of Alternatives - 9 pages)

SECTION 5

SOLID WASTE MANAGEMENT STRATEGY

At this point in the process of developing a long-term solid waste management strategy for Sonoma County, the individual alternatives had each been evaluated twice: the preliminary screening analysis, and the final evaluation. Through this two-step process, alternatives were either eliminated from further review or were selected to remain in the study for possible incorporation into the final strategy.

STRATEGY DEVELOPMENT

The remaining disposal and processing technology alternatives, and supportive policies and programs, were then combined in different ways to produce a variety of comprehensive scenarios for managing the County's wastestream during the period 2015 to 2050. The scenarios varied considerably in key areas:

- The magnitude and types of changes to the current waste management system in the County.
- The relative emphasis on generator source separation versus material processing technologies for handling and preparation of recyclables.
- The level of control exercised by the County and the cities over the environmental and cost impacts of disposal.
- The use of special technologies for processing the organic portion of the wastestream (not including yard waste) into a useful product.
- The use of a new facility (or facilities), in addition to current private operations, for processing recyclables according to end user specifications.

A total of nine scenarios were developed and are presented in Table 11. The scenarios are identified across the top of the page with a letter (A through E), and some have sub-variations (i.e., A-1 and A-2). A short description of each scenario is included that highlights the main features of that scenario. The alternatives that constitute each scenario are indicated along the left side, with check marks indicating if they are included in that particular scenario. Finally, specific comments, advantages, and disadvantages are presented for each scenario.

It is emphasized that all the scenarios share a baseline assumption: by 2015, the combination of existing and planned diversion programs will have reduced the disposed wastestream by 50%. Thus, the scenarios all target the remaining 50% of the wastestream, and additional diversion proposed by a given scenario also targets the same remaining 50% of the wastestream.

Table 11 (SW and Management Scenarios)

COST ANALYSIS

A cost model was developed for the project that incorporates the relative costs associated with each of the alternatives included in the nine scenarios. The model produces a cost projection for each scenario expressed in cost per ton. Key assumptions for each scenario were established that determined the data inputs for the cost model. The assumptions underlying each scenario were prepared based on a combination of technical research, practical experience, and industry interviews. It is believed the cost per ton figures represent a balanced, reasonable approach to defining the factors relevant to calculating a scenario's estimated cost. However, different assumptions will produce different cost projections. Examples of some of the assumptions are as follows:

- Tipping fees at an expanded Central Landfill, a new in-county landfill, and an out-of-county landfill.
- Transport/haul costs to in-county transfer stations, Central Landfill, a new in-county landfill, an out-of-county landfill, an organics processing site, and a centralized MRF.
- Costs for owning/operating a transfer station.
- Percentages of disposed waste hauled directly to a landfill versus percentage of disposed waste transferred through a transfer station(s).
- Round-trip distance to out-of-county disposal site.
- Long-haul transfer vehicle capacity.
- Average travel speed for transfer vehicle in and out of the County.
- Cost to operate standard refuse packer vehicle.
- Cost for MRF operation.
- Costs for wet/dry collection method.
- Costs for operating an organics processing site.
- Percentage of materials collected through wet/dry collection method.
- Percentage of materials directed to an organics processing site, and percentage of those materials that are processed into a usable product versus remaining as residue for disposal.

Some assumptions are specific to a given scenario--for example, the estimate of how much material will be sent through a MRF for processing, and the estimate of how much of that material will actually be recovered for recycling versus how much of it will be disposed as

residue. Other assumptions are common to all the scenarios. For example, the total quantity of wastes to be disposed (except for scenario B-1) is assumed to be 530,000 tons per year (tpy), or 1,450 tons per day (tpd). This is the average waste disposal rate over the entire 35-year planning period (2015 to 2050) for the Solid Waste Management Alternatives Project.

The results of the cost projections are summarized in Table 12. The cost model and related assumptions are included in Appendix B. It is intended that the cost estimates be viewed as important to the process of selecting a final scenario for implementation. However, costs are only one factor among the several criteria used by the LTF to evaluate the relative value of each scenario. The other criteria, including technical, institutional, and environmental considerations, were also evaluated in the earlier analysis of the individual alternatives and scenarios.

SCENARIO EVALUATION

The final stage of the analysis involved evaluation of the nine scenarios for relative risk (technological, environmental, and economic), cost per ton, diversion and disposal quantities, local control, and resource efficiency. The objective was to narrow down the selection to three preferred scenarios. This element of the process involved a vote by the LTF members, where each member was given three votes, and asked to select their top three scenarios.

