South Orange County Wastewater Authority

BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

MARCH 2006

ACKNOWLEDGEMENTS

The process of developing the update to the South Orange County Wastewater Authority (SOCWA) Biosolids Management Strategic Plan has been a collaborative effort involving many individuals, companies and utilities. We would first like to acknowledge the efforts of the consultants who contributed to the preparation of this plan:

- Dennis Wood, Robert Gillette and Lana Yao, *Carollo Engineers* – Carollo developed much of the text and the analysis that are included in this study. Carollo also prepared the graphics contained herein.
- Charles Egigian-Nichols, Tetra Tech – *Tetra Tech* prepared both the Feasibility Study for the Prima Deshecha Compost Facility and the original 2002 SOCWA Biosolids Strategic Plan
- Fred Soroushian and Rene Groskreutz, *CH2MHill* – CH2MHill participated in the development of the Feasibility Study for the Prima Deshecha Compost Facility; the company was also responsible for the 2002 Advanced Digestion Study for SOCWA.
- Jon Hay, *Black and Veatch* – Black and Veatch prepared the SOCWA Facility Heat Drying Analysis as well as providing peer review for the Compost Study Feasibility Study.

We would also like to acknowledge the ongoing participation of SOCWA's Engineering Committee:

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- Dennis Cafferty, *El Toro Water District*
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- Noah Sanchez, *Irvine Ranch Water District*
- Dave Seymour, *Santa Margarita Water District*
- David Shissler, *City of Laguna Beach*

These individuals participated in workshops, reviewed project submittals and offered insight into the operations of their own agencies.

Finally we would like to thank the members of SOCWA staff would contributed to this effort including the members of the Operations Department for data collection and Christine Wade for patiently navigating the challenging straits of Microsoft Word.

INTRODUCTION

The South Orange County Wastewater Authority (SOCWA) performs solids treatment at three of its treatment plants: the J.B. Latham Treatment Plant (JBLTP), the Regional Treatment Plant (RTP), and Plant 3A (3A). The biosolids are anaerobically digested at each of the plants. The digested biosolids are then dewatered by centrifuges and disposed of off-site.

Over the past eight years, SOCWA biosolids have been managed through composting of biosolids, land application of Class B designated biosolids, and landfilling. The first two options were performed for SOCWA by a contractor, Synagro, while the landfilling was completed by SOCWA staff delivering biosolids to the County of Orange Prima Deshecha Landfill. In 2004, SOCWA signed a new contract with the Synagro for a 10-year guaranteed commitment to participate in a proposed composting facility in Kern County titled the South Kern Industrial Center (SKIC) Composting Facility. This contract guarantees the shipment of 25 tons per day (tpd) of SOCWA biosolids to the SKIC Facility. The SKIC Composting Facility has been impacted by political controversies regarding importation of biosolids into Kern County. However, operation is expected to begin in late 2006.

The 2005 SOCWA Biosolids Management Strategic Plan Update is being developed as a time of transition occurs for SOCWA in terms of its existing biosolids management options. SOCWA's current agreement with Synagro for the land application and Corona composting options expires in October 2006. The Corona composting site will permanently close in October, 2008. The back-up contract with Waste Markets ends in July, 2006. SOCWA needs to negotiate new private contracts; however, these new contracts need to reflect the development of the other biosolids management options.

The purpose of the current study is to reconsider the biosolids management options available to SOCWA and to develop an action plan for implementing the recommendations of the study.

BIOSOLIDS MANAGEMENT GOALS

The following goals for the SOCWA biosolids management program were identified through a series of workshops:

- The program should maintain multiple, economical options. At least three options are to be identified for each treatment facility.
- The program should maximize SOCWA control. Options should include both reuse and disposal within the County. The selected program should not increase impacts to the neighbors

surrounding the three treatment plants.

- The program should adhere to environmentally sound practices.
- The beneficial reuse of biosolids is important; however, this goal does not outweigh the need for a program that strives for long term economic responsibility.
- The Biosolids Management Strategic Plan needs to remain flexible and should be updated every two years to reflect the rapidly changing biosolids market.

EXISTING BIOSOLIDS HANDLING AT SOCWA

The centrifuge dewatering process at all three plants yields biosolids cake that ranges between 23% to 28% solids concentration. The current annual average of biosolids production is 77.1 wet tons per day; the projected ultimate biosolids production is 88.7 wet tons per day. Current and projected production for each plant are summarized in Table ES.1 Biosolids hauling from the three SOCWA treatment facilities with solids handling capability can be simplified as a total of 3 to 3-1/2 truck loads each day.

The Regional Treatment Plant and Plant 3A produce Class B biosolids as defined by Federal regulations. The biosolids from the J. B. Latham Treatment Plant can not meet this classification due to insufficient digester detention time.

Neither the J. B. Latham Treatment Plant nor the Regional Treatment Plant has the capability to store more than one day's production of dewatered biosolids cake. Plant 3A has the capability of storing 2 to 3 days of dewatered biosolids cake in outside bins. However, this represents a potential odor concern.

The hauling of biosolids to the County of Orange Prima Deshecha Landfill has been an element of SOCWA's (and its predecessors') biosolids management for over 20 years. This remains the most cost effective approach to biosolids management. The ability to haul large amounts of biosolids to the Prima Deshecha Landfill on a regular basis is limited by potential wet weather conditions and a 10:1 refuse to biosolids criterion. The recent annual average of hauling to the Prima Deshecha Landfill

Table ES.1 SOCWA Biosolids Quantities

Production [1]	J.B. Latham WWTP	Regional WWTP	Plant 3A	Total
Current [2]	23.6	46.2	7.3	77.1
Ultimate[3]	27.1	53.1	8.4	88.7

(1) Wet tons per day
(2) 2004 Historical Biosolids Production
(3) Based on a 15% increase

has been 12 wet tons per day. None of the alternatives developed in this strategic plan include hauling to the landfill at an average rate higher than 12 tons per day.

BIOSOLIDS REGULATIONS

Numerous federal, state, and local agencies regulate biosolids beneficial reuse/disposal. Agency jurisdiction may vary depending on the beneficial use/disposal methods employed. The most significant trend in regulations in the last few years is the growing restriction in land application. Many counties in California have recently developed or are currently developing ordinances for biosolids land application. The counties that have significant impact on SOCWA are Riverside County, Imperial County, San Bernardino County, Kings County, and Kern County. None of these counties completely ban all biosolids land application. However, this trend has an inflationary impact on private beneficial reuse/disposal contracts as the contractors must haul the biosolids to a more distant location. This also impacts the reliability of biosolids management as disposal options are becoming more vulnerable to local political activism.

There are no current regulations in the State of Arizona that prohibit the land application of biosolids. However, it is assumed that local political forces will begin lobbying for the implementation of some form of biosolids restriction within the next 5 to 10 years.

REGIONAL BIOSOLIDS MANAGEMENT PROGRAMS

Wastewater utilities in Southern California have adopted widely varying approaches to biosolids management. The result is that there are numerous biosolids projects that have been developed or are being developed in the region. However, there are no existing programs that appear to offer any partnering opportunities for SOCWA. SOCWA has entered into discussions with the Inland Empire Utilities Agency (IEUA) and the Orange County Sanitation District (OCSD) regarding potential participation in a conceptual regional solids handling facility in the Prado Basin.

SOCWA will continue to work in conjunction with OCSD to identify and develop projects such as the proposed Prima Deshecha Compost Facility that provide biosolids handling solutions on a County wide basis.

The Santa Margarita Water District is evaluating options for biosolids management at its Chiquita Water Reclamation Facility. SOCWA will maintain a dialogue with SMWD to determine if there are any possibilities for joint participation at the Chiquita site.

PRIVATE DISPOSAL AND REUSE OPTIONS

A survey of private disposal options yielded the following:

- Fourteen companies were identified as potential handlers of biosolids.

These firms dispose of biosolids through land application, landfilling and composting. A survey of the firms was conducted to determine site locations, capacities, longevity of the disposal options and other information.

- The number of private biosolids disposal firms has gone up slightly since the 2002 SOCWA Biosolids Strategic Plan Update.
- The current range of land application costs (including hauling) ranges from $40 to $55/wet ton.
- The current average contracted cost for composting (including hauling) is approximately $55/wet ton.
- SOCWA has a 10 year contract with Synagro for 25 wet tons per day of guaranteed capacity at the South Kern Industrial Complex (SKIC) Compost Facility. This site is currently under construction and is expected to begin operation in late 2006.
- Another type of opportunity may be created by firms such as EnerTech that utilize a specialized type of handling to generate a biosolids product for reuse. EnerTech is developing a facility in Rialto that is expected to have a 675 wet ton per day capacity.
- The rate of inflation for private contract costs from 2002 to 2005 appeared to be approximately 10% to 25% for that period.
- There is a greater reliance on handling and disposal of biosolids by private companies within the State of Arizona.
- There appear to be fewer future options available for procuring contracts without a guaranteed delivery amount.
- The experience of Synagro with the SKIC Composting Facility and EnerTech with the reuse facility in Rialto point to challenges faced by private firms in developing new handling facilities. The longer development time and political vulnerability may impact reliability of new contracts that SOCWA negotiates with private firms.

BIOSOLIDS TREATMENT, DISPOSAL AND REUSE OPTIONS

Ten advanced treatment technologies were reviewed for possible implementation at SOCWA's treatment plants (with the exception of composting which was considered at the proposed Prima Deshecha site). These ten options are presented with their estimated unit costs (given different methods of disposal) in Table ES.2.

The conclusions of this technology screening are summarized below:

- Advanced digestion, composting and heat drying are the treatment options that appear most viable for SOCWA.
- Pasteurization was identified as a technology that might merit further consideration if the costs of currently favored options significantly increase.
- Chemical treatment, vermiculture, pyrolysis, incineration and glassification were determined to be infeasible.

Table ES.2 Biosolids Treatment and Disposal Estimated Costs

Treatment	Landfill	Class B Land Spreading	Class A Land Spreading	Compost Class A	Reuse	Daily Cover
Anaerobic Digestion	$34	$39		$90		$41
Phased Digestion	$35		$38			$48
Thermophilic Digestion	$34		$37			$47
Composting (Prima Deshecha)	$74		$77		$68	
Pasteurization	$48-$54		$50-$57			
Drying	$110		$113		$105	
Chemical	$52-$94		$54-$96		$46-$88	
Vermiculture					Unknown Higher than Composting	
Pyrolosis	$110					
Incineration	$120 - $549					
Glassification	Exceeds Incineration				Exceeds Incineration	

Costs in $/wet ton-includes trucking.

BIOSOLIDS ALTERNATIVE TREATMENT SUMMARY

Advanced digestion, composting and heat drying have been the subject of previous studies for SOCWA. The findings of the previous studies were summarized for this analysis. Key findings are as follows:

- Advanced Digestion - Two phase, temperature phased digestion offers potential at the J. B. Latham and Regional Treatment Plants to produce Class A biosolids without a significant potential for odor complaints. This process requires too much space to be implemented at Plant 3A. However, thermo-philic digestion may be feasible at Plant 3A.

- Heat Drying - Heat drying is feasible for both the J. B. Latham and Regional Treatment Plants. There is not sufficient space to implement heat drying at Plant 3A.

MARKET FOR BIOSOLIDS PRODUCTS

The SOCWA Biosolids Strategic Plan evaluated the marketability of two biosolids treatment products: compost and heat drying pellets. This analysis was performed due to the concern about the ability to effectively dispose of the compost generated at the proposed Prima Deshecha Compost Facility. The following key points were identified regarding the marketing of biosolids based compost:

- The proposed Prima Deshecha Compost Facility would generate less than 5 percent of the compost produced by other Southern California operators.

- A 2003 study suggested that SOCWA should focus its marketing effort on local communities, CalTrans and horticultural users. This study also indicated that that there is sufficient demand in Orange County to market all of the compost produced at the proposed Prima Deshecha Compost Facility.

- It appears that the current demand for compost in Orange County is being met by the existing compost producers in the region. Therefore, unless new markets are developed by SOCWA it must compete with existing compost producers for customers.

- Due to the relatively low volume of compost to be produced at SOCWA's proposed composting facility it is not likely that SOCWA can compete in the large retail bagged compost market. It is assumed that SOCWA would market its compost in bulk form to local markets. Currently local compost needs are most likely being met by greenwaste

composters that operate in the region.

- The most important aspect of a successful biosolids composting operation is marketing the product. A third-party operator would be responsible for the marketing and would likely have existing outlets for the product.

The market for dried pellets may also be limited. The experience of the new City of Corona heat drying system and the proposed Encina Wastewater Authority drying facility will provide a future reference as to the relative ease of disposing/marketing the dried product.

BIOSOLIDS MANAGEMENT SCENARIOS

Four biosolids management scenarios were identified for SOCWA. These four scenarios are as described below:

- Each management scenario involves the commitment of 25 wet tons per day to be shipped to the Synagro SKIC Compost Facility for the next ten years as set forth by contract with Synagro.

- Each management scenario involves the disposal of up to 12 wet tons per day of biosolids at the Prima Deshecha Landfill.

- Biosolids Management Scenario No.1 is basically an extension of the existing operation with the inclusion of the 25 wet tons per day commitment to the Synagro SKIC facility. There will be no change in the facility treatment schemes. The agency will continue to contract with private companies for the disposal of biosolids through land application, composting (other than SKIC) or landfilling (other than Prima Deshecha).

- Biosolids Management Scenario No.2 involves the construction and operation of the Prima Deshecha Compost Facility.

- Biosolids Management Scenario No.3 is the same as Scenario No.1; the difference is the implementation of phased digestion at the J. B. Latham Treatment Plant to produce Class A type biosolids at that facility. Disposal will continue to be through the procurement of private contracts.

- Biosolids Management Scenario No.4 is also similar to Scenario No.1 as no change in the treatment scheme is proposed. This alternative considers contracting with a private firm for the specialized reuse of biosolids. The example of the proposed EnerTech facility in Rialto is used in this scenario.

- Heat drying has not been incorporated into any of the current management scenarios due to the high cost of that approach. However, heat drying remains as a

potential back-up option at either the J. B. Latham or Regional Treatment Plants.

- The proposed disposal rate of each of the four alternatives is presented in Table ES.3.

COST ANALYSIS

Table ES.4 presents the estimated annual costs for the four biosolids management scenarios.

Table ES.3 Biosolids Management Scenarios

	Average Daily Disposal Rate (Wet Tons Per Day)				
Management Scenario	**Private Contractor (Land Application)**	**Prima Deschecha Compost Facility**	**Synagro SKIC Compost Facility**	**Private Contractor (Reuse)**	**Prima Deshecha Landfill**
No.1	51.7		25		12
No.2		55	25		8.7
No.3	51.7		25		12
No.4			25	51.7	12

Table ES.4 Biosolids Management Scenario Annual Costs

Alternative	Reuse/Disposal Elements			Annual Biosolids Management Cost
No. 1	Prima Deshecha Landfill	SYNAGRO South Kern	Class B Land Spreading	$1,491,000
No. 2	Prima Deshecha Landfill	SYNAGRO South Kern	Prima Deschecha Compost Facility	$2,528,000
No. 3	Prima Deshecha Landfill	SYNAGRO South Kern	JBL Phased Digestion/Class B Spreading	$1,837,000
No. 4	Prima Deshecha Landfill	SYNAGRO South Kern	EnerTech	$2,152,000

SENSITIVITY ANALYSIS

A cost sensitivity analysis indicated the following issues:

- Inflation of the SKIC costs impacts each management scenario the same.
- The price of land application must grow to over $70 tpd before Alternatives 2 and 4 would become more economically equitable.
- The unit cost for the Prima Deshecha Compost facility was evaluated over a range from $80 per ton to $110 per ton. It is unlikely over this range that the Management Scenario No.2 would ever be the most economic approach.

A review of the management scenarios according to non-cost factors indicated the following:

- Management Scenario No.1 reliance on contracts for land application makes this option the most vulnerable to regulatory and political impacts.
- Management Scenario No.2 is almost entirely focused on composting (the SKIC contract and the Prima Deshecha Compost Facility. That makes this alternative the most sensitive to fluctuations in the reuse (compost) market.
- All of the management scenarios are vulnerable to the reliance on outside contractors. Management Scenario No.4 was found to be slightly more disadvantageous due to the reliance on the EnerTech's contracts for reuse of the energy and residuals generated at that facility.

PRIMA DESHECHA COMPOST FACILITY

The development of a new compost facility at the County of Orange Prima Deshecha Landfill site was evaluated in a feasibility study prepared by TetraTech in 2005. The analysis indicated that there were a significant series of issues that must be resolved prior to making a final determination on whether or not to implement the project. These key issues included the following:

- Selection of a final location for the compost facility at the Prima Deshecha Landfill.
- Geotechnical evaluation to identify foundation requirements and estimated costs for the new facility – the Feasibility Study had indicated that poor geotechnical conditions at the site would have a dramatic impact on the project cost.
- Development of agency agreement between OCSD and SOCWA to determine responsibility, owner-ship capacity and cost sharing.

- Negotiation of lease agreement with the County of Orange to determine site fee.
- Investigation with the County of Orange and negotiation with the private company CR&R (and potential other firms) to secure the source of bulking material and amendments for the compost facility.
- Definition of the appropriate compost technologies that would be allowed in a bid.
- Identification of the procurement procedure for a facility operator.
- Development of the CEQA documentation and facility permitting.
- Determination of the approach that SOCWA should take to the local marketing of compost based biosolids.

A series of preliminary implementation projects were identified to resolve the above listed issues:

- Alternative siting assessment.
- Geotechnical site assessment.
- CEQA development.
- Permitting assistance.
- Development of 30% design documents for bidding (if a design-build form of bidding is to be utilized).

It is estimated that this phase of the project will last two years. The preliminary phase would culminate in the opening of bids for facility construction. An additional two to three years is expected from the bid to facility start-up.

The original concept for the Prima Deshecha Compost Facility was based on a total 110 wet ton per day capacity with the capacity ownership divided evenly between OCSD and SOCWA. However, the 55 wet ton per day ownership by SOCWA would constitute a significant portion of the SOCWA's projected 88.7 wet ton per day ultimate biosolids production. This is not in keeping with the goal of biosolids management diversity and flexibility. Figure ES.1 shows a simplified view of SOCWA's daily biosolids production with a potential future balanced approach to reuse/disposal needs. This disposal requirement is simplified as three truckloads per day plus additional transport to the Prima Deshecha Landfill. The findings of this analysis indicate that SOCWA should pursue participation in the proposed Prima Deshecha Compost Facility at lower ownership capacity of 25 wet tons (or one truck load) per day.

DEFINING THE MANAGEMENT PLAN

The development of the SOCWA Biosolids Management Plan indicated that the most economical course of action for the agency is to continue in the current mode of renewing private

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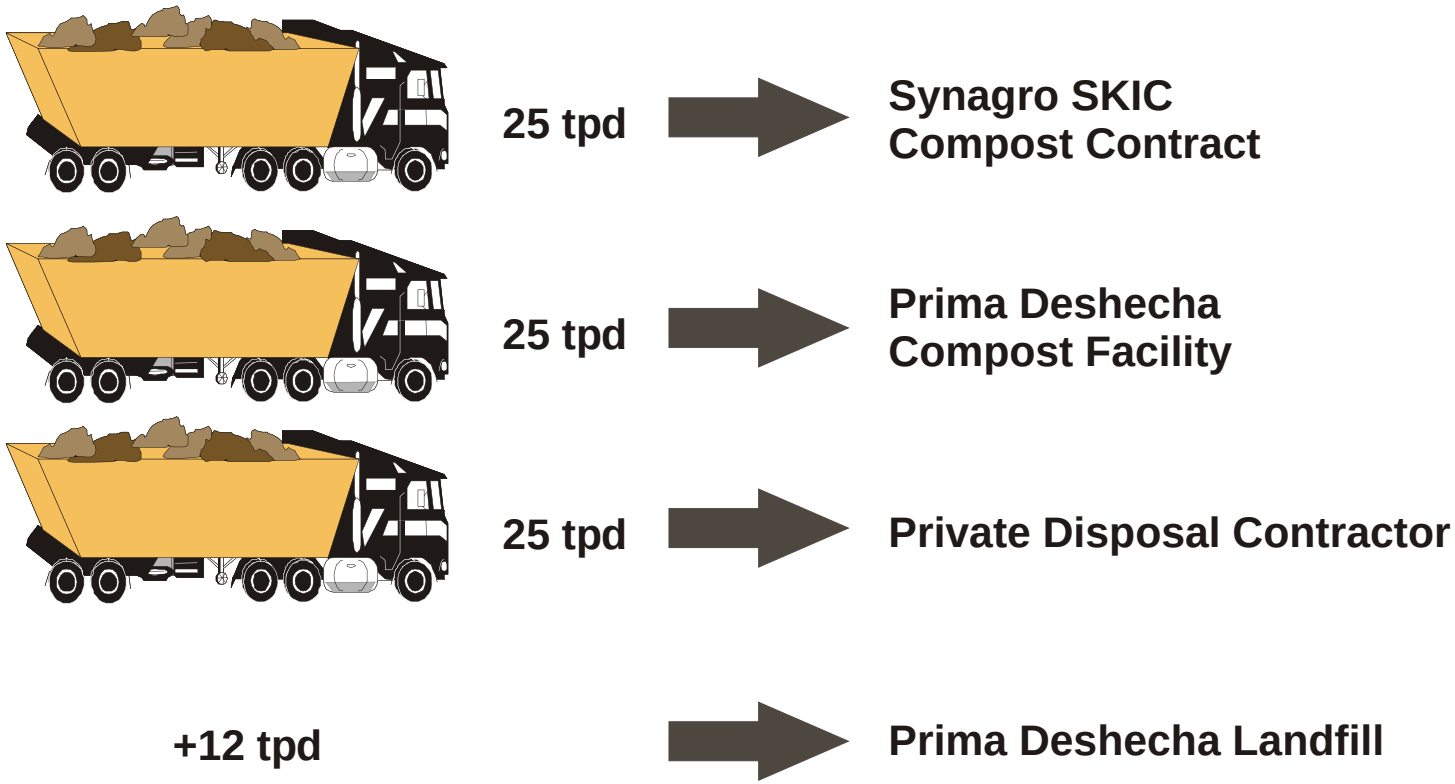

MAINTAINING FLEXIBILITY IN BIOSOLIDS DISPOSAL

FIGURE ES.1

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contracts for reuse/disposal (Management Scenario No.1). The economic advantage of this management approach is countered by the uncertain future of land application. The implementation of the Prima Deshecha Compost Facility (Management Scenario No.2) offers a long term alternative that provides in-county handling of SOCWA's biosolids. However, this option is hampered by technical and institutional uncertainties as well as a currently unfavorable cost comparison to other management scenarios. In addition, options were identified (Prado Basin Regional Facility, Santa Margarita Water District Chiquita solids handling facility, heat drying) that are either too undefined or too expensive to merit consideration as one of the management scenarios. Therefore, the SOCWA Biosolids Management Plan is not based on the recommendation of a single management scenario. The Plan is based on a flexible approach as dictated by the goals set forth in Chapter 2. Figure ES.2 presents the decision path for implementing the Plan. There are currently two courses of action:

- Procure New Private Contracts.
- Procure New Private Contracts and Investigate Prima Deshecha Compost Facility.

The goal of the current negotiation for new private disposal contracts is to provide coverage through 2008 - 2009. Longer contracts will be negotiated if beneficial terms can be obtained.

The expected duration of both the Prima Deshecha Compost Facility development process and the new private disposals contracts indicates that SOCWA should review the Biosolids Strategic Plan again in late 2007 - early 2008. The decisions to be made at this juncture in time are identified in Figure ES.2. The key points will be the final decision to proceed with the Prima Deshecha Compost Facility and the type/duration of new private disposal contracts to procure. A decision not to build the Prima Deshecha Compost Facility will lead to continued reliance on private disposal contracts. A no-go decision would also lead to a crucial update of the Biosolids Strategic Plan in late 2009 - early 2010.

The intervening four years between now and the proposed '09/'10 Biosolids Strategic Plan Update will provide new information that will be helpful in determining a long term plan. This anticipated information includes the following:

- Trend in biosolids land applications limitations - particularly with respect to the political/regulatory climate in the State of Arizona.
- Inflation in private disposal contracts due to both regulatory and consumer price index effects.

- The effectiveness of heat drying operations at the Encina Wastewater Agency and the City of Corona.
- The conceptual development of biosolids management plans for the Santa Margarita Water District Chiquita Water Reclamation Facility.

The development of new and the evolution of existing solids handling technology:

- The identification of new partnering and contracting opportunities.

RECOMMENDATIONS

The recommendations of the Biosolids Management Strategic Plan Update are as follows:

- Investigate and negotiate successor contracts to the current contracts with Synagro and Waste Markets. These new contracts should have durations ranging from 2 to 5 years depending on the terms available.
- Develop an agreement with the Orange County Sanitation District (OCSD) regarding the development of the Prima Deshecha Compost Facility. This agreement should be based on limiting SOCWA's participation in the facility to an average 25 wet tons per day. The agreement should also provide the language to allow either party to withdraw during the preliminary development phase of the project.
- Begin final site selection analysis and geotechnical evaluation for Prima Deshecha Compost Facility with an emphasis on a site that will minimize geotechnical costs.
- Continue to work with the County of Orange IWMD through the site selection process for the Prima Deshecha Compost Facility. Develop terms of a lease agreement in order to identify potential site fees.
- Proceed with discussions with IWMD and CR&R to develop an agreement for amendments and bulking materials for the Prima Deshecha Compost Facility.
- Procure the services of a consultant to work on environmental analysis and permit preparation for the Prima Deshecha Compost Facility of previous actions and investigations regarding the compost facility are successful.
- Work with City of San Juan Capistrano staff in the development of the CEQA process. Identify methods of mitigating potential impacts on neighbors adjacent to the Prima Deshecha site. Develop plan for

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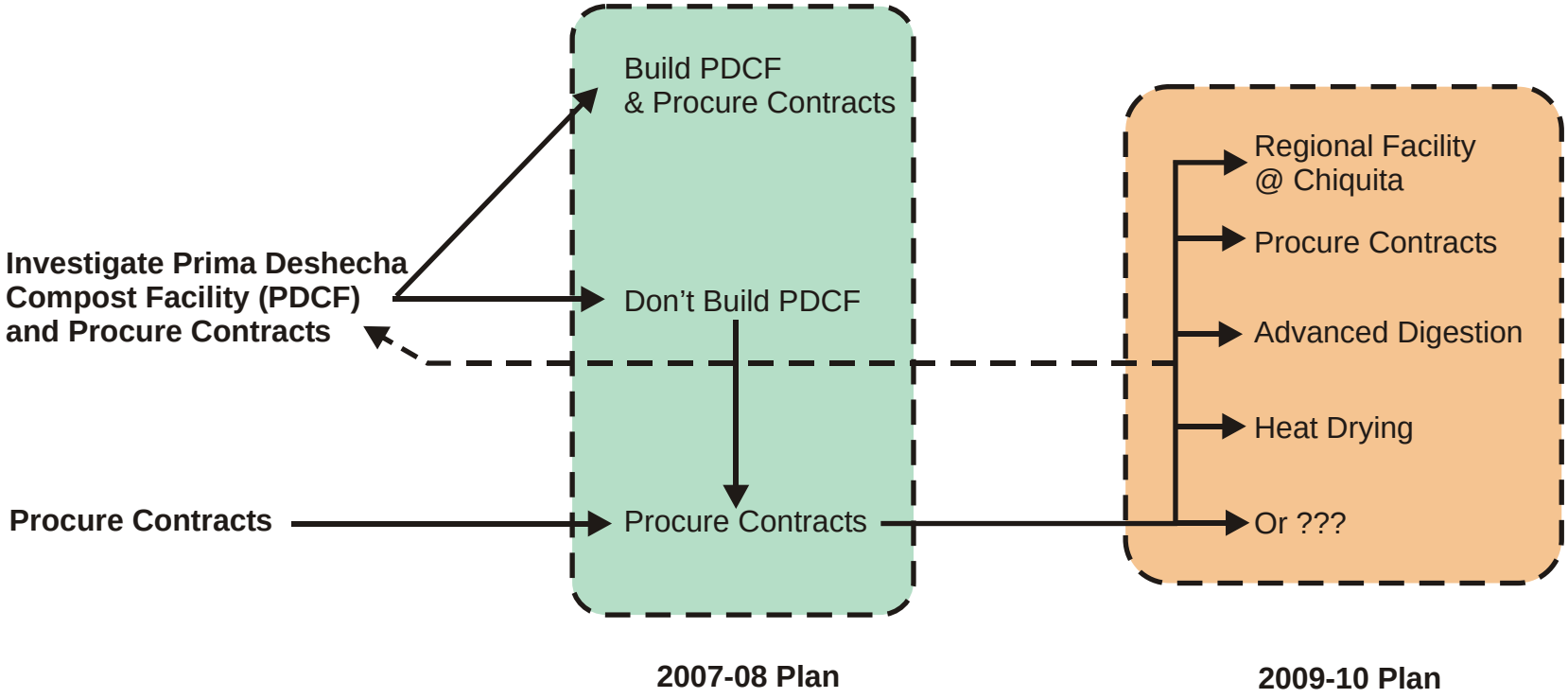

DECISION IN BIOSOLIDS MANAGEMENT

FIGURE ES.2

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integrating compost facility into the site closure plan.

- Identify the delivery mechanism (e.g. design/build/operate) for the Prima Deshecha Compost Facility. Procure a consultant to prepare bidding documents for the project of previous action and investigations regarding the compost facility are successful.
- Evaluate the OCSD biosolids based compost local marketing program. Determine whether this program is applicable to the South County regardless of whether or not the Prima Deshecha Compost Facility is implemented. Develop a plan for a similar marketing program or identify possibility of extending OCSD program to the South County.
- Continue dialogue with the Santa Margarita Water District regarding long term solids management plans at the Chiquita Water Reclamation Facility. Participate in any analysis of a potential regional facility at that location.
- Continue to pursue possible participation in a potential regional solids handling facility in the Prado Basin.
- Monitor the progress of the heat drying systems at the City of Corona and the Encina Wastewater Authority with emphasis on the marketing programs for the drying product.
- Continue to evaluate evolving technologies for the treatment and reuse of biosolids.
- Remain open to new proposals for contracting biosolids reuse /disposal similar to the current EnerTech proposal. Investigate and inform the SOCWA Engineering Committee and Board.
- Follow the decision path identified in Figure ES.2 for either the implementation or non-implementation of the Prima Deshecha Compost Facility.
- Prepare an update to the SOCWA Biosolids Management Strategic Plan in mid- to late 2007 and, at minimum, every two years thereafter.

BIOSOLIDS HANDLING AT SOCWA

The South Orange County Wastewater Authority (SOCWA) performs solids treatment at three of its treatment plants: the J.B. Latham Treatment Plant (JBLTP), the Regional Treatment Plant (RTP), and Plant 3A (3A). The biosolids are anaerobically digested at each of the plants. The digested biosolids are then dewatered by centrifuges and disposed of off-site.

The RTP also treats sludges from the Coastal Treatment Plant and the El Toro Water District Water Reclamation Facility. Raw primary and waste activated sludge is pumped from the Coastal Plant to RTP. Liquid waste activated sludge is trucked from the El Toro plant to the RTP. The El Toro plant is an extended aeration activated sludge plant. There are no primary clarifiers and resulting primary sludge.

At the JBLTP and RTP plants, the dewatered biosolids can be discharged to 40 cubic yard trailers for disposal. At 3A, the biosolids are discharged into smaller bins.

Over the past eight years, SOCWA biosolids have been managed using three methods at four locations away from the agency's treatment facilities. These three methods included composting of biosolids, land application of Class B designated biosolids, and landfilling. The first two options were performed for SOCWA by a contractor, Synagro, while the landfilling was completed by SOCWA staff delivering biosolids to the Prima Deshecha Landfill near San Juan Capistrano. A small portion of backup landfilled biosolids capacity is under contract and taken to the South Yuma County Landfill by an additional contractor.

In 2004, SOCWA signed a new contract with the Synagro for a 10-year guaranteed commitment to participate in a proposed composting facility in Kern County titled the South Kern Industrial Center (SKIC) Composting Facility. This contract guarantees the shipment of 25 tons per day (tpd) of SOCWA Biosolids to the SKIC Facility at a rate of $54 per ton with options to extend the commitment an additional 5 or 10 years. The SKIC Composting Facility has been impacted by political controversies regarding importation of biosolids into Kern County. However, Synagro indicates that this facility will be ready to begin operation in late 2006.

2002 SOCWA BIOSOLIDS MANAGEMENT STRATEGIC PLAN

Tetra Tech, Inc. completed a Biosolids Management Strategic Plan for SOCWA in 2002. One of the primary recommendations of this plan was for SOCWA to reduce reliance on private company biosolids management contracts. A cornerstone of this strategy was the further investigation and development of a potential joint

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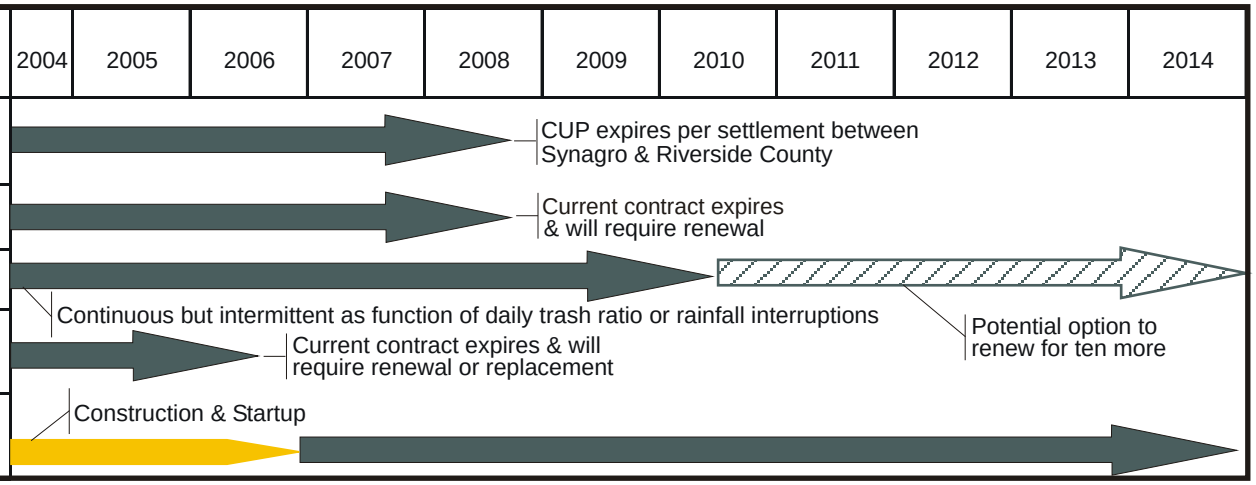
Current Biosolids Management Contracts	Unit Cost ($/WT)	Daily Capacity (TPD)
Synagro Composting @ Corona**	$41.51	110
Synagro Land Application Class B Solids**	$41.60	110
Prima Deshecha Landfill	$34*	200**
Waste Markets Yuma AZ Landfill (backup only)	$56.50	110
Synagro Composting @ South Kern Industrial Center**	$54.00	25



* $34 is based on a $27 tipping fee with an assumed $7 hauling rate.
** Permit limits higher (350 tons per day) but operationally 200 is limit.
*** Adjusts per CPI with provisions for extra cost due to regulatory.

STATUS OF EXISTING SOCWA BIOSOLIDS OPTIONS

FIGURE 1.1

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composting facility with the Orange County Sanitation District at the Prima Deshecha Landfill.

BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE GOAL

The 2005 SOCWA Biosolids Management Strategic Plan Update is being developed as a time of transition occurs for SOCWA in terms of its existing biosolids management options. Figure 1.1 shows the status of the existing contracts. SOCWA's current agreement with Synagro for the land application and Corona composting options expires in October 2006. The Corona composting site will permanently close on October 31, 2008. The back-up contract with Waste Markets comes to an end in October, 2006. The start-up date for the SKIC Composting Facility is projected to occur in December, 2006. SOCWA needs to negotiate new private contracts; however, these new contracts need to reflect the development of the other biosolids management options.

Between 2002 and 2005 SOCWA has completed analysis on individual components of the master plan. Studies on advanced digestion and heat drying have been completed in recent years. SOCWA has also worked with the County of Orange and the Orange County Sanitation District to further develop the concept for the potential composting facility at the Prima Deshecha Landfill. This process culminated with the completion of the Technical Feasibility Study conducted by Tetra Tech in 2005.

The purpose of the current study is to reconsider the biosolids management options available to SOCWA. The specific goals of the Strategic Plan Update are as follows:

- Review and restate the goals of the SOCWA Biosolids management plan
- Consider the impact of the changing regulatory scene and market on management options
- Screen treatment and disposal/reuse options available to SOCWA
- Develop a flexible management plan based on multiple Biosolids handling options
- Identify costs for various management scenarios including the potential cost impact on SOCWA's member agencies
- Develop an action plan for implementing recommendations of the study.

It should be noted that the Biosolids management field is in a constant state of flux due to changing technologies, regulations, public acceptability and unit costs. This Strategic Plan Update is therefore prepared with the understanding that the Plan is to be reviewed and updated every two years.

REPORT ORGANIZATION

The report on the 2005 Biosolids Strategic Plan Update is organized as follows:

- Chapter 2 - SOCWA Biosolids Management Goals - this chapter updates the agency goals as originally identified in the 2002 Plan.
- Chapter 3 - Impact on Biosolids Management at SOCWA Facilities - this chapter reviews biosolids handling issues specific to each treatment plant.
- Chapter 4 - Regulatory Status and Trends - this chapter identifies the current and anticipated regulations that impact the development of the management plan.
- Chapter 5 - Regional Biosolids Management Programs and Partnering Opportunities - this chapter reviews the Biosolids management activities of other Southern California wastewater utilities and considers the potential for partnering opportunities.
- Chapter 6 - Private Disposal and Reuse Options - this chapter updates the potential private contracting options available to SOCWA.
- Chapter 7 - Biosolids Treatment, Disposal and Reuse Option Matrix -the purpose of this chapter is to show the broad array of treatment, disposal and reuse options. A screening process will be use to identify the rationale of selecting a finite set of alternatives for further consideration.
- Chapter 8 - SOCWA Biosolids Alternative Summary - the purpose of this chapter is to summarize work done in previous SOCWA studies including (a) the Alternative Digestion Evaluation, (b) the J. B. Latham Treatment Plant Preliminary Digestion Report, (c) the Prima Deshecha Composting Facility Feasibility Study and (d) the Heat Drying Analysis.
- Chapter 9 - Products and Markets Summary - the purpose of this chapter is to provide a market analysis for compost and pellets products in Orange County.
- Chapter 10 - SOCWA Biosolids Management Scenarios - the purpose of this chapter is to identify three different management scenarios for Biosolids management (each scenario must identify a minimum of three treatment - disposal/reuse options).
- Chapter 11 - Cost Analysis of Biosolids Management Scenarios - this chapter incorporates cost data from other studies and prepares cost estimates for new alternatives

to provide comprehensive alternative costs.

- Chapter 12 - Sensitivity Analysis of Biosolids Management Scenarios - this chapter assesses the vulnerability of each management scenario to various factors including but not limited to environmental, permitting, political, product market, contractual, cost fluctuation and other factors.
- Chapter 13 - Development of the Compost Facility Management Option - this chapter identifies steps needed to further develop the Prima Deshecha Compost Facility.
- Chapter 14 - Developing a Flexible Management Plan - this chapter centers on a decision tree for future actions on the management plan.
- Chapter 15 - Allocation of Costs - this chapter shows how the costs will be allocated to the member agencies.
- Chapter 16 - Recommendations & Implementation Actions

GOALS FROM THE 2002 BIOSOLIDS MANAGEMENT STRATEGIC PLAN

The 2002 SOCWA Biosolids Management Strategic Plan identified the following goals for biosolids management:

- Develop local "self-sufficient" biosolids recycling projects that are environmentally sound, economically efficient and sustainable. This goal includes the requirement that biosolids treatment/processing facilities be compatible with local land use and as odor free as reasonably possible.
- Seek out cooperative planning and partnering opportunities with qualified, experienced, and reliable public and private organizations.
- Promote the concept of stewardship of our resources and Biosolids reuse within or near SOCWA's service area.

These goals were reviewed as part of the 2005 Biosolids Management Strategic Plan Update.

GOALS DISCUSSED AT BIOSOLIDS WORKSHOP NO. 1

Two workshops were held with interested stakeholders during the development of the Strategic Plan Update. The first workshop focused on the screening of the wide selection of biosolids management options; the second workshop considered the most feasible management strategies available to SOCWA. One of the primary purposes of Biosolids Workshop No.1 held on May 25, 2005, was to review and restate SOCWA's biosolids management goals. The workshop found that the following basic objectives set forth in 2002 are still applicable:

- Develop market for the reuse of biosolids.
- Develop partners in markets.
- Have backup alternatives.
- Provide full support for recycling.
- Emphasize local reuse.
- Promote safe and environmental use in the community.
- Develop programs that are flexible to change.
- Identify options that exceed production.
- Implement environmentally friendly alternatives.

Goals were offered by the workshop participants. The goals suggested included the following:

- Identify three treatment/re-use/ disposal options for each of the plants. The intent of this goal is to have a flexible and reliable

approach to biosolids management.

- Identify in-county options for reuse and disposal. An in-county option may be important to establish a political position. Implementing an in-county program provides a good perception for out-of-county options. The intent of this goal is to provide sound environmental management and to buffer SOCWA from the impacts of political movements and decision outside the County of Orange.

- Alternatively it was suggested that options that offered SOCWA a greater degree of control might be a more appropriate goal than an in-county solution.

- Identify options that are feasible within the boundaries of SOCWA's existing operations.

- A reuse goal of 50 percent would match the State's overall solid waste recycling goal.

- The landfill option is economically attractive. Discussions with the County should focus on operational strategies to increase the capability for disposal.

GOALS FOR THE 2005 BIOSOLIDS MANAGEMENT STRATEGIC PLAN

The above suggestions were discussed by the Workshop No.1 participants. The following goals were agreed to by the Workshop:

- Maintain multiple, economical options. At least three options are to be identified for each treatment facility.

- The program should maximize SOCWA control. Options should include both reuse and disposal within the County.

- The selected program should not increase impacts to the neighbors surrounding the three treatment plants.

- The program should adhere to environmentally sound practices.

- The beneficial reuse of biosolids is to be promoted; however, this goal does not outweigh the need for a program that strives for long term economic responsibility.

- The Biosolids Management Strategic Plan needs to remain flexible and should be updated every two years to reflect the rapidly changing biosolids market.

CHAPTER 3 SOLIDS MANAGEMENT AT SOCWA TREATMENT FACILITIES

CURRENT BIOSOLIDS MANAGEMENT

The SOCWA operates biosolids treatment at three of the treatment plants, J.B. Latham Treatment Plant (JBLTP), the Regional Treatment Plant (RTP), and Plant 3A (3A). The biosolids are anaerobically digested at each of the plants. The digested biosolids are then dewatered by centrifuges and disposed of off-site.

The RTP also treats sludges from the Coastal Treatment Plant and the El Toro Water District Water Reclamation Facility. Raw primary and waste activated sludge is pumped from the Coastal Plant to RTP. Liquid waste activated sludge is trucked from the El Toro plant to the RTP. The El Toro plant is an extended aeration activated sludge plant. There are no primary clarifiers and resulting primary sludge.

At the JBL and RTP plants, the dewatered biosolids can be discharged to 40 cubic yard trailers for disposal. At 3A, the biosolids are discharged into smaller bins. These bins must be handled differently than the regular trailers.

Quantity

The biosolids production for the past eight years is presented in Table 3.1. The quantities are reported in wet tons per day. The mass of biosolids has decreased at both the JBLTP and the RTP reflecting the switch from dewatering with belt filter presses to centrifuges. The centrifuge technology is capable of producing a much drier cake. The weight of biosolids and resulting disposal costs has decreased. The dewatering at 3A began operation in June 1998. Prior to that time, the raw sludges were discharged to the sewer system for downstream handling at the JBLTP and were trucked to RTP for treatment.

The projected biosolids production rates are presented in Table 3.2. The ultimate production allows for a 15 percent increase at each plant, which is consistent with potential growth in each service area. The ultimate quantity from all plants, including the Coastal and El Toro solids contribution result in a projected ultimate production rate of about 88.7 wet tons per day.

Quality

The quality of the SOCWA biosolids compared to the 503b regulations is reported in Table 3.3. The RTP and 3A biosolids meet the Class B requirements. The JBL biosolids do not meet Class B at this time. The available digester volume does not provide the required 15 days hydraulic detention time required for Class B. Once the digester upgrade project is completed, there will be more than 15 days of hydraulic detention time. The JBL biosolids may meet Class B

Table 3.1 Historical Biosolids Production (1)

Year	JBLTP	RTP	Plant 3A	Total
1997	44.4	58.5	-	102.9
1998	43.9	46.9	2.3 (2)	93.1
1999	39.9	43.9	4.4	88.2
2000	39.3	45.4	5.5	90.2
2001	35.6	45.8	6.6	88.0
2002	32.3	43.5	8.6	84.4
2003	25.5	45.6	8.1	79.2
2004	23.6	46.2	7.3	77.1

(1) Wet tons per day

(2) The solids system at Plant 3A was brought on-line in June, 1998. Solids were previously discharged into the sewer system for handling at the J. B. Latham Treatment Plant or trucked to the Regional Treatment Plant.

Table 3.2 Biosolids Quantities

Production (1)	J.B. Latham WWTP	Regional WWTP	Plant 3A	Total
Current (2)	23.6	46.2	7.3	77.1
Ultimate(3)	27.1	53.1	8.4	88.7

(1) Wet tons per day

(2) 2004 Historical Biosolids Production

(3) Based on a 15% increase

Table 3.3 Biosolids Quality

503b Quality	J.B. Latham WWTP	Regional WWTP	Plant 3A
Class B	No	Yes	Yes
Class A	No	No	No
Exceptional Quality	Yes	Yes	Yes

requirements when all digesters are in operation. All of the biosolids meet the requirements for Exceptional Quality. Exceptional Quality is required as part of meeting the Class A requirements that allow a wider range of disposal and reuse options.

DISPOSAL PRACTICES

Historical Disposal Practices

Disposal of biosolids was historically done at the County of Orange Prima Deshecha Landfill off of the Ortega Highway (parts of the landfill are located within the City of San Juan Capistrano and portions within unincorporated County land). During the 1980's the South East Regional Reclamation Authority (SERRA, one of the predecessor agencies to SOCWA) attempted to secure back-up contracts for disposal at Los Angeles County Sanitation District landfills and at the BKK operation in West Covina.

The trend away from landfilling as the sole disposal method began in the early 1990's. At that time solids from the J. B. Latham Treatment Plant were periodically hauled to the Chiquita Water Reclamation Facility for a pilot compost facility that was operated jointly with the Santa Margarita Water District. This pilot facility operated for approximately one year after which the operation was terminated due to the lack of compost demand. The first contract with a private company for the hauling and disposal of biosolids was established in the mid-1990's with a firm called CCF. A subsequent contract was signed in 1997 for the hauling of biosolids to the recycling compost facility in Corona. This facility was subsequently acquired by Synagro. Another contracted was approved in 2000 with Synagro for the land application of biosolids. SOCWA also entered into a contract with the firm Waste Markets in 2001 to provide a back-up disposal method of landfilling in the State of Arizona.

Current Disposal Practices

SOCWA currently maintains contracts with both Synagro and Waste Markets as well as an agreement with the County of Orange for continued disposal in the Prima Deshecha Landfill. The projected disposal practices for fiscal year 2005/2006 are presented in Table 3.4. SOCWA recently contracted with Synagro for biosolids handling at a new composting facility in Kern County. This contract is different from previous management contracts in that SOCWA has agreed to the guaranteed average delivery of 25 wet tons per day to the new Kern County facility. The Synagro South Kern Industrial Complex (SKIC) facility is expected to be operational in 2006. As discussed in Chapters 4, biosolids

Table 3.4 Current Biosolids Disposal Contracts

	SYNAGRO	SYNAGRO	SYNAGRO	County of Orange	Waste Markets
Disposal Location	**South Kern Composting Facility (SKIC)**	**Land Application in Needles, CA and Arizona**	**Corona Compost-ing Facility(5)**	**Prima Deshecha Landfill**	**Backup Landfill Simi Valley or Arizona**
Disposal Quantity (1)	25	24	30	12 (3)	No Amount Stated
Disposal Price (2)					
Disposal	$40			$27	
Transportation	$14	(Included)	(Included)	$7	(Included)
Total	$54	$43.48(6)	$41.51 (7)	$34.00	$56.50
Initial Date	2006				
Termination Date	2016	Oct. 2006	Oct. 2008	2014 (8)	Jul. 2006

(1) Wet tons per day.
(2) $ per wet ton.
(3) Limited by 10 to 1 refuse to biosolids ratio and weather.
(4) Estimated based on maximum of 4 loads per day.
(5) Facility closes permanently in December, 2008.
(6) Rate subject to CPI adjustment.
(7) Includes an additional $1.50/ton Riverside County host fee.
(8) The agreement allows the County of Orange the flexibility to extend the agreement an additional 10 yrs.

disposal in Kern County has been subject to political uncertainty on both the County and State levels. The Corona facility is projected to take approximately 40 percent of the current total SOCWA biosolids production. This facility will cease operation in 2008.

ISSUES BY TREATMENT PLANT

J. B. Latham Treatment Plant

Primary sludge and thickened waste activate sludge are digested anaerobically and then dewatered by any of three centrifuges. The centrifuges typically produce a biosolids cake that has a 24% to 28% solids concentration. The centrifuges are located on the second story of the Energy Recovery

Building. The dewatered solids are then conveyed directed to one of two truck bays on the building's first floor. The truck trailers typically can hold approximately 25 wet tons of sludge. One truck trailer is typically hauled from the site each day. The dewatering operation is typically operated for one eight hour shift during each day of the week. The operation usually takes place from 7:30 am to 3:30 p.m. During the summer months the dewatering operation is often run earlier in the morning hours to take advantage of off peak power rates.There is no storage for dewatered cake solids at the Latham Plant beyond what is available in the truck trailers. The plant has used available volume within the digesters during disruptions of the dewatering operation as a means of solids storage. These digesters can hold approximately 2 to 3 days of sludge storage. This usually requires subsequent extended hours of operation for the centrifuges to return the system to equilibrium.

The Latham Treatment Plant is the only one of the three plants that does not produce Class B rated solids due to a lack of digester detention time. This limits the currently available disposal methods to landfilling and composting.

Plant 3A

Primary sludge and thickened waste activate sludge are digested anaerobically and then dewatered by any of three centrifuges. The centrifuges typically produce a biosolids cake that is 23% to 26% solids concentration. The centrifuges are located on the second story of the Operations Building. The dewatered solids are then conveyed directed to a storage bin on the building's first floor. Each bin typically can hold approximately 10 wet tons of sludge. Six bins are typically hauled away from the Plant 3A site each week (usually two are hauled away on Tuesday; four are hauled away on Thursday).

The dewatering operation is typically operated for one eight hour shift. The operation usually takes place from 7:30 am to 3:30 p.m. During the summer months the dewatering operation is often run earlier in the morning hours to take advantage of off peak power rates. The centrifuging operation typically occurs only five days a week.

There is no storage for dewatered cake solids at Plant 3A beyond what is available in the bins. There are a total of eight bins at Plant 3A. Two of these bins are located within the Energy Building as part of the loading process. Filled bins are pulled by a fork lift to the area behind the digesters. The bins remain there until the private contractor comes to haul the units off site. Plant 3A only typically uses one of its two anaerobic digesters. The second digester could be used in

emergency situations to store sludge. This is not recommended as part of the normal operating process as it would involve a significant cleaning cost.

Regional Treatment Plant

Primary sludge and thickened waste activate sludge from the Regional Treatment Plant are combined with trucked sludge from the El Toro Water District Reclamation Facility and pumped sludge from the Coastal Treatment Plant in one of two sludge equalization tanks. The mixed sludge is then digested anaerobically and dewatered by any of four centrifuges. The centrifuges typically produce a biosolids cake that is 23% to 26% solids concentration. The centrifuges are located on the second story of the Energy Recovery Building. The dewatered solids are then conveyed directed to one of two elevated hoppers. These hoppers can then discharge to a single truck bay on the building's first floor. As with the Latham Plant the truck trailers typically can hold approximately 25 wet tons of sludge. Two truck loads are typically hauled from the Regional Treatment Plant each day.

Figure 3.1 J.B. Latham Plant Solids Dewatering System

The dewatering operation is typically in a similar time frame as the Latham Treatment Plant.

The dewatered cake solids at the Regional Plant can be stored within the sludge hoppers. However, each hopper can only hold approximately twenty tons of cake. This is equivalent to approximately one day of solids storage. This plant has also used available volume within the digesters during disruptions of the dewatering operation as a means of solids storage. These digesters can hold approximately 2 to 3 days of sludge storage.

PRIMA DESHECHA LANDFILL

As noted previously hauling to the Prima Deschecha Landfill has been a part of SOCWA biosolids management for over 25 years. SOCWA currently has

an agreement with the County of Orange to dispose of biosolids treatment at the Prima Deshecha Landfill. The available disposal capacity in the landfill is theoretically more than SOCWA's biosolids production. However, there are two operational limits to this disposal method:

- The landfill will close during wet weather periods.
- The disposal is limited during the day until a ratio of 10 units of trash per 1 unit of biosolids can be achieved.

SOCWA has considered ways to maximize the hauling of biosolids to the Prima Deshecha Landfill as this is most cost effective disposal method available. SOCWA currently performs its own hauling to the landfill. There is one employee dedicated as a truck driver; SOCWA also owns the tractor and trailer equipment for the hauling operation. SOCWA staff has considered using a private contractor to increase the rate of hauling to the landfill. However, the landfill operation can lead to long delays for the biosolids hauler. SOCWA's driver has in the past had to wait for hours at the landfill waiting for the go ahead to dump when the County staff has determined that the required trash to biosolids ratio has been met. SOCWA staff has not opted for the additional private hauling based on this limitation. Discussions with County staff have not yielded any potential improvement to this situation,

SOCWA has historically hauled an average of 12 tons per day to the landfill. This value is used as the maximum haul rate in this analysis. The landfill offers the possibility of emergency back-up disposal to other management options. However, the operations limitations of the landfill preclude this being a larger disposal method on a consistent basis.

INTRODUCTION

The purpose of this chapter is to provide a review and, where applicable, update on any recent changes to the major existing and proposed federal, state and regional regulatory requirements governing the reuse and disposal of biosolids by the South Orange County Wastewater Authority (SOCWA). The 2002 SOCWA Biosolids Strategic Plan provided an implementation plan to meet existing regulatory requirements with the flexibility to meet proposed future regulatory requirements. Examination of current and proposed regulatory requirements is critical to the development of appropriate future treatment processes and disposal methods. A comprehensive review of the regulations governing treatment plant residuals was conducted to evaluate the impact on possible future discharge limits for the various reuse/disposal alternatives presented in the Strategic Plan Update.

In recent years, there have been few significant changes in Federal regulations and policies regarding biosolids reuse and disposal. These changes to regulations and policies, which occurred primarily at the local level, will influence treatment, disposal and reuse alternatives presented in the Strategic Plan.

ASSESSMENT OF BIOSOLIDS REGULATIONS

Regulatory Concerns

The regulatory issues of concern regarding the beneficial use/disposal of biosolids include the environmental effects on air, water, and land resources as well as public health.

Protection of the Environment

Biosolids quality is a primary concern in terms of environmental protection. Constituents could be present in biosolids, defined as municipal sewage sludge treated to comply with the federal 40CFR503 regulations, at levels that are detrimental to the environment. Regulatory agencies are continuously refining the maximum acceptable biosolids contaminant levels with respect to beneficial use/disposal methods. Analytical quality testing is required to assess biosolids compatibility with various beneficial use/disposal options before implementation.

Other environmental effects of biosolids beneficial reuse/disposal that are of concern, especially to local agencies, include nuisance odors, vector attraction, visual effects, noise, dust, and traffic.

Protection of Public Health

Issues of concern in terms of public health are exposure to pollutants and pathogens especially with beneficial use projects such as land application or

composting. For these reasons, strict contaminant limitations and biosolids processing requirements have been established for beneficial use and disposal programs to protect public health. A relatively recent trend in the industry has been a shift towards increased biosolids processing to reduce pathogens and provide greater public acceptance. The higher quality biosolids are more adaptable to changing regulations and have more options available for beneficial reuse/disposal.

OVERVIEW OF FEDERAL, STATE, AND LOCAL REGULATORY REQUIREMENTS

Numerous federal, state, and local agencies regulate biosolids beneficial reuse/disposal. Agency jurisdiction may vary depending on the beneficial use/disposal methods employed. In general, the United States Environmental Protection Agency (EPA) provides federal regulations that are implemented by state and local governments. In California, many state and local agencies have developed additional rules, guidelines, and criteria for biosolids regulation and management.

Federal Requirements

The EPA is the primary federal agency having jurisdiction over biosolids management. Each state can develop programs to implement the rules and guidelines developed by EPA or leave the regulation up to EPA. In California, compliance with EPA rules and guidelines is the responsibility of EPA's Regional Office in San Francisco.

Congress has been aware of biosolids use and disposal problems since the passing of the Clean Water Act (CWA) of 1972. However, regulations governing biosolids management practices did not appear until 1977, when amendments to the CWA led to the promulgation (or incorporation into the Code of Federal Regulations (CFR)) of 40 CFR Part 257 (under the joint authority of the CWA and the Resource Conservation and Recovery Act [RCRA]). Passage of Part 257 established standards for cadmium, PCBs, and pathogens in biosolids applied to land and established general management standards for solid waste landfills. In addition to the CWA, several other federal laws provide authority for regulating various aspects of biosolids disposal. These include the Clean Air Act; Subtitles C and D of RCRA; the Marine Protection, Research, and Sanctuaries Act (MPRSA); the Toxic Substances Control Act; and the 40 CFR Part 503 Standards for the Use and Disposal of Sewage Sludge. Table 4.1 lists current federal regulations that directly apply to biosolids use/disposal methods. Table 4.2 summarizes the relevance of the federal regulations to the SOCWA.

In 1987, Congress called upon the EPA to comprehensively regulate the use and disposal of sewage biosolids with the passage of the Water Quality Act of 1987

(P.L. 100-4) (WQA). This act required the promulgation of technical standards and placed new emphasis on identifying and limiting those toxic pollutants in biosolids that may adversely affect public health or the environment. Congress further required that EPA implement the technical standards through NPDES permits issued to POTWs unless current permit conditions issued under other federal or state programs ensured compliance with Section 405 of the CWA.

In order to implement the long-term biosolids permitting program required by the WQA, EPA initiated two rule makings. The first rule making includes 40 CFR Parts 122, 123, and 124 and 40 CFR Part 501. Parts 122, 123, and 124 set requirements and procedures for including biosolids conditions in NPDES permits. Part 501 sets requirements and procedures for approving state biosolids management programs to operate in lieu of federal programs, or for federal programs to implement biosolids permits if a state so chooses. The second rule making, 40 CFR Part 503, adopted February 19, 1993, sets the technical standards for biosolids use and disposal.

The EPA also published revisions to 40 CFR Part 261 on March 29, 1990, defining the new toxicity characteristic leaching procedure (TCLP) to be used as of September 25, 1990, in determining whether a waste is “hazardous.” The revised rule also adds 25 new organic constituents to the list of toxic constituents of concern. Other changes are also made in calculations or regulatory levels of organic chemicals. The new TCLP replaces the Extraction Procedure (EP) leach test that was previously used by EPA in defining toxicity.