The voting process resulted in three scenarios receiving a majority of the votes, with the remaining scenarios each receiving two or fewer votes. The three scenarios are summarized in Table 13. As indicated, they each contain flow control policy and organics processing technologies, and eliminated the option to send waste out of the County. The decision to not send wastes out of the County for disposal emphasized the commitment to be responsible for the waste generated/disposed in the County. The scenarios differ in terms of requirements for processing all waste versus mandatory source separation of recyclables, which emphasizes generator responsibility versus reliance on technologies for diversion. There are also differences in selecting expansion of Central Landfill versus development of a new in-county landfill. This again reemphasized the County's commitment to final disposition of the waste, but indicated some differences in whether the disposal should be at the existing site or a new location.

SELECTION OF PREFERRED STRATEGY

On October 12, 2000, the LTF reached a consensus on a strategy to meet Sonoma County's solid waste management goals and needs for the planning period 2015 to 2050. The strategy consists of the following four (4) key elements:

- Formal agreement among all cities and the County to direct flow of refuse and green waste to a new integrated resource management facility.
- Mandatory source separation of recyclables from waste for residential, commercial, industrial, and institutional waste generators.
- Expansion of Central Landfill beyond its current permitted capacity.
- Siting of an integrated resource management facility to include organics processing (anaerobic digestion or biorefining), green waste composting, and landfilling.

Table 12 (Cost Summary)

Table 13 (Selected Scenarios)

These four elements are designed to support each other in achieving a countywide, integrated materials management strategy for the 35-year planning period that begins when the current permitted capacity of Central Landfill is reached. The strategy elements fulfill priorities established by the LTF, as explained below:

- Fully utilize existing waste management resources and infrastructure in both the public and private sectors. This maintains local control over the costs and environmental impacts of disposal, and facilitates further development of in-county recycling collection/processing capabilities. Relevant strategy elements are Central Landfill expansion, flow control policy, and mandatory recycling policy.

- Maximize waste diversion/resource utilization at a reasonable cost on the principle of generator responsibility. This will extend the useful life of an expanded Central Landfill, while minimizing the size a new landfill in the County or need to contract with an out-of-county landfill operator for waste disposal. Relevant strategy elements are mandatory recycling and the integrated resource management facility incorporating organics processing and green waste composting.

- Complement existing and planned private sector operations for collection/processing of both refuse and recyclables. This recognizes and enhances the historically accepted role in the County that the private sector has fulfilled in providing waste management services under municipal/County licenses or franchises. Relevant strategy elements are Central Landfill expansion, flow control policy, and mandatory recycling policy.

SECTION 6

IMPLEMENTATION TIMELINE AND GUIDELINES

The preferred strategy was presented to the Policy Advisory Committee (PAC) on October 16, 2000. The PAC reviewed, accepted, and forwarded the preferred strategy for completion by the LTF. The next stage in the process is consideration and approval of the recommended strategy by the County Board of Supervisors (BOS). Following approval by the BOS, County staff will be directed to proceed with implementation of the strategy. The implementation timeline and guidelines for the selected strategy are described below.

The implementation period is established as 2001 to 2014. The short-term implementation period is considered to be from 2001 through 2005, while the long-term implementation period is considered to be from 2006 through 2014. The implementation schedule for each strategy element consists of the activities, milestones, and decision points related to securing the resources, permits, agreements, and associated actions required for strategy implementation. The parties involved in implementation activities, and their role/responsibility in the process, will also be noted. Those parties could include, but are not limited to, the following:

- Staff from the County's Department of Transportation and Public Works.
- Staff from other County departments.
- City Councils for each of the nine (9) incorporated jurisdictions in the County.
- Staff from the municipal governments for each of the nine incorporated jurisdictions.
- The Sonoma County Waste Management Agency.
- The AB 939 Local Task Force.
- The Policy Advisory Committee.
- The Board of Supervisors.
- California Integrated Waste Management Board (CIWMB).
- Private sector waste and recycling service providers.
- Private sector waste management and recycling processing facility vendors/operators.
- Community, neighborhood, and civic organizations.
- Homeowners associations.
- Chamber of Commerce and other local/regional business or industry groups.
- School districts, colleges, and universities.
- Non-profit environmental advocacy and action organizations.
- Apartment building owners/managers.