State Requirements

California State Requirements

Biosolids Disposal/Reuse

On the California state level, biosolids beneficial use /disposal is primarily regulated by the State Water Resources Control Board (SWRCB), California Department of Health Services (DHS), and the Regional Water Quality Control Boards (RWQCB). In general, the SWRCB, through its nine regional boards, is primarily concerned with protecting present and probable future beneficial uses of water, as required by the Porter-Cologne Water Quality Control Act (contained in Division 7 of the California Water Code). The San Diego RWQCB would issue Waste Discharge Requirements for the proposed SOCWA composting facility.

The State of California passed legislation in the early 1990s (AB 939) to create a new governing body, the California Integrated Waste Management Board

Table 4.1 Federal Regulations Governing Biosolids

Federal Regulation	Subject	Land Application	Distribution and Marketing	Monofills and Surface Disposal	Incineration	Codisposal Landfill and Landfill Cover
40 CFR 50.12	Regulates sludge incinerator emissions				√	
40 CFR 51.18	Regulates sludge incinerator emissions				√	
40 CFR 52.21	Regulates sludge incinerator emissions				√	
40 CFR 60	Regulates incineration of sludge at rates above 1,000 kg/day				√	
40 CFR 61	Regulates sludge incinerator emissions				√	
40 CFR 122-124	Requires municipal disposal to be included in NPDES	√	√	√	√	√
40 CFR 257	Regulates use and disposal of biosolids not regulated by 40CFR503	√	√	√	√	√
40 CFR 258	Regulates codisposal landfilling and us as alternative daily cover materials for landfills					√
40 CFR 261-268, 271, 301	Defines Whether sludges are hazardous	√	√	√	√	√
40 CFR 501	Requires states to implement federal regulations for biosolids	√	√	√	√	√
40 CFR 503	Regulates land application, surface disposal, and incineration	√	√	√	√	√
40 CFR 761	Defines sludges containing more than 50 mg/kg of PCBs as toxic	√	√	√	√	√

Table 4.2 Federal Biosolids Regulations Impact on SOCWA

Federal Regulation	Application	Relevance to SOCWA
40 CFR Part 50 Clean Air Act	Establishes National Ambient Air Quality Standards.	None
40 CFR Part 60 Clean Air Act	Regulates air emissions from incineration of biosolids.	None
40 CFR Part 61 Clean Air Act	Establishes NESHAPs for mercury and beryllium in incineration and heat drying of biosolids.	None
40 CFR 122-124 Clean Water Act	Inclusion of conditions for biosolids disposal in National Pollutant Discharge Elimination System (NPDES) Permit.	Requires inclusions of biosolids requirements in NPDES permit.
40 CFR Part 257 the joint authority of the Clean Water Act (1977 and 1992 Amendments) and the Resource Conservation and Recovery Act	Federal standards for land application of biosolids not covered under 40 CFR 503.	These are federal standards for use and disposal of municipal biosolids not covered under 40 CFR 503.
40 CFR Part 258-1984 Resource Recovery and Conservation Act	Provides regulations for codisposal of biosolids and solid wastes.	State Title 23 regulations are more restrictive for landfilling.
40 CFR Part 261 and 271 Appendix II - Resource Recovery and Conservation Act	Defines State Hazardous Waste Program and toxicity characteristics leaching procedure (TCLP) to determine if sludges are hazardous.	California waste extraction test (WET) is more stringent than TCLP. SOCWA biosolids have not been shown to be hazardous.
40 CFR Part 501 - Clean Water Act	Establishes State Sludge Management Regulations.	Places conditions on biosolids in Waste Discharge Requirements.
Water Quality Act of 1987 (Also known as 1987 Amendments to the Clean Water Act)	Added language to require technical standards for disposal and beneficial use of biosolids.	Precursor to 40 CFR Part 503.
40 CFR Part 503 - 1983 Standards for the Use and Disposal of Sewage Sludge	Regulates land application, surface disposal, and incineration of municipal biosolids.	These are current federal standards for use and disposal of municipal biosolids.
40 CFR Part 761 - Promulgated under Toxic Substances Control Act	Establishes Standard that biosolids containing more than 50 mg/kg PCBs are hazardous.	PCB concentrations in SOCWA biosolids are well below this level.

(CIWMB) to oversee and regulate solid waste disposal in the state. The CIWMB replaced the previous Solid Waste Management Board for implementing and regulating California's solid waste statutes. This Board has regulatory authority over several biosolids management methods including co-disposal at a municipal landfill and the use of biosolids as alternative daily cover material.

The discharge of wastes to land in California is primarily regulated by the SWRCB according to the California Code of Regulations (CCR), Title 23 Waters, Article 2, and Chapter 15. Chapter 15 regulations apply to the disposal of biosolids and incinerator ash in landfills and on dedicated land. Other regulations and guidance documents include Title 22, Chapter 11; Department of Health Services Manual of Good Practice for Land Spreading Sewage Sludge; and the California Environmental Quality Act. Table 4.3 lists current California regulations that directly apply to biosolids use and disposal methods. Table 4.4 summarizes the relevance of these regulations to the SOCWA. The following sections provide additional details on these programs.

Presently, under the CCR, Title 22, it is the waste discharger's responsibility to determine if the waste is classified as a hazardous waste pursuant to criteria established in CCR, Title 22, Division 4.5, Chapter 11, and Article 3. In addition to regulating hazardous waste through Title 22, DHS has both a general and specific authority under the Health and Safety Code to protect public health. This includes the responsibility of regulating the utilization and disposal of biosolids via land application. While the DHS's advisory guidelines and recommendations are not regulations, they often are used in an enforcement manner through incorporation into the RWQCB's Orders (Waste Discharge Permit Requirements).

In response to concerns over the lack of State standards or guidelines regarding the land application of biosolids, the DHS's Sanitary Engineering Branch published a manual in April 1983 entitled "Manual of Good Practice for Land Spreading of Sewage Sludge."

This manual was replaced by the "Manual of Good Practice for Agricultural Land Application of Biosolids", published by the California Water Environment Association. The 1998 manual includes chapters on management practices for the biosolids generator, transporter, applier and grower. While a guideline, some

Table 4.3 California State Regulations Governing Biosolids

	State Regulation	Land Application	Distribution and Marketing	Monofills and Surface Disposal	Incineration	Codisposal Landfill and Landfill Cover
CCR Title 23 §2908	Regulates discharge of municipal solid waste to land including biosolids.	√	√	√		√
CCR Title 23 §2510 et. seq.	Regulates discharge of waste to land including biosolids.	√	√	√		√
CCR Title 23 §3680 et. seq.	Regulates operator certification for wastewater treatment operators.			√		
CCR Title 22 §66261.24	Defines whether biosolids are hazardous.	√	√	√	√	√
PRC §40191	Includes sewage sludge in the definition of solid waste.	√	√	√	√	√
PRC §42246	Requires procuring agencies to document use of fertilizing material, including biosolids, as not harmful to public health and safety.	√	√			
PRC §50002(b)	Establishes requirements for exemption of land application of sewage sludge that poses no threat to public health or the environment.	√	√	√		√
CCR Title 17 §94126	Includes Method 101A - Mercury emissions for sewage sludge incinerators.				√	
FAC §14505	Regulates municipal biosolids as a fertilizer.	√	√			

Table 4.3 California State Regulations Governing Biosolids

	State Regulation	Land Application	Distribution and Marketing	Monofills and Surface Disposal	Incineration	Codisposal Landfill and Landfill Cover
FAC §14560	Defines biosolids with respect to its use as a fertilizer.	√	√			
FAC §14682	Prohibits distribution of adulterated fertilizing materials including biosolids.	√	√			
CCR Title 14 § 17859	Regulates Sewage Sludge Composting Facilities		√			
CCR Title 14 § 18000	Regulates Solid Waste Site Permitting Facilities		√	√		√
CCR Title 27 § 20220	Regulates Solid Wastes			√		√

Note:

CCR = California Code of Regulations

PRC = Public Resource Code

FAC = Food and Agriculture Code

IN = Incineration

LA = Land Application

LC = Landfill Cover

SD = Surface Disposal

Table 4.4 Relevance of State Regulations Governing Biosolids & SOCWA Facilities

Law or Regulation	Application	Relevance to SOCWA
CCR Title 23, Chapter 15, discharges of waste to land (commonly known as Chapter 15 regulations)	Regulates biosolids and incinerator ash disposal to landfills (waste management units) and dedicated land disposal (land treatment units).	Permit required to dispose of biosolids in a landfill.
CCR Title 22, Division 4.5, Chapter 11	Defines hazardous wastes.	Historically, SOCWA biosolids have been shown to meet Title 22 definition as a non-hazardous waste.
CCR Title 17, Division 3	Defines tests for emissions monitoring.	None
CCR Title 27, Division 2	Requires a minimum percent solids for landfills.	Requires 15 percent solids for secondary or combined solids and 20 percent solids overall.
CCR Title 14, Division 7	Integrated Waste Management Board regulations of sewage sludge composting facilities.	Provides minimum requirements for composting.
Porter-Cologne Water Quality Act	Established State Water Resources Control Board and Regional Water Quality Control Boards.	NPDES permit for SOCWA is issued by the San Diego Region-Regional Water Quality Control Board. Basis for the General WDR for Discharge of Biosolids to Land, etc.
California Environmental Quality Act (CEQA)	Establishes procedures for implementing a project following identification of environmental impacts.	None required at this time. Possible future requirement depending on future biosolids handling processes and method of beneficial use/disposal.
Toxic Pit Clean Up Act of 1984 (Katz Bill AB 3566/3121)	Applies to hazardous materials disposal.	Not applicable since SOCWA biosolids have been shown to be nonhazardous.
Public Resource Code (PRC)	Defines sewage sludge as solid waste and requires documentation for land application exemptions.	Solid waste designation puts biosolids under CCR Title 23 Chapter 15.
Food and Agriculture Code (FAC)	Limits use of biosolids as fertilizer.	Impacts distribution and marketing of biosolids as fertilizer.

Regional Water Quality Control Boards are requiring compliance Senate Bill SB926 was being considered for implementation. It would allow the Kern County Board of Supervisors to regulate or prohibit land application of biosolids in the unincorporated areas of the County. This bill if passed by the Assembly and signed by the Governor could impact the ability of SOCWA to utilize the SYNAGRO South Kern County composting facility. While the bill does not restrict importation of biosolids for composting, the resulting composted biosolids would have to be disposed of at another location. This would affect the economics of this option. However, the sponsor of the bill "shelved" it late June 2005. The bill is a 2-year bill and could be reconsidered January 2006. The sponsor is considering support of a local initiative that would prohibit land application.

Air Quality

Air emissions from the combustion of biosolids are regulated by the California Air Resources Board (CARB) and regional Air Quality Management Districts (AQMD) to meet the objectives of the Regional Air Quality Maintenance Plan. The Regional Plan is designed to maintain federal and state ambient air quality standards. The AQMDs with the 1998 manual by reference in Waste Discharge Requirements. also have the authority to regulate nuisance odor conditions at biosolids processing, handling, and beneficial use/disposal facilities. Permitting of wastewater treatment facilities and composting and incineration facilities is done at the AQMD level (South Coast Air Quality Management District).

Environmental Planning

Finally, the California Environment Quality Act (CEQA) mandates that environmental effects of proposed biosolids management projects be evaluated. In order to obtain CEQA approval, an environmental impact report or negative declaration may have to be completed.

Arizona State Requirements

Due to a potential for land application in western parts of Arizona, a brief overview of the regulatory climate regarding biosolids beneficial use and disposal is presented herein.

Biosolids beneficial use and disposal is regulated on a state level by the Arizona Department of Environmental Quality (ADEQ). Potential dischargers must be in compliance with the applicable portions of 18 Arizona Administrative Code (AAC), Chapter 9, Article 10, regulation the disposal, use, and transportation of biosolids in Arizona, as well as the

following federal regulations, as listed in Table 4.1:

- 40 CFR 503, Subpart C for land disposal.
- 40 CFR 503, Subpart D for incineration outside of Arizona.
- 40 CFR 258 for landfill disposal.
- 40 CFR 257 for all biosolids use and disposal practices not covered under 40 CFR 258 or 40 CDR 503.

It should be noted that those federal regulations regarding incineration of biosolids are not applicable here as that practice is banned in Arizona. There are no current restrictions regarding importing biosolids from other states for disposal.

Local Requirements

County

Many counties in California have recently developed or are currently developing ordinances for biosolids land application. The counties that have significant impact on SOCWA are Riverside County, Imperial County, San Bernardino County, Kings County, and Kern County. None of these counties completely ban all biosolids land application.

Kern County banned land application of biosolids not meeting Exceptional Quality Standards (EQ) starting in 2003, and is considering a complete ban. The County Board of Supervisors requested that staff prepare an ordinance banning all importation of biosolids. The County Counsel recommended that this approach not be pursued due to the Commerce Clause in the United States Constitution. The County is considering the ban of all land application. Adoption of the ordinance would require preparation of an Environmental Impact Report. This would take approximately two years to prepare.

An initiative process has been started that would ban land application of biosolids within the unincorporated land in Kern County. The initiative is titled Keep Kern Clean Ordinance of 2006. It would be on the June 2006 ballot. The initiative process may eliminate the need for the Environmental Impact Report. The intent of the ordinance is similar to Senate Bill SB926 which has been shelved. The ordinance would not restrict the proposed South Kern SYNAGRO composting operation. It would prohibit land application of all biosolids even if they are composted.

Kings County adopted an ordinance which banned Class B in 2003 and only allows Class A EQ composted biosolids to be land applied after 2006.

Riverside County's ordinance bans Class B land application and places 4 different tiers of restrictions based on the nuisance potential which essentially ranges from a ban to application with minimal buffers.

The Counties of Imperial and San Bernardino are the least restrictive, in that they allow land application of both Class

A and B biosolids, but they have such restrictive conditional use permit requirements, that they essentially ban land application.

The three densely populated counties - Los Angeles, Orange, and San Diego do not restrict land application, there are simply no sites with adequate acreage to make the permitting process feasible.

A summary of the relevant counties' biosolids ordinances is presented in Table 4.5. The ordinances share many similar characteristics. Some of the common requirements are as follows

Biosolids to be applied on land must be treated by a wastewater treatment plant which has a current waste discharge permit from a RWQCB or equivalent permit.

- Ordinance requirements pertain to unincorporated lands only.
- Biosolids land application must comply with 40 CFR, Part 503, and Criteria for Standards for the Use or Disposal of Sewage Sludge or its revisions.

The application process varies from county to county in California, but generally, each county requires approval of a biosolids land application and a fee to cover administrative cost and costs incurred from laboratory analysis of biosolids, soil, water and vegetation samples collected by the permitting agency. All the counties permitting biosolids land application require monitoring and reporting on a regular basis.

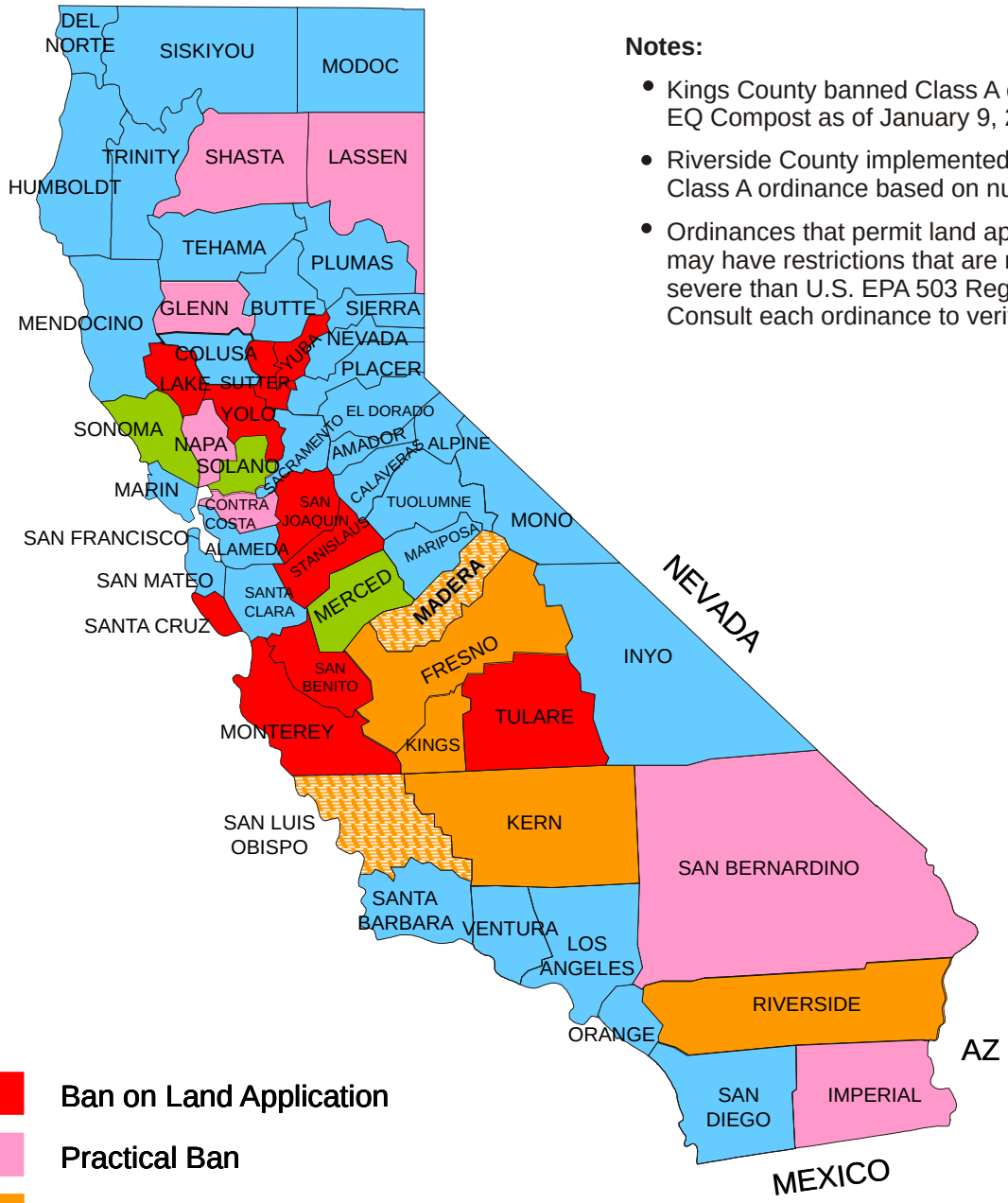
Figure 4.1 shows the 2005 status of county regulations in California regarding biosolids land application No counties in Arizona have developed ordinances for the land application of biosolids. All biosolids applications are regulated through the ADEQ. There are no regulations limiting the disposal of biosolids from California. There also does not appear to be any organized political effort to propose such a ban. However, it is reasonable to conclude based on the local regulatory evolution in California that similar limitations may be imposed in Arizona at some time in the future.

Indian Lands

Biosolids processing and land application has occurred on Indian lands. Such operations are not subject to State or local laws and regulations. They are subject to the federal requirements.

Local Air Boards

The South Coast Air Quality Management District (SCAQMD) would permit the construction and operation of an incinerator or composting operation. With respect to SOCWA, the SCAQMD Rules 1133, 1133.1, and 1133.2 would apply to the planned composting facility. These rules require an enclosed operation. The current planning for the Prima Deshecha. Composting Facility takes these rules into account



Notes:

- Kings County banned Class A except EQ Compost as of January 9, 2005.
- Riverside County implemented a 4 tier Class A ordinance based on nuisance.
- Ordinances that permit land application may have restrictions that are more severe than U.S. EPA 503 Regulations. Consult each ordinance to verify.

Ban on Land Application

Practical Ban

Ban on Class B

Ordinance Permits Land Application

Developing Class B Ordinances

No Regulations/Ordinances Enacted

STATUS OF COUNTY ORDINANCES

FIGURE 4.1

Table 4.5 Summary of Five Counties' Biosolids Ordinances

County	Ordinance Adoption Date	Acceptable Biosolids [1]	Specific Prohibited Area/Time Period	Primary Responsible Agent
Imperial	2004	Class A & B	None Specified, Conditional Use Permit essentially bans application	County Agricultural Commissioner
Kern	1999	Class A	Ban on land application biosolids not meeting Exceptional Quality Standards effective January 1, 2003.	County's Environmental Health Services Department
Kings	2001	Class A	Ban on land application of biosolids not meeting Exceptional Quality Standards and being compost starting January 9, 2006. Application within zone designation AG-40 only.	County Agricultural Commissioner
Riverside	2001	Class A	Ban on land application of all Class B biosolids within unincorporated areas effective November 25, 2001.2. Tiered (4) Class A limitations based on nuisance potential	Director of Environmental Health
San Bernardino	2005	Class A & B	None Specified	County's Environmental Health Services Department

OTHER REGULATIONS IMPACTING BIOSOLIDS USE/DISPOSAL METHODS

The beneficial use/disposal of biosolids from publicly owned treatment works (POTWs) is regulated under different federal, state, and local requirements and agencies depending on the methods employed.

Waste Classification

Classification of biosolids is required on both the federal and state level in order to assess the level of regulated constituents that are present. Based on these classifications, the proper beneficial use/ disposal methods for the biosolids can be determined.

Domestic sewage that passes through a sewer system to a POTW for treatment is not considered a solid waste. However, municipal sewage biosolids that are separated from the sewage during treatment are considered a solid waste. Municipal biosolids are not considered hazardous unless tested and shown to be hazardous. Previous testing has not provided any indication that the biosolids produced at SOCWA are of a hazardous nature. Biosolids would be considered hazardous if mixed with any hazardous waste other than those entering the POTW through a sanitary sewer system.

Further information regarding the classification of biosolids may be found in Appendix A of this report.

Regulation by Disposal Method

The disposal methods covered specifically in the regulations include the following:

- Landfilling
- Alternate Daily Cover at Landfills
- Land Application
- Composting
- Monofills/Land Disposal

The monofill/land disposal method is not currently available as an option to SOCWA. Information regarding the regulation of monofills/land disposal may be found in Appendix B. Regulations regarding the other four disposal methods are described in the remainder of this section.

Landfill Co-disposal of Biosolids

Landfill codisposal of waste is currently regulated on the federal level by Subtitle D of RCRA. Regulatory criteria for solid waste disposal facilities, including codisposal of sewage biosolids in municipal solid waste landfills, are established under 40 CFR Part 258. However, landfill disposal in California is regulated by CCR Title 23, Chapter 15 requirements which are generally more stringent than 40 CFR Part 258.

The SWRCB and the Regional Boards administer biosolids disposal requirements from Chapter 15 under a Waste Discharge Requirements Order.

Depending on the classification of the waste, the biosolids may be discharged to a certain "class" of landfill. Class III landfills have the least stringent requirements. Class I landfills are for hazardous waste disposal.

The California Integrated Waste Management Board (CIWMB) also regulates landfill operations in accordance with CCR, Title 14, and Division 7. The CIWMB has established minimum operational standards for solid waste disposal facilities, and it requires issuance of a Solid Waste Facility Permit (SWFP) to approve on-site operations.

Landfill Standards

Non-hazardous biosolids disposal must comply with Section 2523(c) of Chapter 15, Article 2 which states:

"Dewatered sewage or water treatment sludge may be discharged at a Class III landfill under the following conditions, unless DHS determines that the waste must be managed as hazardous waste:

1) *The landfill is equipped with leachate collection and removal system;*

2) *The sludge contains at least 20 percent solids if primary sludge, or at least 15 percent solids if secondary sludge, mixtures of primary and secondary sludges, or water treatment sludge; and*

3) *A minimum solids-to-liquid ratio of 5:1 by weight shall be maintained to ensure that the codisposal will not exceed the initial moisture-holding capacity of the non-hazardous solid waste. The actual ratio required by the Regional Board shall be based on site-specific conditions."*

One of the most significant conditions for dewatered sludge disposal is the requirement for a leachate collection and removal system (LCRS) at Class III landfills. Several sites have leachate monitoring systems, however, few actually collect and remove the leachate in accordance with Section 2543, Chapter 15 requirements. In some cases, the RWQCB may allow the disposal of sewage biosolids in a Class III Waste Management Unit (WMU) not equipped with a LCRS system, provided the biosolids has a total solids concentration of 50 percent or more.

The wording in Chapter 15 appears to preclude the classification of biosolids as "designated wastes." However, SWRCB legal staff has stated that Regional Boards may classify these wastes

as "designated" if they determine that it is necessary to protect water quality.

However, the RWQCBs, in the absence of uniform statewide criteria, are currently applying more stringent priority pollutant criteria in addition to Chapter 15 requirements to biosolids co-disposed in municipal solid waste landfills. These site-specific criteria, which are not mandated by state or federal law, effectively classify non-hazardous sewage biosolids as designated waste. This classification has a significant impact on POTWs since disposal in Class II WMUs have limited availability and are considerably more expensive than disposal in Class III WMUs. A summary of the construction standards for Class II and Class III landfills is presented in Table 4.6 (see next page).

These regulations are not anticipated to have any impact on SOCWA as landfilling is only considered at the existing operation at the Prima Deshecha Landfill and through contracts with outside contractors.

Alternative Daily Cover

Sanitary landfill operations require the application of a daily cover to the working face of the active waste cell at the end of each day. The daily cover minimizes odor generation and reduces vector attraction. Daily cover has traditionally been earth material that is either excavated from the landfill or imported. Recently, landfills have experimented with alternative materials for use as daily cover. Some materials tested include geotextile fabrics, yard waste, and auto shredder fluff. Biosolids dried to greater than 50 percent solids have also been successfully used as alternative daily cover.

Most of the materials used as alternative daily cover (ADC) were originally wastes that were buried in the landfill. Therefore, landfills not only reduce operating costs by utilizing ADC, they reduce the amount of waste that ends up in the landfill. In fact, the CIWMB concluded that using biosolids as ADC, where demonstrated appropriate, may qualify for diversion credits to meet Assembly Bill 939 waste diversion mandate; however, CIWMB approval of an ADC project must first be obtained.

In May 1990, the CIWMB published the "Procedural Guidance for Evaluation of Alternative Daily Covers." This document outlines the evaluation and approval process whereby biosolids may be used as alternative cover material if specified performance criteria are met. A one-year demonstration project is required to confirm that the performance criteria are consistently achieved.

ADC effectiveness is documented through the demonstration project. The demonstration project itself is preceded

Table 4.6 Construction Standards for Landfills Receiving Sewage Sludge

Waste Category [1,2]	Waste Management Strategy	Class	Type	Primary Containment	Clay Liner [6]	Synthetic Liner	Leachate Collection and Removal System	Interim Cover	Capacity of Precipitation and Drainage Control Facilities
Solids Designated	Full Containment	II	Landfill	Single Liner [3,4]	Required [7] $\leq 1 \times 10^{6}$ cm/sec	Not Required	Required Blanket Type Liner	Required	1,000 year, 24 hour Precipitation
Non-hazardous Solid Waste (including Dewatered Sludge and Acceptable Incinerator Ash)	Protect Beneficial Uses	III	Landfill	None [5]	Optional [5]	Not Required	Required if Liner is Required, or Dendritic	Required	100 year, 24 hour Precipitation

Reference: CCR Title 23, Chapter 15, Article 2.

(1) Waste in any category may be discharged at waste management units with higher levels of containment ability. (2)Wastes suitable for land treatment in any category may be discharged at land treatment facilities. Designated wastes are wastes that are or may be hazardous.

(3) Suitable natural features may satisfy primary containment requirements.

(4) Leachate collection and removal system (LCRS) required as appropriate.

(5) Units at sites not meeting siting and geologic criteria must have a single liner and LCRS.

(6) All permeability's specified in this table are maximum allowable permeability's.

(7) Clay liner required unless waste management units are underlain by a substantial thickness of natural geologic materials with permeability of 1×10^{6} cm/sec or less.

(8) Exemptions may be granted if the discharger can demonstrate that the integrity of containment features, precipitation and drainage control structures, and monitoring facilities will not be jeopardized if this criterion is not met.

by a project plan that outlines the location, the amount of material to be used, and the tests to be conducted. The project is documented by conducting field measurements and site monitoring. The results of the demonstration project are submitted to the CIWMB for review. Upon successful demonstration of suitability of biosolids as ADC material, the CIWMB will amend the Solid Waste Facility Permit (SWFP) for the landfill to allow use of the alternative cover material on an ongoing basis.

The amended SWFP will include Designated Waste Acceptance (DWA) levels specific to the landfill site. The DWA levels summarize characteristics that the biosolids must possess be acceptable. Characteristics of the biosolids physical properties will be required in addition to the regulated pollutant characteristics.

The Regional Water Quality Control Board (RWQCB) also has discretionary approval authority for an alternative cover project and in other aspects relating to the use of biosolids for landfill cover through the adoption of waste discharge requirements.

The RWQCB regulates landfills under CCR, Title 23, Chapter 15, and Division 3. The regulations require landfill owners to submit a Report of Waste Discharge to the RWQCB prior to the issuance of an operating permit. A Report of Waste Discharge outlines the characteristics of the landfill and the quantity and quality of the materials to be disposed at the landfill. This information is necessary for the RWQCB to establish monitoring programs and water quality protection standards for each site.

The RWQCB reviews the demonstration plan for the use of biosolids as alternative daily cover material. Beneficial use of biosolids as cover material requires the issuance of amendments to the Waste Discharge Requirements issued by RWQCB for landfill operations.

Local Enforcement Agencies (LEA) coordinate with the CIWMB to oversee the demonstration project. The LEA provides comments to the RWQCB for incorporation into amended SWFPs to include provisions for the use of biosolids for landfill cover to satisfy local concerns.

SOCWA would not be required to report to any regulatory agency on a regular basis regarding the use of biosolids as landfill cover. The landfill operator, however, would be required to report to the CIWMB and RWQCB regarding the demonstration project and final permitted operation of the landfill using biosolids as cover material. The reporting requirements for the landfill operator would be covered in their site specific Waste Discharge Permit.

The CIWMB ADC requirements limit the application of biosolids to no more than 25 percent of the total daily cover used by a landfill. Because there are limitations on the use of ADC, many landfills have chosen not to use this option. We are not aware of any landfills in Southern

California that use biosolids as ADC. There are a number of landfills in northern California that use ADC, and others that are looking into it because of the cost savings. With ADC use, the disposal tax - as much as $15.00 per ton is not applied. The biosolids are not charged against the AB 939 requirements, and the landfill typically is paid for the material, rather than having to purchase fill dirt. Based on this it may be worth the effort to discuss providing assistance to a landfill in obtaining approval to use ADC.SOCWA staff has contacted the County of Orange staff regarding the potential use of Biosolids as ADC at the Prima Deshecha Landfill. The County has indicated that they are not interested in pursuing this option as they are working with textiles as a means of saving space within the landfill.

Land Application of Biosolids

Land application is defined as the distribution of biosolids on, or just below the surface of the land to recover the beneficial, nutritive characteristics. Suitable application sites include: agricultural land, forest, reclamation sites, parks, golf courses, greenbelts, landscaping, lawns, and home gardens. Biosolids are applied at the specific crop agronomic rate. Agronomic rate is the amount of nutrients, mainly nitrogen, required for plant growth.

Biosolids land application is regulated at the federal level by the EPA through the 40 CFR Part 503 regulations (See Appendix M for the 503 Regulation and the 1994 Amendment.) These regulations establish standards for pollutant limits, operational standards, management practices, and monitoring, recordkeeping, and reporting requirements. The regulation is self-implementing and imposes requirements on persons who prepare sewage biosolids or material derived from sewage biosolids and land appliers of sewage biosolids. Compliance with the 40 CFR Part 503 standards became effective February 19, 1994. To land apply biosolids, the biosolids must satisfy the requirements for pollutant limitations, pathogen reduction, and vector attraction reduction as described in the following sections.

On the State level, the SWRCB through its RWQCBs regulates the land spreading of biosolids, through the issuance of Waste Discharge Requirements (WDRs). For all California POTWs, biosolids must comply with pollutant concentrations specified in both California's Title 22 and the Federal 503 regulations, and the land application must not violate the water quality standards established for the respective Water Quality Control Basin Plans developed pursuant to Section 303(e) of the Clean Water Act. Beyond the criteria for biosolids quality, each Regional Board field office may act independently in establishing permitting requirements for the land application of biosolids. The SWRCB and RWQCBs have not accepted primacy to administer and implement the 503 regulations for EPA. Therefore, the "permitting authority" in California is EPA Region IX.

Compliance with a WDR, issued by the Regional Board for land application, does not necessarily constitute compliance with 40 CFR 503.

The following paragraphs describe in general the land application requirements for all California POTWs, according to the 503 regulations and California's Title 22. Recent permitting options established by the Central Valley RWQCB applicable to the private contractors that might dispose of SOCWA biosolids are presented separately, following the general discussion.

In July 2004, the State Water Resources Control Board (SWRCB) adopted Resolution No. 2004-0012, “General Waste Discharge Requirements for Discharge of Biosolids to Land for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural, and Land Reclamation Activities (Biosolids General Order) and the Environmental Impact Report evaluating those regulations.” The Biosolids General Order (GO) provides statewide regulations that can be used by Regional Boards to regulate the land application of biosolids in California. This resolution assists in stream lining the regulatory process but may not be appropriate for all sites using biosolids due to particular site-specific conditions or locations. Such sites are not precluded from being issued individual waste discharge requirements (WDRs).

Pollutants Limits

Tables 4.7 and 4.8 present standards for the 10 metals regulated by 40 CFR Part 503 and California's Title 22 for land application of biosolids. The 503 pollutant concentrations, 503 ceiling concentrations and Title 22 criteria TTLC are presented in Table 4.7. Biosolids with pollutant levels greater than the 503 ceiling concentrations or the Title 22 TTLC values cannot be applied to land. Biosolids with pollutant levels that meet the 503 ceiling concentration and Title 22, but are above the High Quality Pollutant Concentration (40 CFR 503 Table 3), can be applied to land; however, they are subject to the annual and cumulative pollutant loadings shown in Table 4.8. The 503 regulations for biosolids with pollutant levels below 40 CFR 503 Table 4.3 limits to be applied to land without regard to annual or cumulative loading restrictions. All of the biosolids generated at the SOCWA facilities meet the requirements on Table 4.8 and as such are not limited by cumulative loading limits.

Pathogen Reduction

In addition to pollutant concentrations, biosolids must not pose a public health risk. 40 CFR 503, therefore, stipulates that biosolids applied to land must also

Table 4.7 Biosolids Pollutant Concentration Limits for Land Application

Pollutant	Title 22 TTLC (mg/kg) (1)	General Waste Discharge Requirements Ceiling Limits (mg/kg) (2)	503.13 Table 1 Ceiling Concentrations (mg/kg) (2)	503.13 Table 3 High Quality Pollutant Concentration (mg/kg) (2)
Arsenic	300	75	75	41
Cadmium	100	85	85	39
Chromium	2,500	–	–	--
Copper	2,500	4,300	4,300	1,500
Lead	1,000	840	840	300
Mercury	20	57	57	17
Molybdenum	3,500	75	75	NA(3)
Nickel	2,000	420	420	420
Selenium	100	100	100	100
Zinc	5,000	7,500	7,500	2,800

Notes:
(1) Wet weight basis.
(2) Dry weight basis.
(3) Temporarily suspended by EPA pending further consideration. Value was 18 mg/kg.

Table 4.8 EPA 40 CFR 503 Annual and Cumulative Land Application Rates

Pollutant	General Waste Discharge Requirements Ceiling Limits (lbs/acre)	503.13 Table 2 Cumulative Pollutant Loading Rate (kg/hectare)	503.13 Table 4 Annual Pollutant Loading Rate (kg/hectare)
Arsenic	36	41	2.0
Cadmium	34	39	1.9
Chromium	–	–	--
Copper	1,336	1,500	75
Lead	267	300	15
Mercury	15	17	0.85
Molybdenum	16	NA(1)	NA(1)
Nickel	374	420	21
Selenium	89	100	5.0
Zinc	2,494	2,800	140

Notes: (1)Temporarily suspended by EPA pending further review. Value was 18 kg/hectare.

be treated for pathogen and vector attraction reduction. 40 CFR 503 gives both performance-based standards and technology based standards for methods to reduce pathogens.

The 40 CFR Part 503 identifies two levels of pathogen reduction requirements, Class A and Class B, which may be satisfied by certain treatment methods and/or by meeting pathogen limitation standards. The goal of Class A requirements is to reduce pathogens to below detectable limits. The goal of Class B biosolids is to meet adequate pathogen reduction requirements and to rely upon environmental factors at the beneficial site to further reduce pathogens. Therefore, sites that use Class B biosolids must follow additional site restrictions concerning public access, animal grazing, and crop harvesting.

The 40 CFR Part 503 provides various alternatives for meeting Class A and Class B pathogen requirements. Class A biosolids must meet the following two criteria:

- One of the Class A pathogen reduction alternatives listed on Table 4.9 must be met before or at the same time as vector attraction, except when vector attraction reduction is met by Options 6, 7, or 8 (see Table 4.10).
- Class A biosolids must be monitored for bacteria re-growth at the time of usage or disposal. Fecal coliform density must be less than 1,000 Most Probable Number (MPN) per gram of total dry solids (1,000 MPN/g TS) or Salmonella specific density less than 3 MPN per 4 grams of total dry solids (3 MPN/4g TS).

Table 4.11 presents Class B pathogen reduction alternatives. Compliance with site restrictions is also required for land application of Class B biosolids.

- Food crops with harvested parts that touch the biosolids/soil mixture (such as melons, cucumbers, squash, etc.) shall not be harvested for 14 months after application of biosolids.
  Food crops with harvested parts below the soil surface (root crops such as potatoes, carrots, radishes) shall not be harvested for 20 months after application of biosolids if the biosolids had been stored on land

Table 4.9 Class A Pathogen Reduction Alternatives

Alternative	Description
A1: Time and Temperature	Fecal coliform shall be less than 1,000 MPN/gram, or Salmonella sp. shall be less than 3 MPN/4 grams of total solids at the time of disposal. Maintain certain temperature and time period based on the percent solids and prescribed equations (see 503 Regulations for details).
A2: Biosolids Treated in a High pH-High Temperature Process	Maintain biosolids at certain elevated temperature and pH for prescribed period of time (see 503 Regulations for details).
A3: Biosolids Treated in Other Processes	The density of enteric viruses in the biosolids after pathogen treatment must be less than 1 PFU per 4 grams of total solids. The density of viable helminthes ova in the swage sludge after pathogen treatment must be less than 1 per 4 grams of total solids. Report operating parameters to indicate consistent pathogen reduction treatment.
A4: Biosolids in Unknown Processes	The density of enteric viruses in the biosolids after pathogen treatment must be less than 1 PFU per 4 grams of total solids. The density of viable helminthes ova in the sewage sludge after pathogen treatment must be less than 1 per 4 grams of total solids.
A5: Processes to Further Reduce Pathogens (PFRP)	
Composting	Using either the within-vessel composting method or the static aerated pile composting method, the temperature of the sewage sludge is maintained at 55 degrees Celsius or higher for three days. Using the windrow composting method, the temperature of the sewage sludge is maintained at 55 degrees or higher for 15 days or longer. During the period when the compost is maintained at 55 degrees or higher, there shall be a minimum of five turnings of the window.
Heat Drying	Sewage sludge is dried by direct or indirect contact with hot gases to reduce the moisture content of the sewage sludge to 10 percent or lower. Either the temperature of the sewage sludge particles exceeds 80 degrees Celsius or the wet bulk temperature of the gas in contact with the sewage sludge as the sewage sludge leaves the dryer exceed 80 degrees Celsius.
Heat Treatment	Liquid sewage sludge is heated to a temperature of 180 degrees Celsius or higher for 30 minutes.
Thermophilic Aerobic Digestion	Liquid sewage sludge is agitated with air or oxygen to maintain aerobic conditions and the mean cell residence time of the sewage sludge is 10 days at 55 to 60 degrees Celsius.
Beta Ray Irradiation	Sewage sludge is irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20 degrees Celsius).
Gamma Ray Irradiation	Sewage sludge is irradiated with gamma rays from certain isotopes, such as Cobalt 60 and Cesium 137, at room temperature (ca. 20 degrees Celsius).
Pasteurization	The temperature of the sewage sludge is maintained at 70 degrees Celsius or higher for 30 minutes or longer.
Use of Processes Equivalent to obtain PFRP	Demonstrate operating parameters and/or pathogen levels to be PFRP equivalent subject to permitting authority approval.

Table 4.10 40 CFR 503 Vector Attraction Reduction Requirements

Option	Process
(1)	The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38 percent during sewage sludge treatment.
(2)	When the 38 percent volatile solids reduction requirement cannot be met for anaerobically digested sewage sludge, vector attraction reduction can be demonstrated by digesting a portion of the previously digested sewage sludge anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30 and 37 degrees Celsius. When, at the end of the 40 days, the volatile solids in the sewage sludge at the beginning of that period is reduced by less than 17 percent, vector attraction reduction is achieved.
(3)	When the 38 percent volatile solids reduction requirement in cannot be met for an anaerobically digested sewage sludge, vector attraction reduction can be demonstrated by digesting a portion of the previously digested sewage sludge that has a percent solids of two percent or less aerobically in the laboratory in a bench-scale unit for 30 additional days at 20 degrees Celsius. When, at the end of the 30 days, the volatile solid sin the sewage sludge at the beginning of that period is reduced by less than 15 percent, vector attraction reduction is achieved.
(4)	The specific oxygen uptake rate (SOUR) for sewage sludge treated in an aerobic process shall be equal to or less than 1.5 milligrams of oxygen per hour per gram of total solids (dry weight basis) at a temperature of 20 degrees Celsius.
(5)	Sewage sludge shall be treated in an aerobic process for 14 days or longer. During that time, the temperature of the sewage sludge shall be higher than 40 degrees Celsius and the average temperature of the sewage sludge shall be higher than 45 degrees Celsius.
(6)	The pH of sewage sludge shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for two hours and then at 11.5 or higher for an additional 22 hours at 25 degrees Celsius.
(7)	The percent solids of sewage sludge that does not contain unstabilized solids shall be equal to or greater than 75 percent based on the moisture content and total solids prior to mixing with other materials.
(8)	The percent solids of sewage sludge that contains unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 90 percent based on the moisture content and total solids prior to mixing with other materials.
(9)	Sewage sludge shall be injected below the surface of the land. No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected. When the sewage sludge that is injected below the surface of the land is Class A with respect to pathogens, the sewage sludge shall be injected below the land surface within eight hours after being discharged from the pathogen reduction process.
(10)	Sewage sludge applied to the land surface or placed on a surface disposal site shall be incorporated into the soil within six hours after application to or placement on the land. When sewage sludge that is incorporated into the soil is Class A with respect to pathogens, the sewage sludge shall be applied to or placed on the land within eight hours after being discharged from the pathogen treatment process.
(11)	Sewage sludge placed on a surface disposal site shall be covered with soil or other material at the end of each operating day.
(12)	The pH of domestic septage shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for 30 minutes at 25 degrees Celsius.

surface for at least 4months prior to incorporation into the soil.

- Food crops with harvested parts below the soil surface (root crops such as potatoes, carrots, radishes) shall not be harvested for 38 months after application if the biosolids had been stored on land surface for less than 4 months prior to incorporation into the soil.
- Turf shall not be harvested for one year after sewage sludge application if the turf is placed on land with a high potential for public exposure or a lawn, unless otherwise specified by the permitting authority.
- Public access to land with high potential for public exposure shall be restricted for 1 year after sewage sludge application.
- Public access to land with a low potential for public exposure shall be restricted for 30 days after sewage sludge application.

At this time, only the biosolids produced at the Regional Treatment Plant and Plant 3A meet Class B requirements. The biosolids from the J.B. Latham Wastewater Treatment Plant do not meet Class B requirements due to limited anaerobic digester detention time. SOCWA has completed two studies concerning advanced digestion processes to attain Class A biosolids. Applicable processes may include phased digestion and thermophilic digestion. The benefits of attaining Class A biosolids is discussed in a subsequent chapter.

Vector Attraction Reduction

Vector attraction is any characteristic that attracts disease vectors. Disease vectors are insects or animals are capable of transporting and transmitting infectious agents. Some common vectors include flies, mosquitoes, and rodents. Their interaction with humans provides a pathway for transmission of disease. Vectors themselves are not pathogenic. The 40 CFR Part 503 specifies ten alternatives for meeting the vector attraction reduction requirement as shown on Table 4.10. The least restrictive method for meeting the vector reduction requirements is to solar-dry the biosolids to 75 percent solids.

Exceptional Quality Biosolids

Biosolids that meet the High Quality Pollutant Concentrations listed in Table 4.7,one of the Class A pathogen reduction

Table 4.11 Class B Pathogen Reduction Alternatives

Alternative	Description
B1: Monitoring of Fecal Coliform	The geometric mean of seven samples of treated biosolids, collected at time of use or disposal shall meet a fecal coliform density of less than 2 million colony forming units or most probable number per gram of sewage sludge solids (dry weight basis).
B2: Processes to Significantly Reduce Pathogens (PSRP)	Sewage sludge is treated by one of the five PSRP methods listed below.
Aerobic Digestion	Sewage sludge is agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at 20 degrees Celsius and 60 days at 15 degrees Celsius.
Air Drying	Sewage sludge is dried on sand beds or on paved or unpaved basins. The sewage sludge dries for a minimum of three months. During two of the three months, the ambient average daily temperature is above zero degrees Celsius.
Anaerobic Digestion	Sewage sludge is treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35 to 55 degrees Celsius and 60 days at 20 degrees Celsius.
Composting	Using the within-vessel, static aerated pile, or windrow composting methods, the temperature of the sewage sludge is raised to 40 degrees Celsius or higher and remains at 40 degrees Celsius or higher for five days. For four hours during the five days, the temperature in the compost pile exceeds 55 degrees Celsius.
Lime Stabilization	Sufficient lime is added to the sewage sludge to raise the pH of the sewage sludge to 12 after two hours of contact.
B3: Use of Processes Equivalent to PSRP	Demonstrate operating parameters and/or pathogen levels to be PSRP equivalent subject to permitting authority approval.

requirements, and one of the vector attraction reduction alternatives (Options 1 through 8) may be identified as "exceptional quality biosolids." Exceptional quality biosolids may be used and distributed in bulk or bag form and are not subject to general requirements and management practices other than monitoring, recordkeeping, and reporting to substantiate that the quality criteria have been met.

Management Practices

The following are a few general management practice guidelines for the land application of biosolids:

- Bulk biosolids shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated critical habitat.
- Bulk biosolids shall not be applied to agricultural land, forest, a public contact site, or a reclamation site that is flooded, frozen, or snow-covered so that the bulk biosolids enters a wetland or other waters of the United States, as defined in 40 CFR 122.2, except as provided in a permit issues pursuant to Section 402 or 404 of the Clean Water Act.
- Bulk biosolids shall not be applied to agricultural land, forest, or a reclamation site that is 10 meters (33 feet) or less from waters of the United States, as defined in 40 CFR 122.2, unless otherwise specified by the permitting authority.

Distribution and Marketing of Biosolids Products

The distribution and marketing of biosolids-derived fertilizers and soil conditioners are regulated under 40 CFR Part 503. Biosolids applied to farmland, forest, and reclamation sites must at a minimum meet the pollutant Ceiling Concentration Limits from Table 4.9, Class B pathogen requirements, and vector attraction reduction requirements. The biosolids can be applied using the Cumulative Pollutant Loading Rates under Table 4.10 if the biosolids do not exceed the California TTLC limits of the Pollutant Ceiling Concentrations listed in Table 4.9. Biosolids that are applied on lawns and home gardens must meet Class A pathogen requirements, a vector attraction reduction requirement, and the High Quality Pollutant Concentration listed in Table 4.9.

The exception is that biosolids which meet the Pollutant Ceiling Concentrations, but not the High Quality Pollutant Concentration can be sold for use at product application rates prescribed on a label that are based on meeting Annual Pollutant Loading Rates.

Overall, a label shall be affixed to the bag or other container in which biosolids are sold or given away for application to land, or an information sheet shall be provided to the person who receives biosolids sold or given away in a container for application to the land. The label or information sheet shall contain the following information:

- The name and address of the person who prepared the biosolids that is sold or given away in a bag or other container for application to the land.
- A statement that application of the biosolids to the land is prohibited except in accordance with the instructions on the label or information sheet.
- The annual whole biosolids application rate for the biosolids that does not cause any of the annual pollutant loading rates in Table 4.10 to be exceeded.

Monitoring, Recordkeeping, and Recording

Monitoring frequency for pollutants, pathogen densities, and vector attraction reductions is based on the amount of biosolids used or disposed as shown on Table 4.12. More frequent monitoring is encouraged to check quality abnormalities. Alternatives which use operating parameters to satisfy pathogen and vector attraction reduction requirements should include continuous monitoring.

Generally, the preparer(s) of the

Table 4.12 40 CFR Part 503 Monitoring Frequency

Amount of Biosolids Used or Disposed (metric tons per 365 day period - dry weight) (1)	Monitoring Frequency per Year
0 > amount > 290	Annually (Once)
290 ≥ amount > 1,500	Quarterly (4 times)
1,500 ≥ amount > 15,000	Bimonthly (6 times)
amount ≥ 15,000	Monthly (12 times)
(1) 1 metric ton = 1.1 English tons.	

biosolids are required to maintain records of the biosolids to meet pollutants, pathogens, and vector attraction reduction requirements. The applier(s) are required to maintain records of application rates, management practices, and site restrictions. Records must be kept for five years.

Annual reports are due to the permitting authority by February 19 every year from all biosolids management facilities and all POTWs with a design flow of 1 mgd or greater, or which service a population of 10,000 people or greater. (In California, the permitting authority is EPA Region IX, since no State agency has accepted primary authority as the permitting authority for the 503 regulations.)

San Diego Regional Board Permitting

Currently, the San Diego Regional Board does not provide any additional permitting options for dischargers beyond the state-issued, standard individual Waste Discharge Requirements (WDRs). The Statewide program EIR covering general waste discharge requirements for biosolids land application was finalized in June 2000. It was certified by the SWRCB in August 2000.

On August 17, 2000, the SWRCB adopted with some revisions "General Waste Discharge Requirements (GWDR) for Discharge of Biosolids to Land for Use as a Soil Amendment in Agriculture, Silviculture, Horticulture, and Land Reclamation Activities." Revisions to the July 24, 2000 draft included changes to limitations on moisture content when spreading biosolids under certain conditions.

Composting of Biosolids

Under state regulations, composting facilities are regulated by the CIWMB. This includes biosolids-only composting facility and mixed solid waste composting facility (biosolids, animal material, green material, or municipal solid waste mixture). The CIWMB has adopted the "Composting Operations Regulatory Requirements" based on a "tiered" approach which sets different permitting requirements depending on such factors as quantity, level of treatment prior to composting, and facility site environment.

Both the "Composting Operations Regulatory Requirements" and the "Regulatory Tier Requirements" are contained in California Code of Regulations, Title 14 (Sections 17850 - 17895, and 18100 - 18221, respectively).

A mixed solid waste composting facility must obtain a full Solid Waste Facility Permit prior to commencing operations.

The CIWMB requires that the compost product meet 40 CFR 503 Pollutant Concentration Table 4.3 as shown on Table 4.9 and Class B pathogen reduction requirement as a minimum. The Regulations also contain provisions on general operating standards, sampling requirements, record keeping, and site restoration.

Incineration

Numerical limits set by the recently promulgated 40 CFR Part 503 regulations govern biosolids disposed of at sludge-only incinerators.

Federal Regulations

On the federal level, 40 CFR Parts 50, 51 and 52 establish the national primary and secondary ambient air standards and outline the preparation, approval, and promulgation of source air quality implementation plans. They affect incineration indirectly through ambient air standards adopted by the state.

40 CFR Part 60 Parts C and O contain numerical and process provisions for the incineration of municipal sludge. 40 CFR Part 61 establishes the National Emission Standard for Hazardous Air Pollutants (NESHAP) requirements for beryllium and mercury.

Remaining federal regulations identified in Table 4.1, primarily treat and regulate the disposal of ash as biosolids. Therefore, the earlier discussion on biosolids beneficial use and disposal for the most part, also applies to ash beneficial use and disposal. Incinerator ash does not need further processing to reduce pathogens or vector attraction.

40 CFR Part 503 establishes specific emissions requirements for municipal biosolids incinerators by regulating the concentration of pollutants in the feed sludge. The criteria are related to the incinerator control efficiency which determines how much of the feed pollutants result in the exhaust and the dispersion factor which determines the ground level concentration of the pollutant. Table 4.13 summarizes the criteria that set the feed biosolids pollutant concentrations for sludge incineration.

40 CFR Part 503 also limits the total hydrocarbon (THC) emissions from the incinerator to an average monthly concentration of 100 ppm corrected for 0 percent moisture and 7 percent oxygen. Continuous monitoring is required for total hydrocarbons. Continuous monitoring of carbon monoxide (CO) is also required. If the monthly average CO emissions concentration is less than or equal to 100 ppm when corrected for 0 percent moisture and 7 percent oxygen,

Table 4.13 Summary of 40 CFR Part 503 (E) Metals Emission Requirements for Incineration

Pollutant	Standard Limit Concentration of Pollutant in Furnace Feed Sludge Based on:
Mercury	NESHAP (1) per 40 CFR Part 61
Beryllium	NESHAP (1) per 40 CFR Part 61
Lead	Site-specific conditions
Arsenic	Site-specific conditions
Cadmium	Site-specific conditions
Chromium	Site-specific conditions
Nickel	Site-specific conditions

(1) NESHAP - National Emission Standard for Hazardous Air Pollutants

continuous emissions monitoring for THC is not required 40 CFR Part 503 also bans sewage sludge incineration if it is likely to endangered species or a species' designated critical habitat.

State and Local Regulations

On the state level, Title 17 of the CCR sets test methods for increasing emissions monitoring and establishes them as Air Resources Board's Method 101A. Enactment is, therefore, under purveyance of the local Air Quality Management District. Title 22 of the CCR determines whether incinerator ash produced is a hazardous material.

Other requirements as established by California's Ambient Air Quality Standards Implementation Plan are overseen by the Local Air Quality Management District. SOCWA is regulated by the South Coast Air Quality Management District (SCAQMD).

SUMMARY

Many of the regulations that could affect SOCWA biosolids beneficial use/disposal are in effect and are not expected to change in the near-term. However, the land application of biosolids may be further regulated and restricted by State and local agencies. As discussed, Kern County is considering the ban of all land application of biosolids. An Environmental Impact Report must be prepared before adoption of the ordinance. This would take approximately two years to prepare. If adopted, the SOCWA contract with the SYNAGRO South Kern Industrial Center composting

facility could be economically impacted. The Board has not voted to begin preparation of the Environmental Impact Report.

Senate Bill SB926 would allow the Kern County Board of Supervisors to ban land application of biosolids in the unincorporated areas of the County. While the bill would not restrict importation for composting at the SYNAGRO facility, the ban on land application could affect the economics of this option. This initiative process is underway. The election is scheduled for June 2006. The potential affect of potential change in local regulations is discussed further in Chapter 12, Sensitivity Analysis. The SYNAGRO South Kern Industrial Center composting facility is an important part of the mix of biosolids management for SOCWA. It provides a method for use/disposal of the biosolids generated from the J.B. Latham Wastewater Treatment Plant (JBLTP). These biosolids do not meet Class B requirements due to inadequate digester detention time. They may meet Class B requirements with the completion of the current digester rehabilitation contract. However, a non-Class A or B option is needed when any one digester is out of service.

This chapter also identified the trend in limitations on land application of biosolids throughout the State of California.

Land spreading of biosolids in Arizona is regulated by the State. There have been no local or county restrictions applied. There is not organized opposition to the importation of biosolids at this time. Land spreading in Arizona is an option for the foreseeable future. However, given the trend of local regulations in California it is reasonable to believe that the limitations will be take place in Arizona at some point in the future.

These regulatory trends indicate a long term narrowing of land application options. These trends may also result in a narrowing of the market for biosolids based compost.

CHAPTER 5 REGIONAL BIOSOLIDS MANAGEMENT PROGRAMS AND PARTNERING OPPORTUNITIES

REGIONAL WASTEWATER UTILITY BIOSOLIDS PROGRAMS

The 2002 SOCWA Biosolids Strategic Plan Update indicated that the status of regional biosolids management programs in Southern California was in great flux. This condition has not changed over the past three years. With potential bans in several key agricultural counties (Kern, Kings, Riverside, and Imperial) this most economical option is disappearing in California. This trend could occur in Arizona in the near future. This would greatly restrict the potential land application of biosolids. Consequently, many POTWs are reevaluating biosolids management plans and considering new or expanded composting facilities or other more aggressive biosolids treatment options. These conditions pose opportunities and potential competition to SOCWA's biosolids management strategy and program. The opportunities arise for partnering while threats occur due to a potentially significant increase in compost or other treated biosolids products. The following section provides an insight into the biosolids management plans of other wastewater agencies in Southern California.

Las Virgenes Municipal Water District

Las Virgenes Municipal Water District (LVMWD) operates an in-vessel composting facility that produces approximately 12,000 cubic yards (4,200 tons) of compost annually. The District currently gives away compost to local citizens through a Saturday program where residents pick up the compost at the facility. In addition, compost is sold ($9 per cubic yard) in bulk to landscapers and horticulturists for local uses. The District has recently entered into an agreement with a private contractor to market a majority of its compost at a price that is less than $9 per cubic yard.

LVMWD provides a valuable resource as a large Southern California wastewater utility that has managed its own compost operation for over ten years.

City of Los Angeles

The City of Los Angeles manages a majority of its biosolids at a City-owned farm located in Kern County. The site consists of 4,688 acres and is known as Green Acres Bio-Farm. The farm is currently managed by a private contractor, Responsible Biosolids Management. Recently the City issued an RFP for private contractors to submit proposals for innovative technologies to manage a portion of the City's biosolids production.

In 2004, the City produced 238,836 wet tons of biosolids at its two wastewater treatment plants (Hyperion and Terminal Island). Of this total, 237,122 wet tons of biosolids were land-applied to City-owned

property in Kern County and 1,714 wet tons were composted at Griffith Park. At this time it does not appear that the City of Los Angeles is pursuing composting as a viable alternative for its biosolids.

Sanitation Districts of Los Angeles County (LACSD)

LACSD has two large projects under development that include an option to purchase 14,500 acres of farmland and a proposed composting facility (Westlake Farms) in Kings County. The purchase is contingent on approval of the composting facility that could process up to 500,000 tons of the biosolids annually. The compost would be utilized on the farm acreage and not marketed off-site.

The second project is a joint venture with Inland Empire Utilities Agency to construct and operate a large composting facility currently under construction in San Bernardino County. This facility is close enough to SOCWA's proposed composting facility to compete for market share.

Currently, Los Angeles County has five vendors that manage its biosolids through composting, injection in a cement kiln, and land application. The biosolids are injected into cement kilns to control production of nitrous oxides.

Inland Empire Utilities Agency

The Inland Empire Utilities Agency (IEUA) serves the cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Upland, and the Rancho Cucamonga Water District. The Inland Empire Utilities Agency (IEUA) produces approximately 180 wet tons of biosolids daily. A major portion (150 wet tons) of the IEUA's biosolids is currently being co-composted with dairy manure at an agency-owned co-compost facility located in Chino.