For each element of the selected strategy, a description of decision steps and activities, milestones, and involved parties, along with the estimated time frame for each step, is provided below. A graphical schedule for implementation of all elements of the strategy is depicted in Exhibit 6.

Exhibit 6 (Graphical Schedule for Implementation of Elements – 2 pages)

AMEND COUNTYWIDE INTEGRATED WASTE MANAGEMENT PLAN

In order to become an adopted policy for the community, the strategy approved by the County Board of Supervisors must be incorporated into the Countywide Integrated Waste Management Plan (CoIWMP). This process included review under the California Environmental Quality Act (CEQA), including preparation of a program environmental impact report (EIR). The LTF must consider the proposed amendment to the CoIWMP, and the SCWMA must also approve the amendment. Approval of the revised CoIWMP is also required by the CIWMB. Finally, the County Board of Supervisors must certify the CEQA document. The total anticipated timeline for this step in the process is 25 months. The process is summarized below.

AMEND COUNTYWIDE INTEGRATED WASTE MANAGEMENT PLAN		
Estimated Time to Complete	**Activity/Milestone/Decision Points**	**Involved and Responsible Parties**
1 month	Board of Supervisors approval of strategy; direct staff to proceed with implementation.	County Board of Supervisors; County Transportation and Public Works Department staff.
18 months	Review and amend CoIWMP, including identifying weighting and ranking criteria for facility siting. Prepare Program EIR.	County Transportation and Public Works Department staff.
6 months	LTF consider amended CoIWMP; SCWMA approve CoIWMP; CIWMB approval of CoIWMP; Board of Supervisors certify EIR.	LTF; SCWMA; CIWMB; Board of Supervisors, Transportation and Public Works Department staff.
TOTAL: **25 MONTHS**	**RESULT:** **Amended CoIWMP incorporating selected strategy; certified CEQA document.**	

COUNTYWIDE FLOW CONTROL POLICY

At the PAC meeting, there was general discussion and agreement that the flow control policy/agreement among the cities/County would need to come as an early step in order to assure an adequate supply of materials, as well as to enable financing mechanisms for the proposed integrated resource management facility. This policy will be a formal agreement among all cities and the County to direct the flow of disposed waste and source-separated green waste to a new integrated resource management facility. The purpose of the policy will be to assure the availability of materials for the facility, and therefore enable financing mechanisms for development of the facility.

The SCWMA consists of representatives from all ten (10) jurisdictions in the County; namely, the nine incorporated cities and the County unincorporated areas. The SCWMA is structured and operated according to the terms of a JPA. A countywide flow control policy could be

adopted by the SCWMA as an amendment to the JPA. However, it is anticipated that for an issue as significant as this, the jurisdictional representatives would probably also formally adopt the policy by vote of their respective city councils, and then accept and ratify the policy by membership of the SCWMA. The total anticipated timeline for this strategy element is 18 months, excluding revisions to individual jurisdiction's refuse ordinances or franchise agreements with their collection service providers.

COUNTYWIDE FLOW CONTROL POLICY		
Estimated Time to Complete	**Activity/Milestone/Decision Points**	**Involved and Responsible Parties**
1 month	Research status of flow control authority for public agencies based on recent, relevant judicial rulings.	County Transportation and Public Works Department staff and County Counsel.
2 months	Prepare draft countywide flow control policy for review by LTF.	County Transportation and Public Works Department staff.
3 months	Review and revise draft policy.	LTF; County Transportation and Public Works Department staff.
3 months	Draft policy review by SCWMA member jurisdictions; Revise draft policy.	SCWMA members; County Transportation and Public Works Department staff.
2 months	Public hearings on draft policy.	City Councils of member jurisdictions.
2 months	Revise draft policy based on public input; Review by PAC.	PAC; SCWMA members; County Transportation and Public Works Department staff; County Counsel.
1 month	Board of Supervisors Public Hearing; Public testimony; Final Policy.	Board of Supervisors; County Transportation and Public Works Department staff.
2 months	City Council meeting to adopt policy.	City Councils of Member jurisdictions.
1 month	Board of Supervisors adopts flow control policy as formal, legal agreement between SCWMA member jurisdictions.	County Board of Supervisors.
1 month	SCWMA adopts flow control policy as amendment to JPA.	SCWMA.
TOTAL: **18 MONTHS**	**RESULT:** **Formal Flow Control Policy to direct flow of waste to new integrated resource management facility.**	

MANDATORY RECYCLING POLICY

This policy will require source separation of recyclables from residential, commercial, industrial, and institutional generators. The process of adopting a mandatory recycling policy applicable countywide is similar in some respects to the process for adopting a countywide flow control policy. However, the actual formulation of the mandatory program recommendation is considerably more complicated. Responsibilities of different generators, the role of private sector recycling service providers, monitoring methods, non-compliance sanctions/penalties at the municipal and County level, a potential ban on the disposal of certain materials at Central Landfill, and other issues must be considered in developing the mandatory recycling policy.