The IEUA and Los Angeles County Sanitation Districts are currently constructing an in-building compost facility in a former IKEA furniture warehouse in San Bernardino County. The facility will be housed within a 410,000 square foot building on 24 acres, and it is expected to cost approximately $66 million to convert the building to a composting facility. The projected overall capacity of the indoor composting facility is 300,000 tons of biosolids, greenwaste and manure per year. The construction of the project began in June 2004 and is scheduled to be completed in late December 2005.

The facility will utilize aerated static pile composting, within an enclosed building. A biofilter will be installed at the facility to control potential odors from the process building. Biosolids, greenwaste, manure and other bulking additives will be

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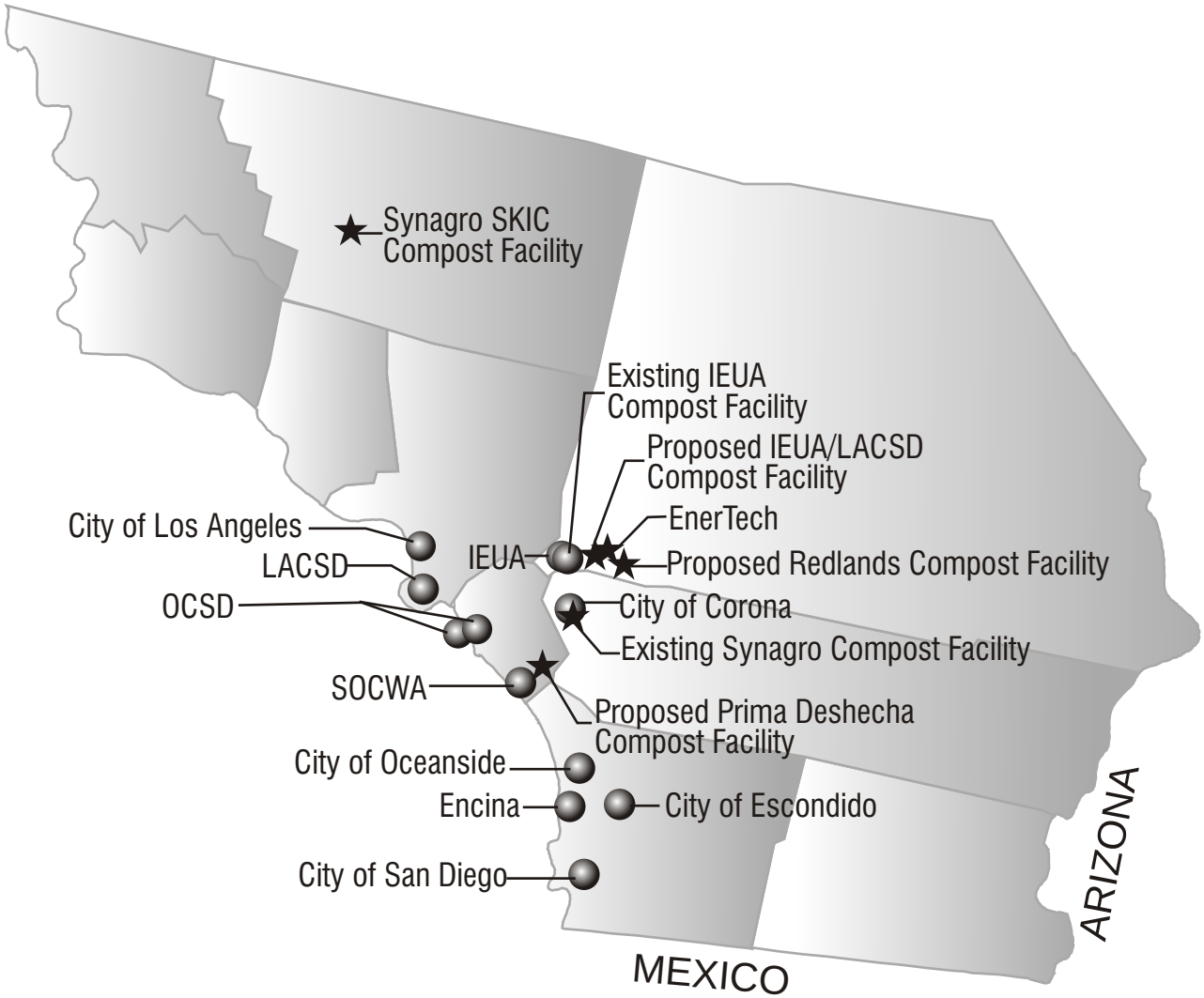

REGIONAL BIOSOLIDS HANDLING

FIGURE 5.1

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

composted at the facility, and the product will be marketed to local agriculture and/or horticulture markets. IEUA/LACSD expect to utilize a private contractor to market the product.

This facility may be a direct competitor to the proposed joint SOCWA/OCSD composting facility at the Prima Deshecha Landfill. It is expected that the new IEUA/LACSD facility will market its compost to horticulture markets in Southern California through a private contractor.

IEUA is also taking the lead in the development of a new regional biosolids handling facility. It has not been determined whether the facility would used composting or some other treatment technology. This facility will be located in the Prado Basin (adjacent to the Prado Dam). The site is approximately 63 acres; the capacity of the proposed facility has not been identified. IEUA was contacted regarding the possibility of contracting for usage of a portion of the capacity of the new composting facility. IEUA staff indicated that the facility had been developed based on the premise that there would be a 25% allocation of biosolids capacity each to the IEUA, the Los Angeles County Sanitation District, the Orange County Sanitation District, and Riverside County (EMWD/WMWD). SOCWA officials have made preliminary contacts with OCSD staff regarding a potential contract at the IEUA/LACSD composting facility.

City of Corona

The City of Corona has recently completed a biosolids thermal drying system at the City's wastewater treatment plant. The thermal dryer has a capacity of approximately 110 wet tons per day and will use waste heat from a new electric co-generation plant to dry the biosolids. The City currently produces approximately 60 wet tons of biosolids per day.

Corona's facility has been completed and should be operating on a limited basis in August 2005. The facility cost approximately $10 million and is not located within a building. Initially, the facility will be operated with City personnel.

Corona will select a private contractor to manage the dried biosolids that will be produced at the thermal drying facility. The City will initially pay a private contractor to manage the pelletized biosolids and is hopeful that it can eventually develop a local market for the pelletized product to offset production costs.

City of Redlands

The City of Redlands has entered an agreement with a private developer-operator to build and operate a

composting facility located adjacent to the City's water reclamation plant. The City is providing the site for an annual lease cost of one dollar per year. In exchange, the City's approximate 14 wet tons per day of water biosolids will be processed at no cost.

The $25 million facility would be operated by the companies American Bio Tech and the Haskell Company. The facility is planned to have a capacity of about 400 wet tons per day. An enclosed, aerobic process will be utilized. The companies are actively pursuing contracts with other agencies in the area to utilize the remaining capacity. The facility is planned to be operational in late 2007.

Orange County Sanitation District

The Orange County Sanitation District (OCSD) future biosolids management plan includes participation in sustainable reuse markets through manufacturing higher-value products such as compost, dry pellets and granulars, organo-mineral fertilizers, and energy.

As part of the implementation plan Orange County may develop in-county facilities at its treatment plants and at other locations. Plans for composting include a joint composting facility with SOCWA at the Prime Deshecha Landfill for up to 55 wet tons per day, and another unidentified composting facility that would process up to 400 wet tons per day. Other proposed options include thermal drying facilities (on and off-site), merchant energy production (co-combustion), and exploring the benefits of other product manufacturing technologies. In addition, Orange County plans to maintain failsafe backup reuse capacity for land application of chemically stabilized biosolids, reuse of biosolids products as ADC at landfills, and direct landfill options.

OCSD utilizes three vendors (Tule Ranch, SYNAGRO and Solid Solutions) to manage its biosolids. Current management options include compost, Class B and Class A land application and landfilling at two Arizona sites. According to the District biosolids management fees paid to vendors average approximately $40 per wet ton. The District is also considering a contract with EnerTech to process up to 200 tons of biosolids per day at EnerTech's proposed Rialto facility. The proposed contract price is $69.50 per wet ton including transportation.

OCSD also owns farmland in Kings County, CA where it currently land applies chemically stabilized Class A biosolids. As of February 2006, the land application of Class A biosolids in Kings County will be prohibited and only Class A EQ compost will be allowed for land application. The District may decide to compost at its Kings County site or may

sell the property and pursue other options.

SOCWA Member Agencies

The Irvine Ranch Water District (IRWD), the Trabuco Canyon Water District (TCWD), the El Toro Water District (ETWD), the Santa Margarita Water District (SMWD) and the City of San Clemente (CSC) each operate their own water reclamation facilities. Each agency maintains its own biosolids management program with the exception of the ETWD which trucks solids from the ETWD Water Reclamation Facility to the SOCWA Regional Treatment Plant. Each of the remaining agencies participates with SOCWA in contracts with private contractors for the off-site disposal/reuse of biosolids or self hauls biosolids to the Prima Deshecha Landfill.

The SMWD has recently embarked on an analysis of biosolids treatment alternatives at its Chiquita Water Reclamation Facility. This project is in a very preliminary phase. However, early screenings of options have indicated that the concepts of heat drying and incineration at the Chiquita site merit further analysis.

United States Department of Defense – Camp Pendleton

In 2002 one contact was made with Camp Pendleton representatives regarding biosolids partnering opportunities. The representative spoke positively of the idea and pledged to conduct additional research into the feasibility of the opportunity through the base engineering chain of command. Other informed observers note that developing workable relationships with the military at Camp Pendleton is typically extremely difficult. This tends to limit interest in pursuing the partnering opportunities with Camp Pendleton.

Encina Wastewater Authority

The Encina Wastewater Authority (EWA) is a joint powers authority (JPA) owned by six agencies; the City of Carlsbad, City of Vista, City of Encinitas, Leucadia Wastewater District, Vallecitos Water District, and the Buena Sanitation District. EWA produces approximately 28,000 wet tons of biosolids annually and currently has a contract to land apply their Class "B" biosolids to agricultural fields in Arizona.

The EWA prepared a "Biosolids Strategic Plan" in March of 2002 to determine its future plan for biosolids management. It was concluded by EWA that a heat drying process best met EWA's biosolids management goals.

Encina's biosolids are currently hauled to Arizona and applied to farmland that is owned and operated by Ag Tech. Ag Tech has been managing biosolids for

Southern California wastewater agencies for approximately 20 years.

EWA is pursuing the development of a thermal drying and pelletization facility at their Carlsbad wastewater treatment plant. After several years of study, Encina decided that heat drying was the most desirable technology for the Authority's long-term biosolids management program.

Construction of the heat drying facility is scheduled to begin in 2006 and completion is scheduled for late 2007. EWA is also planning to update its pelletized biosolids marketing study next year.

It is reported that the EWA considered the possibility of developing the new heat drying facility as a regional Biosolids treatment facility. However, this concept was abandoned due to the spatial constraints of the existing plant site and the potential for local neighborhood resistance within the City of Carlsbad.

City of San Diego

The City of San Diego Metro Biosolids Center (MBC) provides thickening and digestion of the raw sludge generated at the North City Water Reclamation Plant (NCWRP), and dewatering of blended wet biosolids from both the Point Loma Wastewater Treatment Plant and the NCWRP. MBC produces biosolids that are approximately 30 percent solid and 70 percent water, the consistency of wet clay. The City of San Diego currently landfills its biosolids at the Otay Mesa landfill. There are no immediate plans for the City to pursue other options such as composting or heat drying.

PARTNERING OPPORTUNITIES

Chapter 6 of this report identifies options in SOCWA's traditional program of hiring contractors for the off-site disposal/reuse of biosolids. The alternative exists of either contracting or developing a mutual agreement with another public agency. Partnering with a public agency offers the following advantages compared to hiring a private contractor:

- Public agencies tend to be more stable over a long period of time
- Public agencies will have a similar outlook regarding the risks associated with the failure to reliably and consistently dispose of Biosolids
- Public agencies do not have the same cost mark-up associated with profit.
- Public agencies tend to have a greater access to Federal and State grants and loans for projects.

There are also relative disadvantages for partnering with other public agencies as noted below:

- Public agencies are more sensitive to political pressure including the sensitivity associated with transporting biosolids from one area into another area.
- The development of contractual agreements and financing can take a longer period of time for public agencies.
- Public sensitivity is a key issue in considering potential regional biosolids handling facilities. As noted above the possibility of a regional operation at the EWA plant was in part eliminated due to neighborhood concerns in the City of Carlsbad.

The discussion on Southern California agencies in this chapter indicates that there are not many regional opportunities. It has been assumed that SOCWA would not consider approaching another agency regarding projects in distant counties (e.g. City of Los Angeles operation in Kern County) due to the potential political/regulatory volatility of these options. It is recommended that SOCWA consider the following items regarding potential projects with other member agencies:

- OCSD is a partner in the conceptual project for the Prima Deshecha Composting Facility. Although a much larger agency than SOCWA, OCSD shares the same goal of finding a potential biosolids solutions within the County of Orange. Regardless of the ultimate fate of the Prima Deshecha facility SOCWA should remain in contact with OCSD staff regarding the potential for joint partnership in other projects.
- Further discussion should be explored with OCSD and IEUA regarding purchase or rental of capacity in the Prado Basin regional solids handling facility.
- The Chiquita WRP has sufficient property size to accommodate various mechanical forms of solids drying. The SMWD is in the preliminary phase of exploring biosolids options for this facility. A joint project with SOCWA may offer economic benefits to both parties. However, it should be noted that there are political sensitivities to consider with respect to both the view of future neighbors around the site and concern regarding truck traffic into the site.

- SOCWA's other member agencies are not currently offering any options for regionalization at their own facilities. However, the development of any SOCWA biosolids options should consider the potential participation of these agencies with regard to their own biosolids.

INTRODUCTION

A SOCWA goal of maintaining multiple, economical options for biosolids treatment, disposal and reuse was identified in Chapter 2. Each SOCWA facility is to have a minimum of three available disposal/reuse options. The types of disposal/reuse that are available depend, in part, on the level of treatment achieved as discussed in Chapters 3 and 4. Table 6.1 identifies the appropriate disposal/reuse methods for each plant.

Options for further treatment, including the Prima Deshecha Composting Facility, are reviewed in Chapter 6. This part of the Biosolids Strategic Plan Update also identified options for modification of the digestion system to achieve designation of the biosolids as Class A. It is believed that this upgrade of the designation would increase the options for reuse/disposal through means such as land application.

Disposal of Biosolids at the Prima Deshecha Landfill has been an important part of the SOCWA operation as described in Chapter 3. The limited options for reuse/disposal through partnering with other regional public agencies were described in Chapter 5. However, the primary means of disposing of SOCWA's Biosolids has historically been contracting through private entities for shipment to land application, landfilling or composting. This chapter focuses on the range of options for private contracting.

BIOSOLIDS MANAGEMENT FIRMS

The SOCWA's Biosolids Management Strategic Plan (BMSP), finalized in September of 2002, identified eight private biosolids management firms and facilities. Of the seven firms that were originally identified in the BMSP, one firm has changed its operations and one facility was never constructed. The BMSP identified California Soil Products as a company that chemically stabilized biosolids in Los Angeles County. It does not appear that the Company is in operation in Los Angeles County.

Table 6.2 lists the firms and facilities that were identified in SOCWA's 2002 BMSP as potential biosolids management options. It also includes the additional firms identified in this study.

Nursery Products are operating under a "cease and desist" order. They are seeking another site. This could affect the long-term viability of this option. The firms listed above, with the exception of Nursery Products and Biosoils, could provide immediate biosolids management options for SOCWA.

Survey Results

The private biosolids management firms that currently operate in Southern California and Arizona were identified and contacted as part of this study. A standard set of questions was presented to each firm, and their responses are summarized below.

Table 6.1 Applicable Disposal/Reuse Options

Treatment Facility	Classification of Dewatered Biosolids	Management Method
J. B. Latham Treatment Plant	- (1)	- Prima Deshecha Landfill - Other Landfill - Composting - Further Treatment
Plant 3A	Class B	- Prima Deshecha Landfill - Land Application - Composting - Further Treatment
Regional Treatm ent Plant	Class B	- Prima Deshecha Landfill - Land Application - Composting - Further Treatment

Notes:

(1) Insufficient digester time to consistently meet Class B requirements.

Table 6.2 Private Biosolids Management Firms

Firms	Location(s)	Management Method
Previously Identified Firms		
SYNAGRO	California and Arizona	Compost and Land Application
Tule Ranch	Kern County, CA	Land Application
San Joaquin Composting	Kern County, CA	Composting
Yakima Farms	La Paz County, AZ	Compost
Waste Markets	Yuma County, AZ	Landfill
Ag Tech LLC	Yuma County, AZ	Land Application
Newly Identified Firms		
Solid Solutions	La Paz, Maricopa, Yuma, AZ	Land Application
Nursery Products	San Bernardino County, CA	Compost
USA Transport	Kern County, CA	Land Application
Biosoils	San Bernardino County, CA	Thermal Drying
Avra Gro	Maricopa County, AZ	Land Application
Biosolids Management	Maricopa County, AZ	Land Application
Universal Environment Solutions	Maricopa and Yuma County, AZ	Land Application
Southwest Land Reclamation	Maricopa, Yavapai, Cochise, Navajo Counties, AZ	Land Application

Synagro

SOCWA currently contracts with SYNAGRO to compost its biosolids at the Regional Compost Facility in Corona, land apply at sites in California and Arizona, and compost at SYNAGRO's Arizona Soils facility. SOCWA has also contracted with SYNAGRO to compost a portion of its biosolids production at SYNAGRO's proposed South Kern Industrial Center. The current SYNAGRO operations are summarized in Table 6.3.

Table 6.3 SYNAGRO Biosolids Management Operations

Facility	Indian Reservation	Maricopa Land Sites	Regional Composting	S. Kern Industrial Center	Arizona Soils Compost
Management Method	Land Application	Land Application	Composting	Composting	Composting
Site Location	Riverside County, CA	Maricopa County, AZ	Riverside County, CA	Kern County, CA	La Paz County, AZ
Site Size (acres)	1,200	2,000	67	100	40
Biosolids Accepted	Class A	Class A and B	Class A and B	Class A and B	Class A and B
Site Status	Not Operating	Operating	Operating	Not Constructed	Operating
Site Capacity (wtpy)	25,000	50,000	180,000	200,000	180,000
Excess Capacity (wtpy)	25,000	Yes	No	No	100,000
Management Fee*	$40/ton	$43.48/ton	$41.62/ton***	$55/ton	$49/ton
Anticipated Site Life	10 years	10 years	3 year (until 11/08)	25 years	20 years
Site Permitted By	None	State	County	County	State
Compost Method	Not Applicable	Not Applicable	Windrow	ASP	Windrow
Market Price Compost	Not Applicable	Not Applicable	$7 cubic yard **FOB Facility	$7 cubic yard **FOB Facility	$7 cubic yard **FOB Facility

*Management Fee includes transportation.
**FOB Facility - Price for product not including transportation.
***As of October 4, 2005.

San Joaquin Composting

San Joaquin Composting operates a large windrow biosolids composting facility in Kern County. The site is not currently affected by Kern County's restrictive biosolids ordinance. However, new proposed air quality regulations could require the facility to modify its operations in the future. San Joaquin Composting is owned by McCarthy Farms, which previously operated a large land application operation in Kings County. The land application site is no longer operating due to County Class B biosolids restrictions. However, Class A compost from the San Joaquin Compost facility is being land applied at the McCarthy Farms site in Kings County. Their operation is summarized in Table 6.4

Table 6.4 San Joaquin Composting

Facility	San Joaquin Composting
Management Method	Composting
Site Location	Kern County, CA
Site Size (acres)	160
Biosolids Accepted	Class A and B
Site Status	Operating
Site Capacity (wtpy)	786,000
Excess Capacity	285,000
Management Fee*	$20 /ton
Anticipated Site Life	20 Years
Site Permitted By	County
Compost Method	Windrow
Market Price Compost	$3-$4 Cubic Yard

*Management Fee does not include transportation; cost is approximate.

Solid Solutions

Solid Solutions currently operate land application sites in Arizona. The Company also markets green waste mulch and compost for various Southern California producers. Their operations are presented in Table 6.5.

Table 6.5 Solid Solutions

Facility	**La Paz Land Sites**	**Maricopa Land Sites**	**Yuma Land Sites**
Management Method	Land Application	Land Application	Land Application
Site Location	La Paz County, AZ	Maricopa County, AZ	Yuma County, AZ
Site Size (acres)	5,000	5,000	5,000
Biosolids Accepted	Class A and B	Class A and B	Class A and B
Site Status	Operating	Operating	Operating
Site Capacity (wtpy)	150,000	150,000	150,000
Excess Capacity	Yes	Yes	Yes
Management Fee*	$40/ton	$40/ton	$40/ton
Anticipated Site Life	10 years	10 years	10 years
Site Permitted By	State	State	State
Compost Method	Not Applicable	Not Applicable	Not Applicable
Market Price Compost	Not Applicable	Not Applicable	$7 cubic yard FOB Facility

*Management Fee includes transportation; cost is approximate.

The Yakima Company

The Yakima Company currently operates a biosolids drying and composting facility at the La Paz County Landfill in Arizona. Class B biosolids are air-dried and composted at the facility and then transported to California for land application of the resultant Class A product. The Company gives the product away to farmers and also pays to transport it to the application site. Yakima is interested in selling the facility and facilitating a joint venture between La Paz County and Southern California biosolids producers. The operation is summarized in Table 6.6.

Table 6.6 The Yakima Company

Facility	Maricopa Land Sites
Management Method	Composting
Site Location	La Paz County, AZ
Site Size (acres)	40
Biosolids Accepted	Class A and B
Site Status	Operating
Site Capacity (wtpy)	300,000
Excess Capacity	200,000
Management Fee*	$14/ton + transportation
Anticipated Site Life	10 years
Site Permitted By	State
Compost Method	Windrow
Market Price Compost	Given away

*Management Fee does not include transportation; cost is approximate.

Tule Ranch

Tule Ranch currently operates land application sites in Kern County and Yuma County, AZ. At the Kern County sites, Tule Ranch receives Class B biosolids and chemically stabilizes the material on-site to meet Class A requirements prior to land application. The two operations are summarized in Table 6.7.

Table 6.7 Tule Ranch Biosolids Operations

Facility	Kern Land Sites	Yuma Land Sites
Management Method	Land Application	Land Application
Site Location	Kern County, CA	Yuma County, AZ
Site Size (acres)	4,000	7,000
Biosolids Accepted	Class A and B	Class A and B
Site Status	Operating	Operating
Site Capacity (wtpy)	160,000	280,000
Excess Capacity	Yes	Yes
Management Fee*	$40/ton	$40/ton
Anticipated Site Life	10 years	10 years
Site Permitted By	County	State
Compost Method	Not Applicable	Not Applicable
Market Price Compost	Not Applicable	Not Applicable

*Management Fee includes transportation; cost is approximate.

Waste Markets

SOCWA currently has a back-up contract with Waste Markets to landfill its biosolids at two facilities, one located in Simi Valley, CA and at another located in Yuma County, AZ. The Simi Valley landfill has a limited capacity of 3,000 wet tons of biosolids per month. In an emergency situation that affected more than one Southern California wastewater treatment plant, the capacity of the landfill would quickly reach capacity limits. The Arizona landfill, South Yuma Landfill, has a large capacity for biosolids and is currently accepting biosolids from Orange County Sanitation Districts.

Ag Tech

Ag Tech has operated Class B land application site for over twenty years near Yuma, AZ. Ag Tech owns the pr0operty where biosolids are applied. The Yuma operation is summarized in Table 6.8.

Table 6.8 Ag Tech LLC

Facility	**Yuma County Sites**
Management Method	Land Application
Site Location	Yuma County, AZ
Site Size (acres)	7,500
Biosolids Accepted	Class A and B
Site Status	Operating
Site Capacity (wtpy)	300,000
Excess Capacity	Yes
Management Fee*	$ 40/ton
Anticipated Site Life	10 years
Site Permitted By	State

*Management Fee includes transportation; cost is approximate.

USA Transport

USA Transport operates a land application sites in Kern County that accepts Class B and chemically stabilizes the material to meet Class A requirements prior to application. The operation is summarized in Table 6.9.

Biosolids Management

Biosolids Management currently operates Class B land application sites in Maricopa County, AZ. This operation is summarized in Table 6.10.

Table 6.9 USA Transport

Facility	Kern County Sites
Management Method	Land Application
Site Location	Kern County, CA
Site Size (acres)	1,200
Biosolids Accepted	Class A and B
Site Status	Operating
Site Capacity (wtpy)	76,800
Excess Capacity	Yes
Management Fee*	$ 8.50/ton + trans.
Anticipated Site Life	20 years
Site Permitted By	County

*Management Fee does not include transportation; cost is approximate.

Table 6.10 Biosolids Management

Facility	Maricopa County Sites
Management Method	Land Application
Site Location	Maricopa County, AZ
Site Size (acres)	6,000
Biosolids Accepted	Class A and B
Site Status	Operating
Site Capacity (wtpy)	160,000
Excess Capacity	Yes
Management Fee*	$ 45/ton
Anticipated Site Life	20 years
Site Permitted By	State

*Management Fee includes transportation; cost is approximate.

Southwest Land Reclamation

Southwest Land Reclamation currently operates Class B land application sites in four Arizona counties. All accept Class A or Class B biosolids. The sites are summarized in Table 6.11

Universal Environment Solutions

Universal Environmental Solutions operates Class B land application sites at sites in Maricopa and Yuma Counties, AZ. The two sites are summarized in Table 6.12.

. Table 6.11 Southwest Land Reclamation Biosolids Operations

Facility	Maricopa County Sites	Yavapai County Sites	Cochise County Sites	Navajo County Sites
Management Method	Land Application	Land Application	Land Application	Land Application
Site Location	Maricopa County, AZ	Yavapai County, AZ	Cochise County, AZ	Navajo County, AZ
Site Size (acres)	1,000	1,000	1,000	1,000
Biosolids Accepted	Class A and B	Class A and B	Class A and B	Class A and B
Site Status	Operating	Operating	Operating	Operating
Site Capacity (wtpy)	20,000	20,000	20,000	20,000
Excess Capacity	Yes	Yes	Yes	Yes
Management Fee*	$40/ton	$40/ton	$40/ton	$40/ton
Anticipated Site Life	10 years	10 years	10 years	10 years
Site Permitted By	State	State	State	State

*Management Fee includes transportation; cost is approximate.

Table 6.12 Universal Environmental Solutions

Facility	Maricopa Land Sites	Yuma Land Sites
Management Method	Land Application	Land Application
Site Location	Maricopa County, AZ	Yuma County, AZ
Site Size (acres)	16,000	12,000
Biosolids Accepted	Class A and B	Class A and B
Site Status	Operating	Operating
Site Capacity (wtpy)	640,000	480,000
Excess Capacity	Yes	Yes
Management Fee*	$40/ton	$40/ton
Anticipated Site Life	10 years	10 years
Site Permitted By	State	State
Compost Method	Not Applicable	Not Applicable
Market Price Compost	Not Applicable	Not Applicable

*Management Fee includes transportation; cost is approximate.

Avra Gro

Avra Gro Operates Class B Land application sites in Maricopa County, AZ.. Its Operation is Outlined in Table 6.13.

Table 6.13 Avra Gro

Facility	**Maricopa County Sites**
Management Method	Land Application
Site Location	Maricopa County, AZ
Site Size (acres)	20,000+
Biosolids Accepted	Class A and B
Site Status	Operating
Site Capacity (wtpy)	1,000,000
Excess Capacity	Yes
Management Fee*	$ 40/ton
Anticipated Site Life	Years
Site Permitted By	County
Compost Method	Not Applicable
Market Price Compost	Not Applicable

*Management Fee includes transportation; cost is approximate.

PLANNED PRIVATE BIOSOLIDS OPERATIONS - ENERTECH

It is anticipated in the future that the growing need for biosolids management options will spur the development of companies that utilize innovative reuse options. A recent example of this potential trend is a company called EnerTech. This firm has completed a preliminary design for a processing facility to be located in Rialto, CA. It will process biosolids and produce a fuel suitable for energy production, cement kilns, etc. The planned capacity is 675 wet tons per day. They have secured commitments for 650 wet tons per day. However, the commitments are not firm contracts. The Board of Directors of the Orange County Sanitation Districts has authorized the general manager to execute a contract with EnerTech. EnerTech has recently indicated that an arrangement to accept an average of 17 wet tons per day would be available to an agency like SOCWA. The expected tipping fee is approximately $70 per ton.

EnerTech has obtained the Permit to Construct from the Air Quality Management District. The City of Rialto has certified the Environmental Impact Report.

MANAGEMENT FEES

Management fees for biosolids contractors usually include two primary components: a gate fee and a transport cost. The gate fee reflects the cost to operate the facility and, where applicable, the capitalization of facilities constructed for handling the biosolids. The transport cost reflects the cost of hauling the biosolids to the site. The apportionment of the two components depends on the type and location of the operation. The management fee for the Synagro SKIC operation is approximately $55 per wet ton. For example, of these fees approximately $40 is the gate fee and $15 is related to the transport cost. As the distance increases the percentage of the transport cost increases. According to several contractors, the cost to transport biosolids from Orange County to sites in Arizona is approximately $35 per wet ton. However, in some cases the trucks are able to negotiate a "back haul" whereby trucks transport materials or products back from Arizona to California, which reduces trucking costs.

The management fees for private contractors to manage biosolids listed in this study was obtained from the contractors and represents an average range of current contract prices. The actual operators' costs have risen recently with increased fuel costs. These fuel increases may not be reflected in the average, reported costs. In general, contractors do not reveal exact prices in order to be competitive when contracts are bid. The price to transport biosolids from SOCWA's facility to one of the identified contractor's sites would depend on several factors, including transport distance, volume of biosolids contracted, and the number of trailers, if any, that need to be left on-site.

SUMMARY OF SURVEY RESPONSES

Each of the operations is summarized in Table 6.14 (land application) and Table 6.15 (composting/landfills). The table lists the site capacity, the available or excess capacity, and the expected site life. The table also lists landfill sites that accept biosolids.

Based on the responses to the survey, it appears that land application options in Southern California for SOCWA's biosolids management program have been reduced significantly. The application of Class B biosolids has been effectively banned in Southern California, with the possible exception of Indian lands where county ordinances have no jurisdiction.

Due to local restrictions on the land application of Class B biosolids in California, many private biosolids management firms have set up business in Arizona. There are tens of thousands of acres of land in Arizona that have been registered with the State to accept biosolids. At the present time there are many more Arizona land application options than in California.

There are also several biosolids composting facilities that are currently operating in Arizona, including SYNAGRO's Arizona Soil Products and the Yakima Company's facility at the La Paz County Landfill. While these composting sites are more expensive alternatives to direct land application, it is less likely that these facilities will be affected by any future biosolids restrictions or bans in Arizona.

The survey identified a total of fourteen firms that are currently managing, or could potentially manage biosolids generated in Southern California. Of these fourteen firms, three firms (SYNAGRO, Tule Ranch and USA Transport) currently operate land application sites in California and land-apply only Class A biosolids. Seven firms (SYNAGRO, Tule Ranch, Ag Tech, Solid Solutions, Avra Gro, Biosolids Management, Universal Environment Solutions and Southwest Land Reclamation) currently operate land application sites in Arizona.

Three firms (SYNAGRO, San Joaquin Composting and Yakima Company) currently operate or are planning biosolids composting facilities. SYNAGRO currently operates composting facilities in Corona, CA and La Paz County, AZ. In addition, SYNAGRO is developing a new composting facility in Kern County called SKIC (Southern Kern Industrial Center). San Joaquin Composting operates a large windrow composting facility in Kern County and Yakima Company operates a composting facility at the La Paz County Landfill in Arizona.

SOCWA's current contract with Waste Markets to serve as a back-up biosolids hauler (to landfills in Simi Valley and in

Yuma will expire in July, 2006. Waste Markets has indicated that it will not renew the contract as it will not longer be serving the municipal biosolids market.

ISSUES WITH PRIVATE CONTRACTORS

SOCWA has historically negotiated contracts with private contractors for the off-site disposal and/or the beneficial reuse of biosolids (in addition to disposal at the Prima Deshecha Landfill). This has been a reliable and cost effective approach to biosolids management. The status of these contracts and the impetus for change were discussed in Chapter 1 of this report.

Maintaining a minimum of three treatment/reuse/disposal options for each SOCWA treatment facility implies some form of continue contracting with private firms. SOCWA's contract with Synagro for the guaranteed disposal of 25 wet tons per day is a given unless political forces either delay or stop the construction of the SKIC Composting facility.

Each contract with a private firm that handles biosolids is apt to have the following components:

- Contract Term. Longer contracts will typically lock down a base rate while providing a sense of security; shorter contracts will provide SOCWA with more flexibility.
- Termination. Contracts with private entities will create the conditions that would allow either party to terminate the contract.
- Cost Inflation - Fuel, Labor and Material Prices. Contracts with private companies typically include the provision for adjusting the management fee due to the standard impacts of inflation on fuel, labor and materials. Contracts involving more distant disposal locations such as Arizona will be more vulnerable to these potential impacts.
- Cost Inflation - Market and Political Forces. Some contracts with private companies also include the provisions for adjustments of price due to unforeseen impacts on their operation. For instance, if a regulatory change in Kern County imposed a requirement to enclose the composting facility it is likely that this capital cost would be reflected in an increase in the management fee.
- Guaranteed Delivery. In the past SOCWA has been able to maintain contracts similar to that held currently with Waste Markets. This contract guarantees prices for the transport and disposal of SOCWA biosolids without committing to any quantity of shipment. This has been an important component of SOCWA's management strategy as it allows the agency to maintain 'back-up' contracts for

Table 6.14 Biosolids Land Application Firms

Firm	Site Location(s)	Site Acreage	Biosolids Accepted		Site Status	Site Capacity (wtpy)	Excess Capacity (wtpy)	Man. Fee	Site Life (years)	Permitted By
			Class A	Class B						
SYNAGRO										
Indian Reservation	Riverside, CA	1,200	X		Not Operating.	25,000	25,000	$40.00	10	None
Arizona Sites	Maricopa, AZ	2,000	X	X	Operating	80,000	50,000	$40.00	10	State
Tule Ranch										
Kern County Sites	Kern, AZ	4,000	X	X	Operating	160,000	Yes	$40.00	10	County
Yuma County Sites	Yuma, AZ	7,000	X	X	Operating	280,000	Yes	$40.00	10	State
Ag Tech LLC	Yuma, AZ	7,500	X	X	Operating	300,000	Yes	$40.00	20	State
Solid Solutions										
La Paz County Sites	La Paz, AZ	5,000	X	X	Operating	150,000	Yes	$40.00	20	State
Maricopa County Sites	Maricopa, AZ	5,000	X	X	Operating	150,000	Yes	$40.00	20	State
Yuma County Sites	Yuma, AZ	5,000	X	X	Operating	150,000	Yes	$40.00	20	State
USA Transport	Kern, CA	1,200	X	X	Operating	76,800	Yes	$8.50 + trans.	20	County
Avra Gro	Maricopa, AZ	20,000+	X	X	Operating	1,000,000	760,000	$40.00	50	State
Biosolids Management	Maricopa, AZ	6,000	X	X	Operating	160,000	Yes	$45.00	20	State
Universal Env. Solutions										
Maricopa County Sites	Maricopa, AZ	16,000	X	X	Operating	640,000	Yes	$40.00	20	State
Yuma County Sites	Yuma, AZ	12,000	X	X	Operating	480,000	Yes	$40.00	20	State
Southwest Land Reclam.										
Maricopa County Sites	Maricopa, AZ	1,000	X	X	Operating	20,000	Yes	$40.00+	20	State
Yavapai County Sites	Yavapai, AZ	1,000	X	X	Operating	20,000	Yes	$40.00+	20	State
Cochise County Sites	Cochise, AZ	1,000	X	X	Operating	20,000	Yes	$40.00+	20	State
Navajo County Sites	Navajo, AZ	1,000	X	X	Operating	20,000	Yes	$40.00+	20	State

Table 6.15 Biosolids Processors and Landfills

Firm	Site Locations	Process	Site Ac.	Biosolids Accepted		Site Status	Site Capacity (wtpy)	Excess Capacity (wtpy)	Man. Fee	Compost Sales Price (cubic yd.)	Site Life
				Class A	Class B						
SYNAGRO											
Regional Compost (Recyc)	Riverside, CA	Compost	67	X	X	Operating	180,000	0	$40.00	$7.00	3+ Years
Arizona Soils	La Paz County, AZ	Compost	40	X	X	Operating	180,000	100,000	$49.00	$7.00	20 Years
S. Kern Industrial Center	Kern County, CA	Compost	100	X	X	Not Built	200,000	0	$55.00	$7.00	25 Years
San Joaquin Compost	Kern County, CA	Compost	160	X	X	Operating	786,000	285,000	$20.00	$5.00	20 Years
The Yakima Co.	La Paz County, AZ	Compost	40	X	X	Operating	300,000	200,000	$14.00 +trans.		20 Years
Nursery Products	San Bernardino, CA	Compost	40	X	X	Operating	300,000				
Biosoils	San Bernardino, CA	Heat Drying	10	X	X	Not Built	180,000	180,000	$70.00	Unknown	20 Years
EnerTech	Rialto, CA	Pyrolosis	N/A	X	X	Not Built	228,000	Add silo	$70.00	N/A	20 Years
Waste Markets											
Simi Valley Landfill	LA County, CA						36,000	Some			
South Yuma Landfill	Yuma, AZ	Landfill	N/A	X	X	Operating					
Prima Deschecha	Orange County, CA	Landfill	N/A	X	X	Operating					
Puente Hills Landfill	LA County, CA	Landfill	N/A	X	X	Operating					
Ramona Landfill	San Diego, CA	Landfill	N/A	X	X	Operating					
Sycamore Landfill	San Diego, CA	Landfill	N/A	X	X	Operating					
Otay Landfill	San Diego, CA	Landfill	N/A	X	X	Operating					
Sunshine County Landfill	LA County, CA	Landfill	N/A	X	X	Operating					
Lancaster Landfill	LA County, CA	Landfill	N/A	X	X	Operating					
Palmdale Landfill	LA County, CA	Landfill	N/A	X	X	Operating					
Simi Valley Landfill	LA County, CA	Landfill	N/A	X	X	Operating					
Kettleman City Landfill	Kern County, CA	Landfill	N/A	X	X	Operating					

emergencies. There appears to be trend in private companies toward contracting based on a guaranteed monthly or annual delivery of biosolids.

Chapter 2 identified a goal of maximizing SOCWA control over biosolids management. This would appear to dictate that SOCWA reduce the amount of dependence on private firms. However, this goal of management disposal is not quite that simple. The construction of a Prima Deshecha Composting Facility is apt to involve a private company to operate and/or market the composting process. At the very least, SOCWA would be trying to compete in a compost product market, which is subject to manipulation by private companies. Treatment techniques such as heat drying or incineration provide greater independence by reducing the amount of biosolids to be removed from the plant sites. However, these alternatives still create an end product which must be disposed of off-site.

LONG TERM COST IMPACTS

Chapter 11 presents costs for the alternatives developed within this Biosolids Strategic Plan Update. These costs will indicate that the current method of utilizing private companies to continue handling the off-site disposal of the majority of SOCWA's biosolids will be the most cost effective alternative available in the short term. Figure 6.1 provides a plot of the historical disposal costs for SOCWA. If SOCWA were to solicit proposal prices for Class B land application, the expected costs would range from $40 to $55 per wet ton. Similarly, the contract price of $55 per wet ton for the Synagro SKIC facility provides a measure of the current cost for contracting at a compost facility in Southern California. However, it is not possible to predict the inflation of these costs over the next 10 to 20 years. A comparison of the 2002 Biosolids Strategic Plan with the 2005 Update as pertains to private contractors is summarized below:

- There appears to be either the same number or slightly more options for private disposal/reuse available now than were available in 2002.
- The rate of inflation for private contract costs from 2002 to 2005 appears to be approximately 10% to 25%.
- There is a greater reliance on handling and disposal within the State of Arizona.
- There appear to be fewer options available for procuring contracts without a guaranteed delivery amount.
- The experience of Synagro with the SKIC Composting Facility and EnerTech with the reuse facility in Rialto point to challenges faced by private firms in developing new

handling facilities. The longer development time and political vulnerability may impact reliability of new contracts that SOCWA negotiates with private firms.

CHAPTER 7 BIOSOLIDS TREATMENT, DISPOSAL, AND REUSE OPTION

INTRODUCTION

The purpose of this chapter is to review a wide range of biosolids management options available for the South Orange County Wastewater Agency (SOCWA). The management options are three-fold in nature. The first component consists of treatment including but not limited to digestion, composting, and h eat treatment. Treatment as defined in this chapter is referred to as on-site treatment. This covers the addition of new treatment processes at the J.B. Latham Treatment Plant (JBLTP), the Regional Treatment Plant (RTP), or Plant 3A (3A). This also includes the potential construction of a new composting facility at the Prima Deshecha Landfill. The treatment options produce a given quality of biosolids with respect to the Environmental Protection Part 503 regulations and suitability for reuse.

The second set of management options consists of disposal or reuse after on-site treatment. These options include but are not limited to landfilling and land application. Composting also fits into this category as it is treated in this analysis as a combined treatment/disposal option. The contract with Synagro for the hauling and handling of biosolids at the proposed South Kern Industrial Center (SKIC) Composting Facility is an example of a disposal/reuse option.

A third category of options involves the hauling of the biosolids off-site for further treatment (beyond composting) and disposal by a third party. The proposed Enertec facility in Rialto is an example of this category. This category would also include any participation with another public agency (with that agency as the lead) in a regional biosolids treatment facility. This category of management options is not directly addressed in this chapter.

From the options, a matrix of overall treatment, disposal, and reuse options will be identified. The overall options will be consistent with the biosolids quality and subsequent suitability for the various disposal and reuse alternatives. The estimated cost of each alternative will be presented. Finally, a ranking of the alternatives has been performed. This ranking occurred as part of Workshop No. 1 conducted among technical and management staff of the SOCWA member agencies. A group of biosolids management options has been identified for further consideration.

The SOCWA operates biosolids treatment at three of the treatment plants, J.B. Latham (JBLTP), the Regional Treatment Plant (RTP), and Plant 3A (3A). The biosolids are anaerobically digested at each of the plants. The digested biosolids are then dewatered by centrifuges and disposed of off-site.

BIOSOLIDS TREATMENT OPTIONS

This section summarizes the current biosolids treatment options available to SOCWA.

Anaerobic Digestion

Anaerobic digestion is a very widely used process to stabilize biosolids. This process is used at each of the three SOCWA plants with digestion. The processes are operated in the mesophilic temperature range (~95 degrees F).

This process is considered the base case. The biosolids produced at the RTP and 3A plants meet 503b Class B requirements. The JBLTP digesters do not have sufficient volume to meet the Class B detention time. The biosolids require further treatment to meet Class B. All of the biosolids require additional treatment to meet Class A.

The base treatment option is shown in Figure 7.1 along with potential disposal methods.

Phased Digestion

Phased digestion can produce pathogen limits comparable to Class A technology when operated in mesophilic-thermophilic digestion steps. The major advantages in addition to the pathogen reduction are the potential to increase production of biogas and to enhance volatile solids reduction. This results in less biosolids for disposal. Phased digestion does not produce an offensive product if operated within a given temperature range. The technology is not approved as a Class A technology. To be considered as a Class A technology, additional monitoring is required to confirm coliform reductions to meet the Process for Reduction of Pathogen (PFRP) requirements. Phased digestion has been identified as a potential process at the JBLTP plant to produce Class A biosolids. This would increase disposal options as compared to the current condition of not meeting Class B. Additional construction cost is not considered at this point based on the assumption that that the existing digesters at each treatment plant could be reconfigured to handle the necessary series operation for phased digestion. However, a variation of phased digestion is presented in Chapter 8 that involves the construction cost for a new acid phase digestion system.

A schematic of the phased digestion option is presented in Figure 7.2.

Thermophilic Digestion

The thermophilic process is operated at temperatures of around 130 degrees F. At these temperatures, the pathogen content of the sludge is reduced beyond the levels that can be achieved through mesophilic temperatures. When designed and operated properly, the process can produce Class A biosolids. The process

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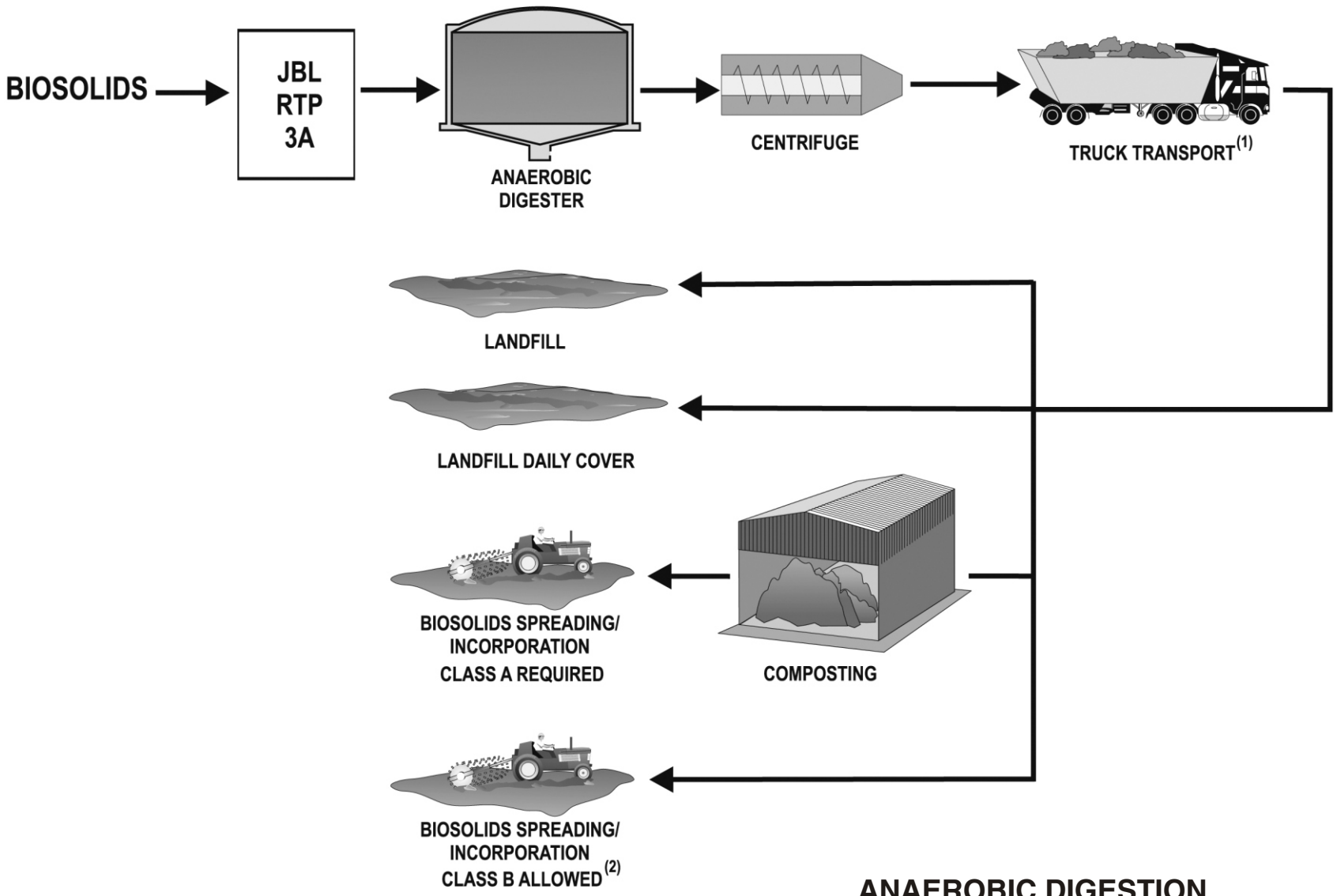

Notes:
(1) Hauling from 3A is with special bins.
(2) Not a current option for JBL. Biosolids don't meet Class B.

ANAEROBIC DIGESTION BASE CASE

FIGURE 7.1

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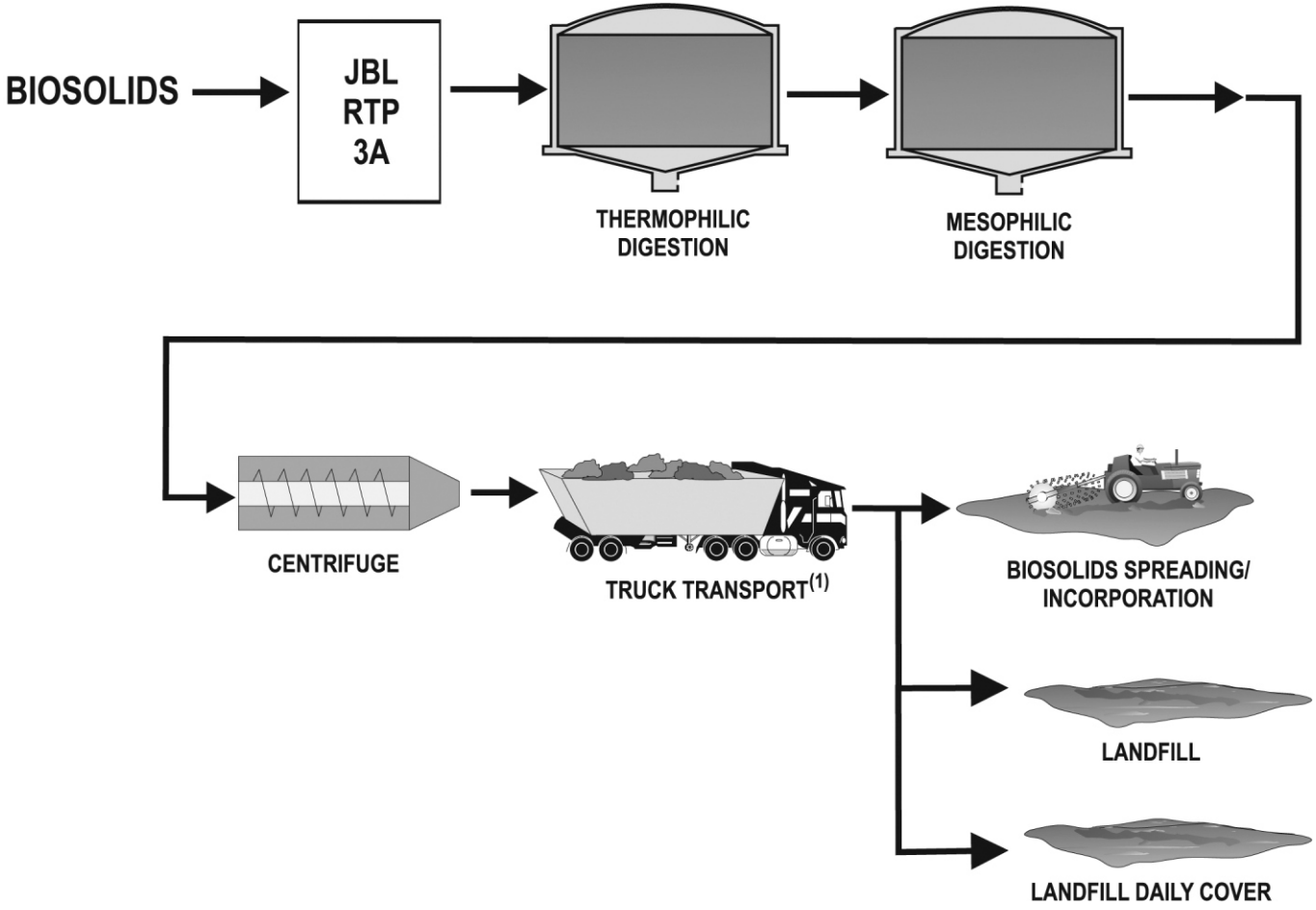

Notes:
(1) Hauling from 3A is with special bins.

PHASED DIGESTION
CLASS A

FIGURE 7.2

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can be either aerobic or anaerobic. However, only the anaerobic process would apply to the SOCWA plants.

The thermophilic process considered in this analysis is a single stage process operated in a batch mode. This process is capable of providing pathogen reduction levels comparable to Class A approved technology. To date, these technologies have had operational problems and produce biosolids with offensive odors. This could lead to neighbor complaints at each of the plant sites. The process is energy intensive. The resulting biosolids would require further processing to allow beneficial reuse other than land spreading.

Figure 7.3 presents a schematic for thermophilic digestion.

Composting

Biosolids composting is a stabilization process normally performed after dewatering. The organic biosolids constituents are further aerobically decomposed. High temperatures achieved during the microbial decomposition reduce pathogenic organisms to meet Class A requirements. To meet Class A, time and temperature requirements must be met. The resultant humus-like material can be used as a soil amendment.

The carbon to nitrogen ratio (C:N) of digested biosolids is in the range of 10:1 to 15:1. By adding a carbon-rich bulking agent such as wood or paper waste with a C:N of 40:1, the mixture is brought to a C:N ratio of 25:1. Lower C:N ratios do not produce a high quality usable soil amendment soil amendment. Green waste may also be considered as a bulking agent.

The bulking agent also raises the initial solids content of the mixture and provides bulk porosity important for aerating the composting biosolids. A portion of the composted biosolids may be recycled and mixed with the feed biosolids and the bulking agent. The required amount of bulking agent is dependent on the percent solids of the agent and the biosolids. Typical volume ratios are 1.0 to 2.5 parts bulking agent to 1 part biosolids.

During the composting process, the volatile solids content of the digested biosolids is reduced. The bulking agent can become partially decomposed and the solids content of the mixture can increase. When composting is complete, the compost material is typically screened to retrieve a portion of the bulking agent. The product is normally allowed to cure for several days before it is bagged and labeled or distributed in bulk form. Composting operations can meet Class A or Class B pathogen reduction requirements dependent upon time and temperatures met during the process.

There are three basic types of composting processes: windrow composting, aerated static piles, and in-

vessel composting. SOCWA has completed a feasibility analysis for an enclosed aerated static pile composting facility to be located at the Prima Deshecha landfill. A schematic for a generic enclosed composting facility is presented in Figure 7.4.

Windrow

In windrow composting, the biosolids and bulking agent mixture is formed into long open-air piles. The biosolids are turned frequently to ensure an adequate supply of oxygen throughout the compost pile and to ensure that all parts of the pile are exposed to temperatures capable of reducing pathogens. Windrow composting can require significant space. Odors can be of concern. This requires either enclosing the process with odor control or site the operation in a rural area.

Aerated Piles

Aerated static piles rely on forced air to supply air for both decomposition and moisture removal. Air is supplied by blowers connected to perforated pipes running under the piles. The blowers draw or blow air into the piles, assuring even distribution of air throughout the composting biosolids mixture. A layer of previously composted biosolids placed over the surface of the pile helps to insulate the pile and assure that sufficient temperatures are achieved throughout the pile.

Aerated static pile composting is usually conducted in an enclosed building because escaping air from the piles requires scrubbing prior to discharge.

In-Vessel

In this process, the feed biosolids, bulking agent, and recycled biosolids are fed into an enclosed vessel or reactor. Environmental conditions such as temperature and oxygen supply can be monitored and controlled inside the reactor. The biosolids mixture is maintained in an aerobic condition by blowing air through it or by mixing it to continually bring it in contact with air. A curing period is usually required after in-vessel composting. In-vessel systems are becoming more popular due to their benefits for odor and gas emission control (because odors can be collected and treated), process control, and better public acceptance.

Currently, there are two basic types of in-vessel reactors including a tunnel reactor and a plug-flow, agitated bay system.

Tunnel reactors may be constructed either vertically or horizontally. An example of a vertical tunnel reactor is the Davis (Taulman-Weiss) Silo Reactor and a horizontal tunnel reactor is the PWT Tunnel Reactor. The plug-flow agitated bay system is offered by several manufacturers. The agitated bay system consists of modular units of parallel walls (or bays).

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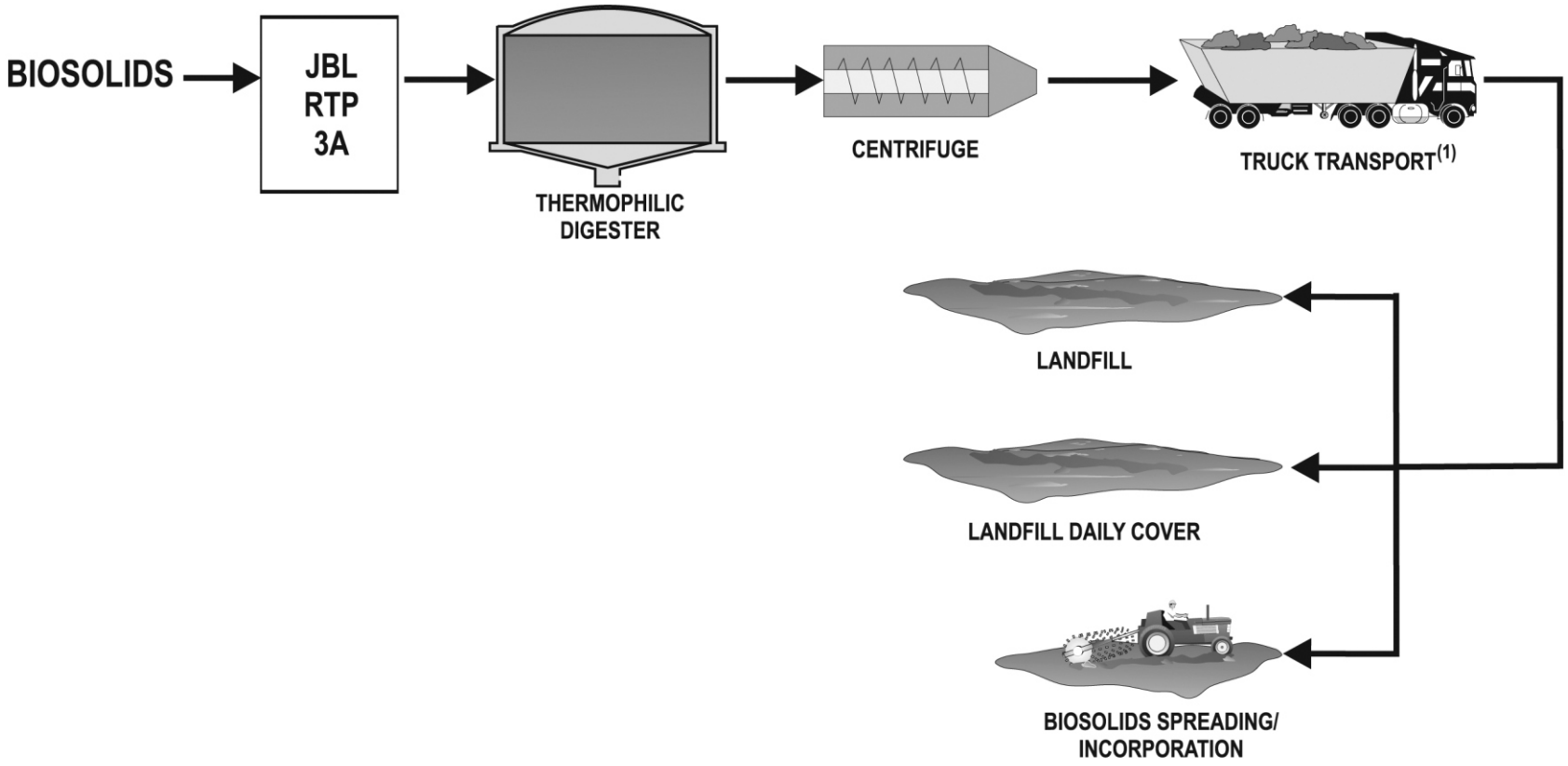

Notes:
(1) Hauling from 3A is with special bins.