It is proposed that the LTF be the forum and mechanism for policy development. Interested parties outside the LTF would have the opportunity to present to the LTF their perspectives on a draft policy. Under sponsorship of the County Department of Transportation and Public Works and the SCMWA, the draft policy would be submitted to the appropriate staff and city councils for each city. A sequence of review and revision would follow these submissions, culminating in adoption by each jurisdiction and the County Board of Supervisors.

The total anticipated timeline for this element of the strategy is 19 months, excluding revisions to individual jurisdiction's refuse ordinances or franchise agreements with their collection service providers.

MANDATORY RECYCLING POLICY		
Estimated Time to Complete	**Activity/Milestone/Decision Points**	**Involved and Responsible Parties**
3 months	Research other mandatory recycling policies/programs, and prepare report for review by LTF.	County Transportation and Public Works Department staff; County Counsel.
3 months	Consideration by LTF of policies and programs; input from other stake-holders.	LTF; private sector recyclers; institutions; apartment/building owners and managers; Chamber of Commerce; homeowner associations; community /civic/environ-mental organizations.
1 month	Review and revise draft policy.	SCWMA representatives; County Trans-portation and Public Works Department staff; County Counsel.
3 months	Meetings with City Councils.	County Transportation and Public Works Department; SCWMA representatives.
1 month	Incorporate jurisdictional revisions, distribute draft policy back to jurisdic-tions.	County Transportation and Public Works Department staff.

MANDATORY RECYCLING POLICY		
Estimated Time to Complete	**Activity/Milestone/Decision Points**	**Involved and Responsible Parties**
1 month	Public hearings on draft policy.	City Councils of member jurisdictions.
3 months	Revise draft policy based on public input; Review and recommendation by PAC.	PAC; SCWMA members; County Transportation and Public Works Department staff; County Counsel.
1 month	Board of Supervisors Public Hearing; Public testimony; Final policy prepared.	Board of Supervisors; County Transportation and Public Works Department staff; County Counsel.
2 months	City Council meetings to adopt policy.	City Councils of Member jurisdictions.
1 month	Board of Supervisors adopts policy.	County Board of Supervisors.
TOTAL: **19 MONTHS**	**RESULT:** **Mandatory policy for source separation of recyclables from waste for residential, commercial, industrial, and institutional generators.**	

EXPANSION OF CENTRAL LANDFILL

This element of the preferred strategy seeks to fully utilize the value of Central Landfill by allowing for additional expansion beyond its current permitted capacity. The expansion would be implemented prior to siting of the new integrated resource management facility. The expansion would provide short- and medium-term landfill capacity while a new facility was being developed. The expansion plan would depend on regulatory and site constraints.

This element of the strategy would encompass an involved public input process, and supporting technical and environmental studies. The total estimated timeframe for this element of the preferred strategy is 5.5 to 6.5 years.

EXPANSION OF CENTRAL LANDFILL		
Estimated Time to Complete	**Activity/Milestone/Decision Points**	**Involved and Responsible Parties**
12 to 16 months	Conduct preliminary technical / economic analyses, including environmental constraints analysis to identify major environmental issues and fatal flaws, and develop 2 to 4 expansion plan options.	County Transportation and Public Works Department staff.