THERMOPHILIC DIGESTION CLASS A

FIGURE 7.3

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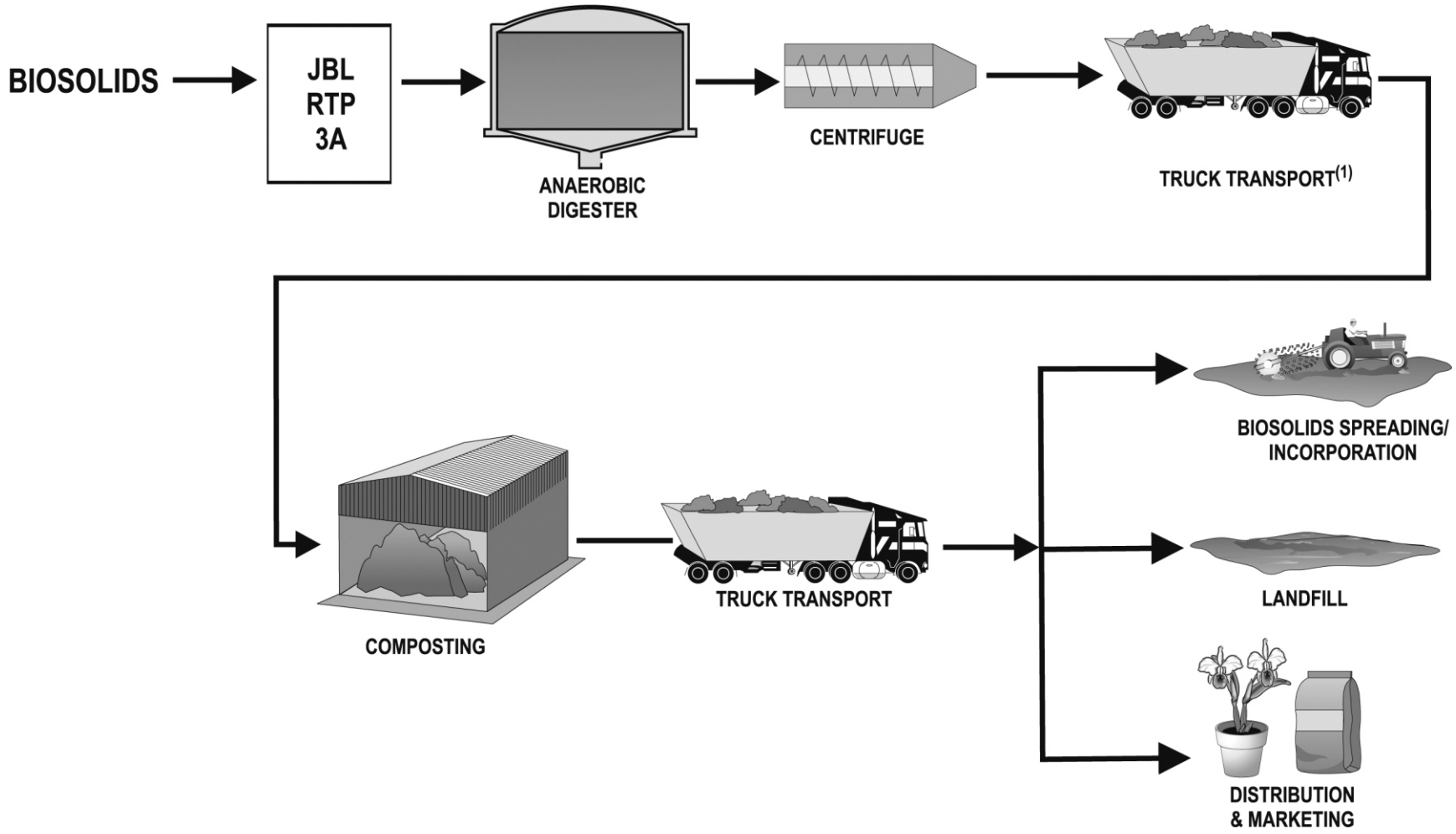

Notes:
(1) Hauling from 3A is with special bins.

COMPOSTING
CLASS A

FIGURE 7.4

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For both types of in-vessel systems, biosolids and bulking agents are initially mixed before entering the systems. A certain quantity of feedstock is fed to the system daily, and an equal amount of finished compost is pushed out from the opposite end. Most systems also include an aeration source which blows air countercurrent to the compost's direction of flow. The air provides oxygen to the microorganisms and maintains decomposition rates of compost. A mechanical mixer could be used to periodically mix the material. The stabilization period in the system is approximately 14 to 21 days followed by an additional curing period of approximately 30 days. Curing is induced by stockpiling the composted material in a warehouse type building. Both the composting and curing locations would be fully enclosed, and air and odor emissions would be scrubbed.

Pasteurization

Pasteurization is intended to kill pathogens in raw sludge by elevating the temperature to 70°C (158°F) or higher for 30 minutes or longer. The Pasteurization must be done in a batch process to prevent recontamination that might occur in a continuous process. The storage of the sludge after process completion is also a concern because of the potential for re-growth of pathogens and resulting generation of odors.

Pasteurization is shown schematically in Figure 7.5.

Cambi Process

The Cambi process is a pre-digestion batch heat treatment. The Cambi process uses steam and pressure in batch tanks to solubilize the organics and destroy pathogens prior to anaerobic digestion. The City of San Francisco is currently running a pilot scale operation to assess the feasibility of installing the Cambi system at their new digestion facility.

EMWD Pasteurization Process

The Eastern Municipal Water District (EMWD) has been developing a pasteurization process at their Perris treatment plant for some time. EMWD has obtained a US Patent for the technology and has licensed US Filter as the sole distributor. The technology is now called the ECO-Therm process. This process is a continuous process that, according to the vendor, has obtained approval by US EPA Region 9 as a Class A approved technology under Alternative 1 (Time-Temperature). Although this process is a continuous process, the reactor arrangement (subject to patent information) can be a multi-baffled reactor or a plug flow, accomplished by having multiple runs of pipe connected in a serpentine arrangement. Heat is recovered using a sludge-to-sludge heat exchanger prior to dewatering.

Heat Drying/Pelletization

Heat drying involves reduction of the moisture content of biosolids by induced evaporation. It utilizes mechanical agitation and auxiliary heat to increase the evaporation rate and has the capability and flexibility to produce pathogen free biosolids with any desired percent solids, up to nearly 100 percent. Heat drying alternatives include flash drying, spray drying, rotary heat drying, and Carver Greenfield. The U.S. EPA reports that the most common type of dryer currently used in handling biosolids is the rotary dryer.

Heat drying can be achieved with direct or indirect methods. Direct heating exposes biosolids to full contact with hot gases. Indirect drying uses hot gas to heat surfaces. The biosolids then come into contact with the heated surfaces. This contact evaporates a significant amount of moisture from the biosolids. The disadvantage to direct dryers is that new hot gas needs to be generated to evaporate moisture from the biosolids. Furthermore, the gas must be treated prior to release into the atmosphere. Indirect dryers can recycle the gas used to heat the surfaces and reduce energy costs.

In the past, heats drying alternatives tended to have high energy costs and were not widely used. Newer technology has made heat drying less energy intensive and more feasible. To meet the Class A PFRP requirement, the heat drying process must reduce the moisture content of the biosolids to 10 percent or lower. In addition, the temperature of the biosolids must be greater than 80°C or the wet bulb temperature of the gas in contact with the biosolids as it leaves the dryer must exceed 80°C.

Rotary dryers are the most commonly used process. Rotary dryers are essentially cylindrical rotary kilns that mechanically mix the biosolids as the drum rotates. Rotary dryers can be either direct or indirect heat dryers. Various agencies in the U.S. are currently using rotary dryers in pelletization operations.

Pelletization of biosolids is a process in which water is evaporated from stabilized biosolids. As the biosolids are exposed to hot air, evaporation occurs and the biosolids are reduced to small dried pellets. The pellets are then graded into different size categories. Those that do not fit the adopted product specifications are crushed, recycled back into the dryer, or disposed. Those that meet product specifications are either sold in bulk or bags as soil amendment. The pelletization technology is currently practiced in large biosolids handling facilities such as New York District, New York and Boston, Massachusetts. Swiss Combi and Andritz manufacture a drum drying unit using a direct drying unit. U.S. Filter manufactures an indirect drying unit called a “Dragon Dryer.” Because heat

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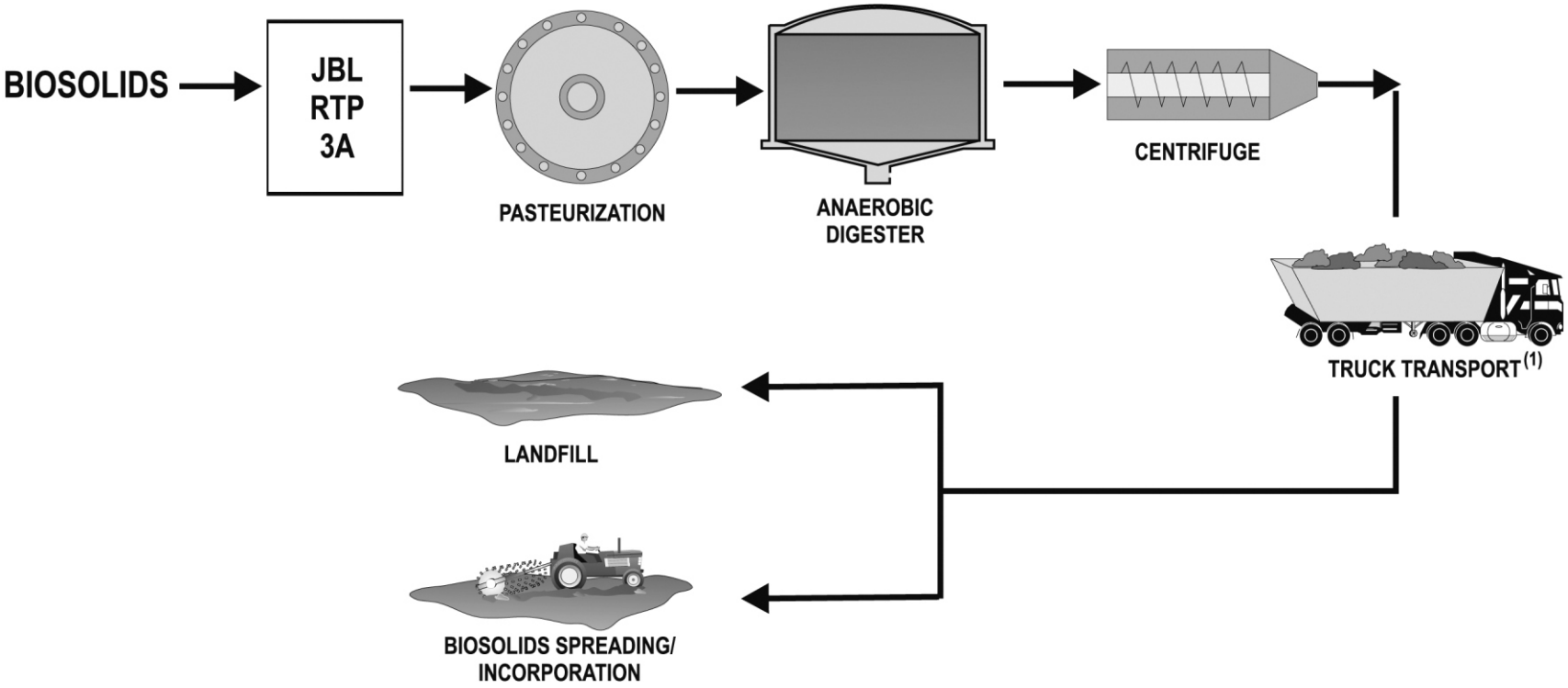

Notes:
(1) Hauling from 3A is with special bins.

HEAT TREATMENT PASTEURIZATION CLASS A

FIGURE 7.5

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drying processes have demonstrated to produce a marketable product, it will be further evaluated in this study. A report titled "Evaluation of Onsite Thermal Drying Facility for Biosolids" has been completed for SOCWA. The report concluded that thermal drying could be implemented at the RTP and JBLTP plants. Other Southern California agencies are implementing heat drying including the Encina Wastewater Authority and the City of Corona.

Heat drying involves more components and flow streams than most of the other biosolids treatment options. This is reflected in the schematic shown in Figure 7.6.

Chemical Treatment

Chemical addition processes are utilized to not only dewater and stabilize biosolids, but in some cases, to immobilize toxic compounds or heavy metals in a bonding matrix, thereby rendering the final product inert. Lime is often used to raise the pH to levels needed to reduce pathogens. The product is suitable for amending acidic soils. This is more applicable to the Eastern United States as compared to the West.

A chemical treatment schematic is shown in Figure 7.7.

Post Dewatering Lime Stabilization

Post dewatering lime stabilization involves adding dry lime to the biosolids cake and mixing it in a vessel called pug. Sufficient lime must be added to raise the pH to 12 after two hours of contact time. Afterwards, the final product must be mixed with a bulking agent and windrowed before it can be distributed or marketed.

There are several manufacturers of lime stabilization processes including the Schwing BIOSET process discussed below.

BIOSET Process

The BIOSET Process is a continuous process for converting municipal biosolids into a Class A material in accordance with Title 40 of the United States Code of Federal Regulations part 503.

The process is comprised of mixing dewatered biosolids, calcium oxide and sulfamic acid, transferring the mixture into a continuous plug flow reactor, and discharging the pathogen-reduced solids to a container.

The first step is the reaction of calcium oxide with dewatered sludge, generating heat. The calcium hydroxide produced from the first reaction, then reacts with the sulfamic acid, generating additional heat. Since the calcium oxide to sulfamic acid ratio is held at approximately 100:1,

the pH of the Class A material is maintained at 12 to 12.3. The reactor is under pressure, thus all the heat generated is used to elevate the temperature of the biosolids. No heat is lost due to vaporization. At this pH level and at the elevated temperature, ammonia, contained within the biosolids, is released and is mixed thoroughly throughout the Class A biosolids, and serves as a biocide to further enhance the pathogen destruction.

The combination of high temperature, high pH and biocide effects of the ammonia ensures that the biosolids are pathogen free in accordance with Class A requirements. The BIOSET Process also provides the following:

- The reduction in volatile solids is greater than 60 percent,
- There are no ammonia or H_2S odors.

N-Viro

N-Viro Chemical Stabilization is a patented PFRP process (EPA approved in January 1988) in which cement kiln dust, lime kiln dust, lime, fly ash, or other alkaline material is added to dewatered biosolids. The mixture produces an exothermic reaction in which a minimum temperature of 52°C and a pH of greater than 12 are achieved. The mixture is then stored at this condition for 12 hours. The material is then dried by thermal drying; the material must remain above a pH level of 12 for at least three days. The product must dry to at least 50 percent solids content at the completion of the process. A typical mixture is 1.25 parts alkaline material to 1.0 part biosolids. The final product can be used as a soil amendment or landfill cover material.

FPM System

The FPM system from Waste Conversion Industries (WCI) is a chemical stabilization process capable of converting biosolids to fertilizer. The main components of the system are an Enriched Organic Reactor (EOR) and an Enriched Organic Dryer (EOD). In the EOR, biosolids are mixed with a proprietary formulation of reagents and fertilizer nutrients. In a six-minute processing time, the biosolids are stabilized and deodorized. A fertilizer is formed. The fertilizer is then dried in the EOD to meet customer specifications for dryness, pathogen reduction, and particle size. WCI claims that the EOD can produce a Class A biosolids by meeting the heat drying process to further reduce pathogens.

WCI has one current test installation in Yakima, Washington. It has processed biosolids, septage, yard debris, organic portions of municipal solid waste, food processing waste, and agricultural residue into a chemical fertilizer. WCI claims that they have had no problems in marketing the fertilizers produced thus far

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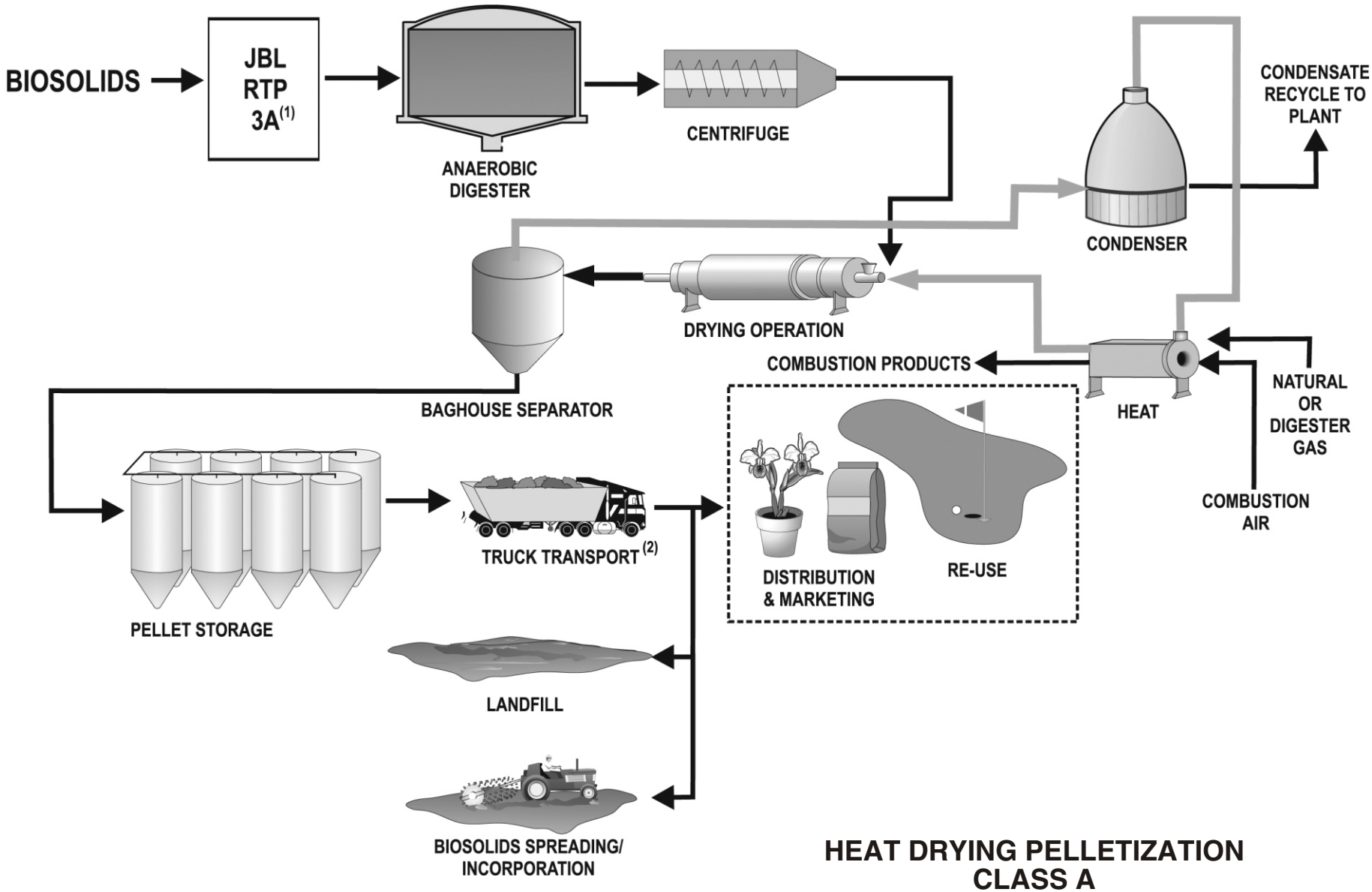

HEAT DRYING PELLETIZATION CLASS A

FIGURE 7.6

Notes:
(1) Only an option for JBL and RTP. Insufficient space at 3A.
(2) Hauling from 3A is with special bins.

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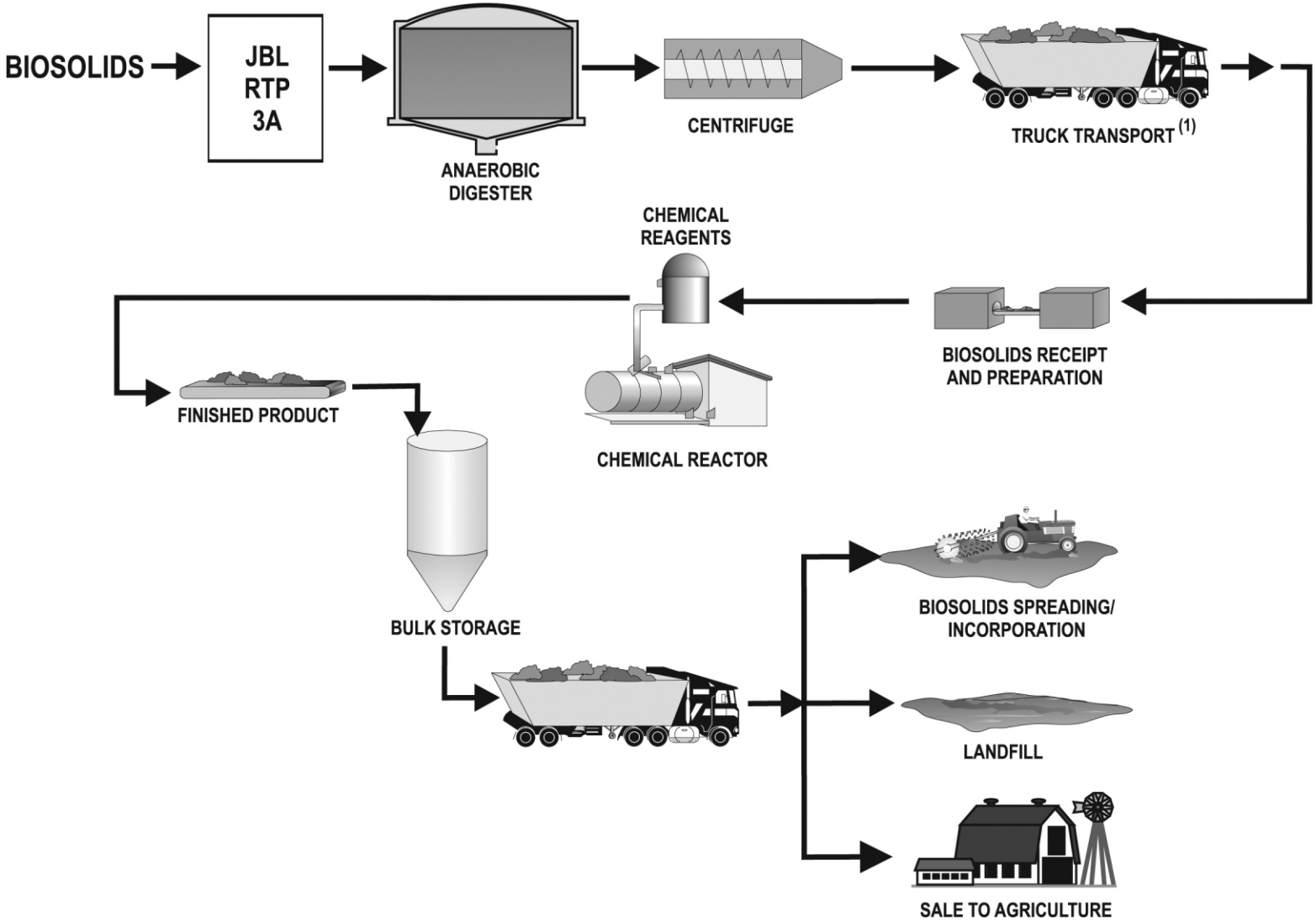

Notes:
(1) Hauling from 3A is with special bins.

CHEMICAL TREATMENT CLASS A

FIGURE 7.7

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and have had successful growth results from farmers, nursery operator, and agronomists.

Vermiculture

Vermiculture (or earthworm conversion) is a process in which earthworms consume biosolids and produce feces or castings used as a soil conditioner. The worms require oxygen. The anaerobically digested biosolids require a pre-treatment aeration process to keep the biosolids porous and to provide oxygen for the worms by adding bulking agents. In some cases, even aerobically digested biosolids requires pre-aeration if insufficient oxygen is available in the biosolids. The mixture is then placed on a bed of biosolids. After the consumption of the organics is complete, the worms are separated from their odorless castings, typically using a rotating drum screen.

Vermiculture requires an equal weight of worms to consume an equal weight of biosolids. Therefore, a sizable parcel of land is needed for the worm beds or windrows, making this system more feasible for plants in rural areas with large land space. According to a vermiculture establishment, there are currently no vermiculture operations in use for processing wastewater biosolids. Additionally, a vermiculture operation in San Diego revealed that one of the major problems of vermiculture is the need for worms. The operation must also include a step to grow the needed worms.

Figure 7.8 presents a schematic of the vermiculture process.

Incineration

Incineration is the complete combustion or rapid exothermic oxidation of combustible materials such as fixed carbon, hydrogen, and sulfur in biosolids. Other combustible materials include grease and scum with very high fuel values. The types of furnaces used most widely include the fluidized bed and the multiple-hearth furnaces. Incineration can produce a Class A material. Ash produced from the furnaces can be beneficially used and/or disposed in the same way as biosolids.

The South Coast Air Quality Management District (AQMD) has specific rules for implementation of biosolids incineration. There are no biosolids incinerators in operation in the AQMD region.

An incinerator installation would require a footprint of about 60 feet by 60 feet at the RTP and JBLTP. The Plant 3A footprint would be about 60 feet by 40 feet. There is not sufficient space to construct an incinerator at 3A. The biosolids could be transported to one of the other two plants for incineration. The incinerator requires an overall height of approximately 50 feet. To mitigate the visual impact, a portion of the incinerator could be installed below grade. This may cause difficulties at

JBLTP due to the shallow groundwater table.

Two California agencies have recently ceased operation of their incinerators. The South Tahoe Public Utility District stopped operation due to high operations costs and the need to have more than one operations shift. The City of Barstow experienced an explosion that damaged the unit.

Incineration is shown schematically in Figure 7.9.

Pyrolysis

Pyrolysis and gasification are thermal conversion processes that distill biosolids into energy products. Dried biosolids feed into a thermal reactor at elevated temperatures (above 400ºC). Unlike combustion, these processes take place in the absence of oxygen or with much less than stoichiometric amounts of supply air. Under these conditions, the material is converted to a synthesis gas (carbon monoxide and hydrogen), liquid tars and char which can be separated and further utilized as energy products in boilers and engines. Commercial scale demonstrations of pyrolysis/gasification for biosolids conversion have taken place including the Enersludge™ process (Perth, Australia), the Pyromex™ process (Emmerich, Germany). Each technology has its own process conditions and reactor design tailored to the desired product stream.

Another thermal process that shows promise for conversion of wet waste streams like biosolids into a more useable fuel is direct hydrothermal liquefaction. In this process, biosolids slurry (12-16% solids) is brought to elevated temperatures (300-350ºC) with sufficient pressure to maintain the water primarily in the liquid phase. The primary product is an oil and char containing liquid with reduced oxygen content that can be dewatered into fuel slurry or separated crude oil. Existing energy facilities can readily use these fuels. A commercial facility utilizing this process has been proposed by EnerTech Environmental, Inc. in Rialto, CA. Other developers include Changing World Technologies (West Hampstead, NY), and Biofuel B.V. (Heemskerk, Netherlands).

These technologies, like combustion, offer the opportunity for complete energy recovery from the biosolids with nearly 100 percent volatile solids destruction. However, also like combustion, proper controls are required to reduce emissions from the process. Particularly with pyrolysis and gasification, exhaust streams will require permitting and controls. Odors from the process and products can also be a concern and should be addressed at the design stage. Because these processes use high temperatures and pressures, the capital cost and level of operating expertise are more typical of chemical processing industry than wastewater treatment.

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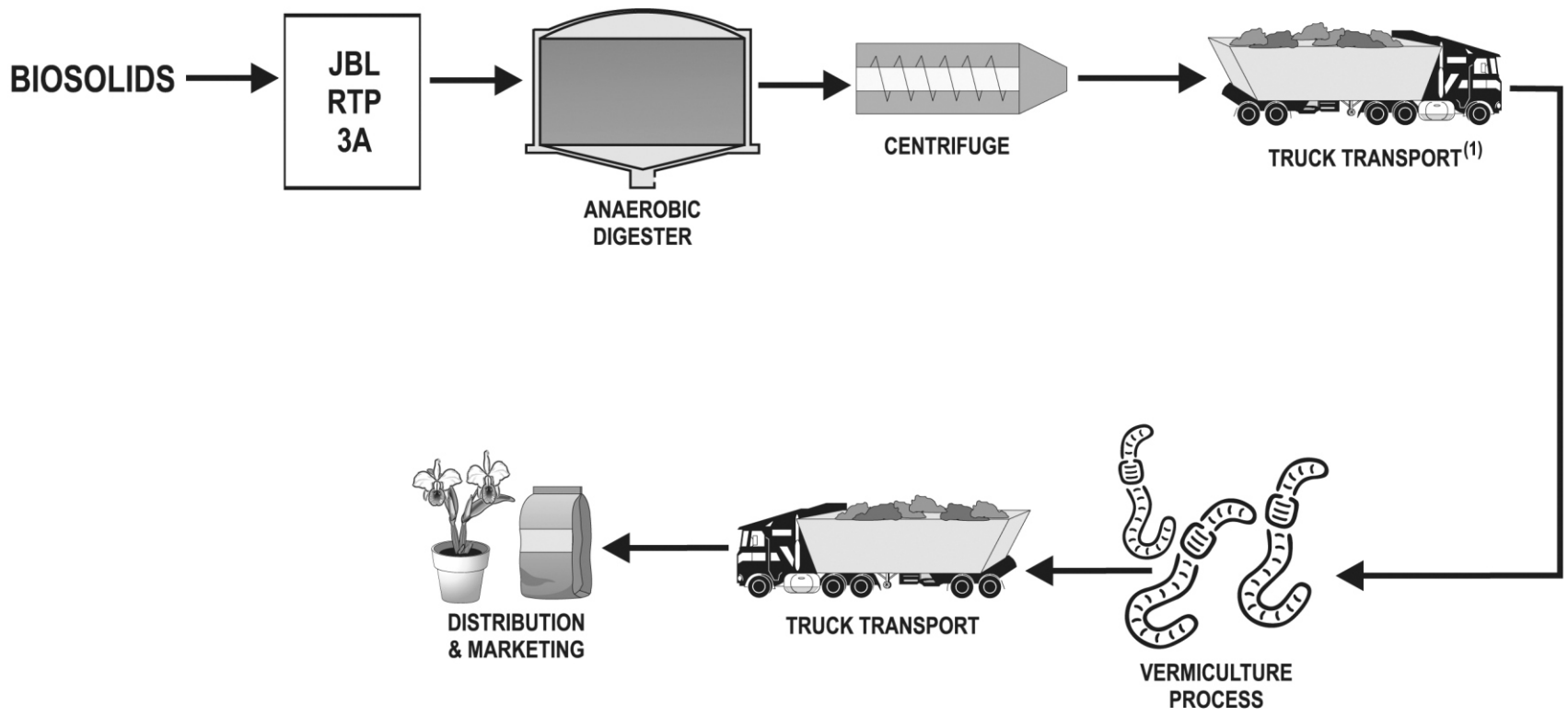

Notes:
(1) Hauling from 3A is with special bins.