EXPANSION OF CENTRAL LANDFILL		
Estimated Time to Complete	**Activity/Milestone/Decision Points**	**Involved and Responsible Parties**
6 months	Conduct public hearings; LTF review and recommend preferred expansion option to Board of Supervisors. Board of Supervisors approve proposed expansion plan.	LTF; Board of Supervisors; County Transportation and Public Works Department staff; interested/affected stakeholders.
18 months	Conduct CEQA analysis. Includes preparation of preliminary engineering drawings, land use planning documents, field investigations, EIR.	County Transportation and Public Works Department staff.
2 months	Certification of EIR.	Board of Supervisors.
6 to 12 months	Solid Waste Facility Permitting, including preparation of Joint Technical Document, Preliminary Closure/Post-Closure Maintenance Plan, Waste Discharge Requirements, local land use permits.	County Transportation and Public Works Department staff; County Counsel.
12 months	Engineering design and development, including design studies, plans and specifications, local permits, contractor bidding.	County Transportation and Public Works Department staff; other County Departments; County Counsel.
12 to 16 months	Facility relocation and construction of initial cell(s) and infrastructure.	County Transportation and Public Works Department staff.
TOTAL: **5.5 to 6.5 years**	**RESULT:** **Expansion of Central Landfill.**	

SITING, DESIGN, AND CONSTRUCTION OF AN INTEGRATED RESOURCE MANAGEMENT FACILITY

This element of the strategy will involve the selection of a site, technical and economic analysis of organic processing technologies, permitting, design and construction, and finally the preliminary operation of an integrated resource management facility. The facility, as envisioned, will incorporate the existing green waste composting operations at Central Landfill, which must be relocated due to site constraints at the expanded Central Landfill site, as well as the operation of a selected organics processing facility. This may include either an anaerobic digester, or a biorefinery, for the processing of organics materials into useable products. This facility will also

incorporate landfilling operations for residual materials not handled by the green waste or organics processing operations.

For this element of the strategy, a myriad of stakeholders will be involved, and the pubic input process will incorporate numerous public hearings, review of draft documents, and final selection of a site and technology. Because of the incorporation of new technologies into this element, further review and analysis of these technologies will be required. This may also involve visitation to existing pilot or full-scale facilities, and presentations and proposal by potential vendors of these technologies.

It is anticipated that a County bond measure will be required to finance the construction and perhaps operation of the organics processing facility. (The county may also wish to issue bonds for engineering and land use studies.) The timeframe for this aspect of the element is included in the estimated schedule. The total estimated timeframe for this element of the preferred strategy is 8.5 to 11.5 years.

SITING, DESIGN, AND CONSTRUCTION OF AN INTEGRATED RESOURCES MANAGEMENT FACILITY		
Estimated Time to Complete	**Activity/Milestone/Decision Points**	**Involved and Responsible Parties**
18 months	Conduct siting study/options evaluation utilizing exclusionary criteria.	County Transportation and Public Works Department.
2 months	Select a limited number of alternative sites, and conduct preliminary technical/economic analysis of alternative sites, utilizing comparative criteria.	LTF; County Transportation and Public Works Department staff.
4 months	Conduct public hearings on preferred sites.	County Transportation and Public Works Department staff.
1 to 2 months	Board of Supervisors approve preferred site(s).	Board of Supervisors; County Counsel.
4 to 6 months	Conduct site specific environmental investigations of preferred site(s) to identify major environmental issues and fatal flaws.	County Transportation and Public Works Department staff.
4 to 6 months	Land option agreement on purchase of land by County.	County staff; County Counsel.
12 to 18 months	Conduct CEQA analysis of preferred site/facility and alternatives. Includes preparation of engineering drawings, land use planning documents, field investigations, supplemental EIR.	County Transportation and Public Works Department staff

SITING, DESIGN, AND CONSTRUCTION OF AN INTEGRATED RESOURCES MANAGEMENT FACILITY		
Estimated Time to Complete	**Activity/Milestone/Decision Points**	**Involved and Responsible Parties**
2 months	Certification of EIR.	Board of Supervisors.
12onths	Solid Waste Facility Permitting, including preparation of Joint Technical Document, Preliminary Closure/Post-Closure Maintenance Plan, Waste discharge requirements, air quality permit to construct, local land use permits.	County Transportation and Public Works Department staff; County Counsel.
6 months	Bond Proposal and Financing.	County Board of Supervisors; affected stakeholders.
18 months	Facility design and pre-construction, including design studies, plans and specifications, local permits, contractor bidding.	County Transportation and Public Works Department staff; other County Departments; County Counsel; regulatory agencies.
12 to 36 months	Facility construction: • Infrastructure/civil improvements. • Greenwaste facility construction. • Organics processing facility. • Landfill.	County Transportation and Public Works Department staff.
TOTAL: **8.5 to 11.5 years**	**RESULT:** **Development of an integrated resource management facility for organics processing, green waste composting and landfilling.**	