VERMICULTURE

FIGURE 7.8

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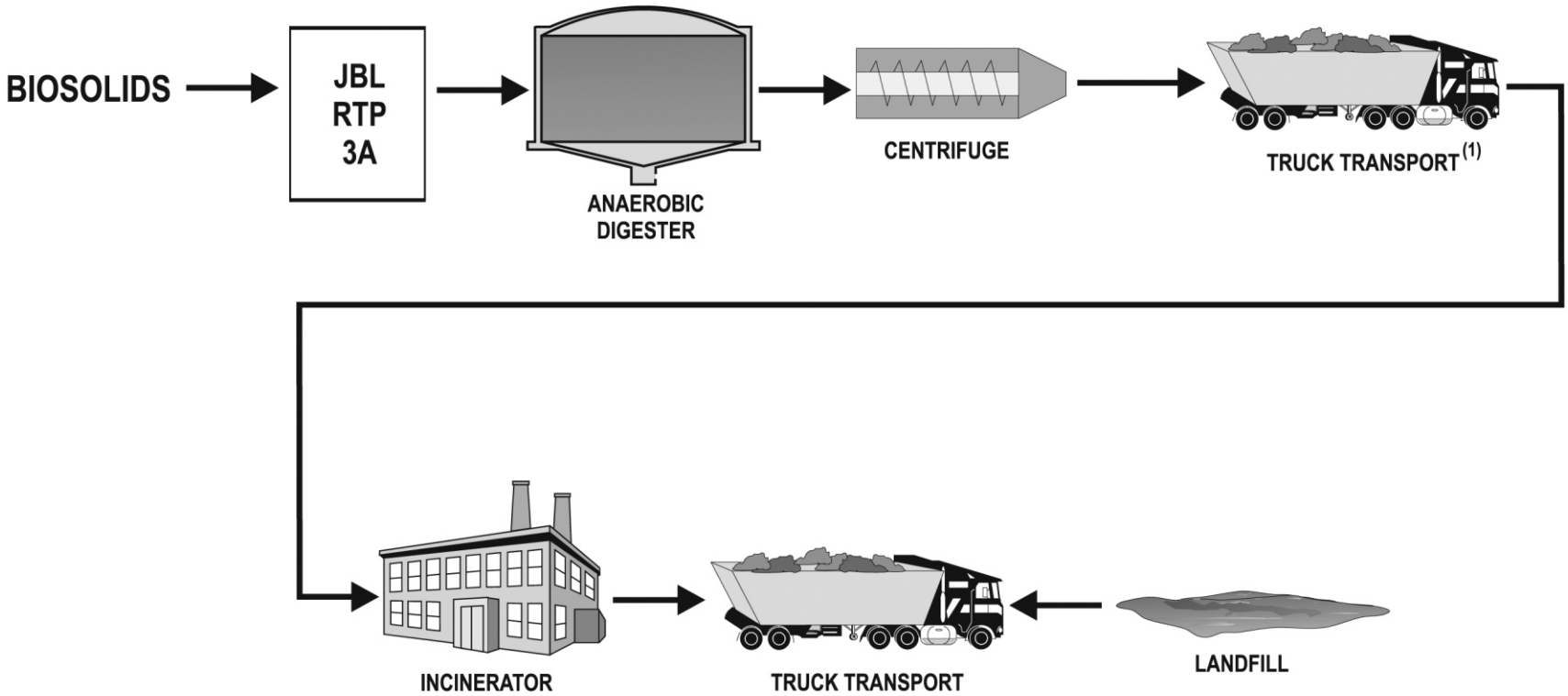

Notes:
(1) Hauling from 3A is with special bins.

INCINERATION
CLASS A

FIGURE 7.9

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A biosolids treatment system similar to pyrolysis is currently being developed by the private company Enertec in Rialto, CA.

A schematic of the pyrolysis process is presented in Figure 7.10.

Glassification

Glassification processes convert biosolids to synthetic gas (hydrogen and carbon monoxide and ceramic-like inert materials (CIM) formed from aggregates of heavy metal contaminants. The synthetic gas is suitable for fuel in combustion processes or further conversion to other products, such as methanol. The CIM consists of black sand or gravel material suitable for landfilling or building products use. Biosolids pretreatment required include drying and pulverizing in which the biosolids are dried to less than 10 percent moisture. The dried biosolids are then fed to the gasifier which is an oxygen-blown, entrained flow slagging device. Conversion of the feedstock to the raw synthetic gas occurs in a refractory-lined pressure vessel with internal cooling. Pulverized fuel and oxygen are introduced through a nozzle at the head of the vessel. Gas needed for a pilot light enters through the same nozzle, which also contains ignition and temperature-monitoring equipment. Initial gasification occurs at a high pressure and temperature. Secondary endothermic reactions cool the gas before it exits the reaction chamber.

A glass pack unit manufactured by Minergy adds sand to the biosolids before incineration. A glass-type product is produced from the process. The final product can be reused as sand blasting materials or asphalt products.

Figure 7.11 shows the glassification process schematically.

Evolving Technologies

Options for biosolids treatment are in a state of flux now due to the demand for cost effective biosolids/disposal/reuse options. Technological applications continue to be developed and fine tuned in biosolids treatment. Some of these technologies do not readily fit into the categories listed above. One example of an emerging technology is the *Cannibal Process* patented by the Envirex branch of the U.S Filter Corporation. The *Cannibal Process* achieves the reduction of biological solids with a recycle of solids from the activated sludge process through a new side stream bioreactor. This process offers a significant advantage for new plants or plants without existing solid handling by achieving solids reduction without digestion or solids dewatering. This treatment process has been used at several Southern California treatment facilities that have capacities below 3 mgd. The *Cannibal Process* is not

directly applicable to the JBLTP, Plant 3A or the RTP as these facilities already have solids handling systems. The *Cannibal Process* might be considered as a treatment option at the Coastal Treatment Plant if on-site solids handling is considered at this facility in the future (although the *Cannibal Process* is specifically designed to handle solids from primary treatment).

Future updates of the Biosolids Management Strategic Plan will need to consider the potential benefits offered by evolving technologies such as the *Cannibal Process*.

DISPOSAL AND REUSE OPTIONS

The second part of the overall biosolids management alternative is disposal or reuse. This section briefly describes the options considered in this study. It should be noted that each of the options involves the participation of a third party or private contractor as noted.

Landfilling

Landfill disposal at Prima Deshecha will continue into the future. The landfill is within close proximity of the SOCWA plants. It provides the least costly disposal option. SOCWA currently uses its own staff and hauling equipment to bring Biosolids to the Prima Deshecha Landfill.

Additional landfills were identified in Chapter 6. A contract with a back-up landfill should continue to be maintained.

Class B Land Spreading

The biosolids from the RTP and 3A Plant could continue to be disposed of by Class B land spreading. As discussed in Chapter 4, Class B disposal in California is becoming very restrictive and may not be available in the future. At this time, there is capacity for Class B land spreading in Arizona. The JBLTP biosolids cannot be disposed of by this method as the digestion process does not continuously meet Class B requirements.

Class A Land Spreading

The Class A land spreading options will require additional treatment beyond the existing anaerobic digestion at the SOCWA facilities. There are Class A options available within California. Treatment could consist of phased digestion, thermophilic digestion, or pasteurization.

Composting

Composting was described in the previous section on treatment. This is the only approach that is considered both as both a treatment and a disposal option. However, the use of composting still requires the marketing and the disbursement of the compost product. The screening of alternatives in this chapter does not consider this aspect of

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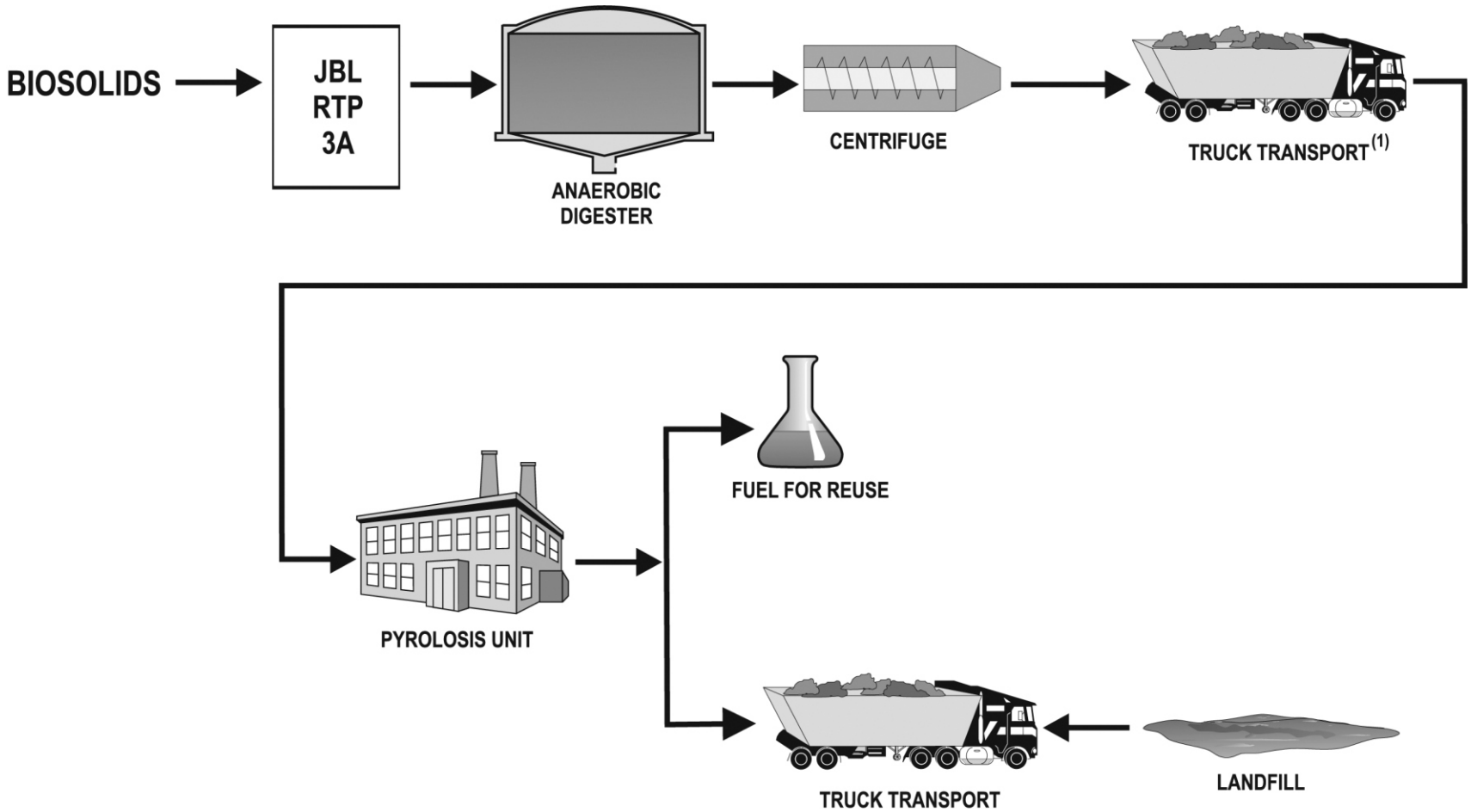


Notes:
(1) Hauling from 3A is with special bins.

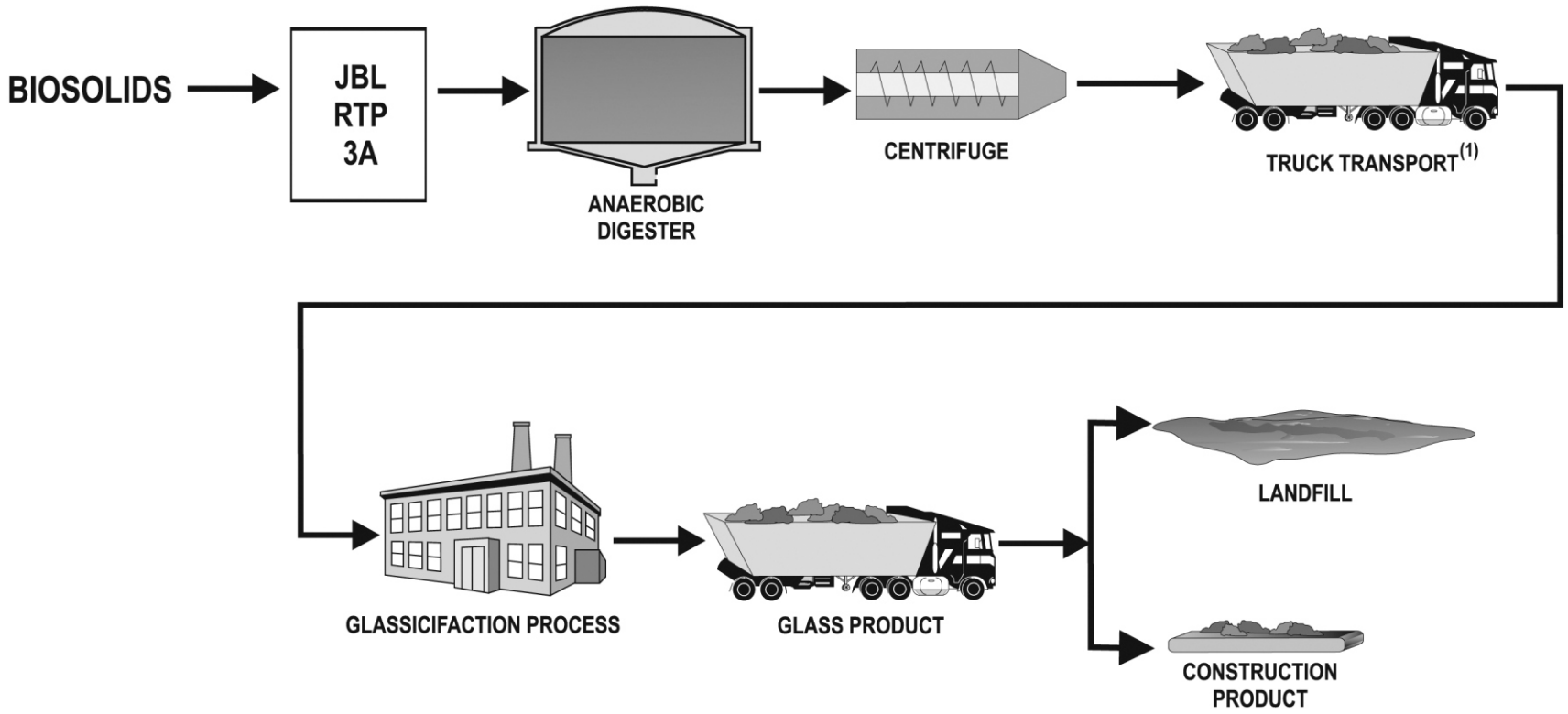
PYROLOSIS
CLASS A

FIGURE 7.10

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

20-SOCWA11-05F7.11-7178A00.CDR



Notes:
(1) Hauling from 3A is with special bins.

GLASSIFICATION CLASS A

FIGURE 7.11

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

composting. However, the marketability of the compost product is considered in subsequent chapters.

Four composting options are considered in this analysis:

- The existing contract with Synagro for the composting facility in Corona. This facility is scheduled for closure in 2008.
- The existing contract with Synagro for the proposed composting facility at the South Kern Industrial Center. This current contract is based on 25 tpd; there is currently an option to increase this amount. This facility is tentatively scheduled to open in late 2006.
- The option for a new compost facility at the Prima Deshecha Landfill.
- Future contracting with other private or public enterprises that manage their own compost facilities.

Reuse

This option consists of beneficial reuse of the processed biosolids. The reuse methods could include sale of compost or dried, pelletized biosolids.

Alternative Daily Cover

Class B biosolids can be used as part of the daily cover at sanitary landfills. The $15 per ton disposal tax is waived when the biosolids are disposed of this way. Alternative daily cover is very popular in Northern California. It is reported that the Prima Deshecha Landfill has sufficient soil on-site for daily cover. This option would need to be considered at other landfills.

MANAGEMENT OPTION MATRIX

Considering the treatment and disposal/reuse options, a matrix of biosolids management options was developed. The options are summarized in the matrix presented in Table 7.1. The table shows the applicable treatment options in conjunction with applicable reuse/disposal options. The management options are shown graphically on Figures 7.1 through 7.11. The graphics give the treatment option and its relevant disposal/reuse options. It should be noted that advanced digestion, pasteurization, and heat drying are the only options believed to be feasible on the SOCWA plant sites given space restrictions. Further studies would be required to determine if there is sufficient space to implement processes such as chemical treatment, pyrolosis, or incineration. Figures 7.7 through 7.11 indicate the assumption that the remaining treatment options would require the acquisition of an off-site location similar to the proposed Prima Deshecha Composting Facility. The alternative would be the contracting for this form of off-site treatment as noted

for the third category of management options referenced at the beginning of this chapter.

Estimated Management Costs

For each of the management options listed in Table 7.1, the estimated unit cost has been developed. The unit cost is given in dollars per ton (wet), and it includes the cost of capital, operations and maintenance, hauling, and disposal. No credit has been applied for the reuse options. The costs are summarized in Table 7.2.

The costs have been based on past projects completed by Carollo Engineers, projects completed for SOCWA, as well as information from manufacturers. The costs reflect current cost levels and they have been adjusted for the projected biosolids production from the three plants. Table 7.2 reflects single values for treatment options such as advanced digestion and heat drying where past studies have explored these technologies in some depth at SOCWA facilities (as discussed further in Chapter 8). Ranges of costs are presented in Table 7.2 where specific studies have not been conducted for SOCWA. The wide ranges for some technologies reflect that there are multiple types of a given technology that are available.

Table 7.1 Biosolids Management Options

Treatment	Landfill	Class B Land Spreading	Class A Land Spreading	Compost to Class A	Reuse	Daily Cover
Anaerobic Digestion	√	√		√		√
Phased Digestion	√		√			√
Thermophilic Digestion	√		√			√
Composting	√		√		√	
Pasteurization	√		√			
Heat Drying	√		√		√	
Chemical	√		√		√	
Vermiculture					√	
Pyrolosis	√					
Incineration	√					
Glassification	√				√	

Table 7.2 Biosolids Management Options Estimated Cost

Treatment	Landfill	Class B Land Spreading	Class A Land Spreading	Compost Class A	Reuse	Daily Cover
Anaerobic Digestion	$34	$39		$90		$41
Phased Digestion	$35		$38			$48
Thermophilic Digestion	$34		$37			$47
Composting (Prima Deshecha)	$74		$77		$68	
Pasteurization	$48-$54		$50-$57			
Drying	$110		$113		$105	
Chemical	$52-$94		$54-$96		$46-$88	
Vermiculture					Unknown Higher than Composting	
Pyrolosis	$110					
Incineration	$120 - $549					
Glassification	Exceeds Incineration				Exceeds Incineration	

Costs in $/wet ton-includes trucking.

MATRIX SCREENING

This section presents the evaluation and screening of the biosolids management matrix. The screening was performed in conjunction with member agency management and technical staff at a workshop held on May 25, 2005. Each of the management options was presented. The group discussed the criteria by which each of the options would be compared. The criteria were also ranked by importance. From this, a group of options was selected for further consideration. The other options were dropped from contention.

Rating Criteria

The rating criteria are listed in Table 7.3. The table also shows the weighting of each criterion as identified by the workshop participants by consensus. An importance factor of 5 is the highest. A description of how each factor was used in the ranking is presented in Table 7.4.

Ranking

Using the criteria described above, the alternatives were ranked on a scale of 1 to 5, with 5 being the highest. A 5 defines an alternative that meets the

Table 7.3 Rating Criteria and Weighting

	Weighting - Importance Factor (5 Highest)				
Rating Criteria	**5**	**4**	**3**	**2**	**1**
Available Space	√				
Unit Cost ($/ton)		√			
Diversity of Use/Disposal Options		√			
Environmental			√		
Expandability				√	
Impact on Plant Operations		√			
In-County Solution		√			
Permitting			√		
Potential Reuse			√		
Proven Technology		√			
Regional Solution			√		
Regulatory Uncertainty		√			

Table 7.4 Rating Criteria Description

Rating Criteria	Description
Available Space	Can the technology and facilities fit onto the existing plant sites? Are there alternative sites in the area?
Unit Cost ($/ton)	Equivalent cost in dollars per ton. 20-Years, 5.5 %.
Diversity of Use/Disposal Options	Ability to maintain multiple options to decrease impact of loss of any one.
Environmental Impact	This includes noise, odor, traffic and other impacts to neighbors and the environment as a whole.
Expandability	Ability to modularly expand capacity in response to increases in biosolids production or addition of other WWTP's to project.
Operations	Impacts to WWTP labor and overall operations due to recycle streams.
In-County Solution	Biosolids treatment, reuse, and/or disposal in Orange County.
Permitting	Ease and feasibility in securing conditional use permits, RWQCB WDR, and AQMD permits.
Potential Reuse	Quality and suitability of product for reuse.
Proven Technology	Does the technology have a 5-year track-record in the United States?
Regional Solution	Can the project serve other SOCWA plants and agencies?
Regulatory Uncertainty	Is the alternative subject to closure or disruption caused by changes in local regulations?

objectives of the criteria. The raw scores were then multiplied by the weighting factors and a total score was determined. The ranking and total scores for the options are presented in Table 7.5

The treatment options identified for further consideration include anaerobic digestion, composting at Prima Deshecha, and heat drying/pelletization. Anaerobic digestion is an integral part of the other two options. Composting was given the highest score of all options. It was identified as an in-County solution that provided diversity among the disposal options. It also fits as a regional solution. Heat drying could be implemented at the JBLTP and RTP. The option produces a dry product that could be either reused or easily disposed of at Prima Deshecha.

Phased digestion, thermophilic digestion, and pasteurization were identified as options that would be considered if future conditions change. The spaces identified in previous reports for phased and thermophilic digestion should be maintained for this potential.

Table 7.5 Alternative Management Option Ranking

Alternative	Ranking Factor												
	Available Space (1) (5)	Unit Cost (4)	Diversity (4)	Environmental (3)	Expandability (2)	Operations (4)	In-County (4)	Permitting (3)	Reuse (3)	Proven Technology (2)	Regional Solution (3)	Regulatory (2)	Total Score (weighted)
Anaerobic Digestion	5	5	2	3	1	5	1	5	2	5	2	1	139
Phased Digestion	4	4	3	3	1	3	1	5	2	3	2	2	122
Thermophillic Digestion	4	4	3	2	1	3	1	5	2	3	2	2	119
Composting (Prima Deshecha)	5	3	4	4	3	4	5	4	3	5	4	3	172
Pasteurization	1	4	4	3	1	2	4	3	3	3	1	4	121
Heat Drying Pelletization	3	2	4	4	2	2	5	3	3	4	1	4	136
Chemical Treatment	1	3	4	3	1	2	3	4	3	3	1	4	116
Vermiculture	1	1	4	3	1	1	4	4	3	2	1	4	104
Pyrolosis	1	2	4	3	1	1	3	3	3	2	1	4	101
Incineration	1	1	4	2	1	1	3	1	3	4	1	1	84
Glassification	1	1	4	3	1	1	4	1	3	2	1	4	95

(1) Weighting Factor. Total score is sum of raw score times weighting factor.

The treatment options that were not selected for further consideration include: 1) chemical treatment, 2) vermiculture, 3) pyrolosis, 4) incineration, and 5) glassification. The major drawback for each of these options is available space to implement the technologies. The unit costs are generally high as compared to the options retained for consideration. The technologies are not widely used and are considered difficult to operate. It should be noted that the latest generation of incineration technology is being considered more in the municipal wastewater industry as the process has become more self-sustaining from an energy perspective. It may be desirable to reconsider this technology in the future if other Southern California agencies are successful in implementing incineration.

Disposal and Reuse

All of the disposal and reuse options except for alternative daily cover were selected for further consideration. At this time, there is no need at the local landfill for daily cover augmentation with biosolids.

Final Matrix

Considering the previous discussion, Table 7.6 presents a final matrix of management options. The matrix is broken down by the three SOCWA plants. It includes the treatment options identified for future, potential development.

Table 7.6 Biosolids Management Options for Further Consideration

	Disposal Option				
Plant/Treatment	**Landfill**	**Class B Land**	**Class A Land**	**Compost Class A**	**Reuse**
J.B. Latham					
Anaerobic Digestion	√			√	
Phased Digestion	√		√		
Heat Drying	√				√
Regional Treatment Plant					
Anaerobic Digestion	√	√		√	
Phased Digestion	√		√		
Heat Drying	√				√
Plant 3A					
Anaerobic Digestion	√	√		√	
Thermophilic Digestion	√		√		
Prima Deshecha Compost Facility	√		√		√

CHAPTER 8 SOCWA BIOSOLIDS ALTERNATIVE TREATMENT SUMMARY

INTRODUCTION

Table 7.6 identified the results of the screening for the biosolids management options for further consideration. These selected technologies are summarized below:

- Anaerobic digestion (no change from existing operation).
- Advanced (phased or thermophilic) digestion.
- Heat drying.
- Composting (at the Prima Deshecha site).

It should be noted that none of these technologies involve change to either the existing thickening or solids dewatering options. The option of maintain the existing treatment operation in its current form (identified as the 'anaerobic' digestion option) involves an ongoing process of negotiating contracts for the hauling and disposing of solids by a third party. This is discussed further in Chapter 10. Each of the options involving modified treatment at one or more of the SOCWA facilities has been addressed to some degree in a prior study. Four recent SOCWA reports have provided evaluation and feasibility analysis of alternatives for improving biosolids management including advanced digestion systems for J.B. Latham (JBLTP), the Regional Treatment Plant (RTP), and Plant 3A, onsite thermal drying facilities at JBLTP and RTP, and development of a composting facility at Prima Deshecha Landfill. The purpose of this chapter is to summarize and review work done in previous SOCWA studies. Proposed alternative biosolids technologies from these evaluations are summarized below along with cost estimates for implementation. All costs have been escalated using the Engineering News Record Construction Cost Index to current levels.

ADVANCED DIGESTION PROCESS EVALUATION

A recent SOCWA report Advanced Digestion Process Evaluation (CH2MHill, June 2002) describes alternative digestion systems for achieving a higher level of treatment of biosolids. The current anaerobic digestion system at JBLTP does not consistently achieve Class B pathogen reduction. The detention time is too low. Once the digester upgrades project is completed, the biosolids may meet Class B with all digesters in service. The system at RTP meets Class B but does not achieve Class A pathogen reduction standards. The digestion system at Plant 3A meets Class B. The 3A biosolids are now disposed of at the Prima Deshecha Landfill or the Corona composting site. Class B biosolids are not required for these disposal options. Reaching a higher level of treatment would increase the available disposal options for the biosolids. The existing facilities can be modified with the proposed advanced

systems to achieve Class A standards. Some of these approaches have the additional advantage of increasing digestion rate thereby increasing gas production and decreasing the quantity of biosolids for disposal.

The report discusses multiple types of advanced digestion alternatives in relationship to their feasibility at JBLTP, RTP, and Plant 3A. Three technologies - two phase anaerobic digestion, temperature phased anaerobic digestion, and thermal hydrolysis/anaerobic digestion - were considered feasible for one or more facility. Equipment requirements and order-of-magnitude cost estimates were given to implement these technologies at SOCWA facilities.

Two Phase (Acid/Gas) Anaerobic Digestion

Two phase anaerobic digestion attempts to separate the two primary anaerobic reactions, acid formation and methane gas generation. To achieve Class A standards, it was recommended that the acid phase be conducted at thermophilic (130°F) temperatures and the gas phase at mesophilic (95°F) temperatures. Additionally, the digesters should be operated in a draw/fill/hold mode with a 6-hour holding time to consistently produce Class A biosolids. This requires a 7-hour holding tank ahead of the acid phase digester.

To implement this technology at JBLTP, it was recommended that one of the smaller existing digesters be used as the acid phase digester with a hydraulic retention time of 2 days. The flow from the acid digester would split between the three other digesters with a gas phase retention time of 13 days. A holding tank (32,000 gallon) would be required ahead of the acid digester.

At the RTP, the existing large digesters would not readily accommodate a short detention time. To implement the two phase approach, it was recommended that a new smaller acid phase digester be built for a two day retention time with the four existing digesters used in series for the gas phase. An existing sludge equalization tank would be used for the 7-hour holding time before the acid digester.

At Plant 3A a new 120,000 gallon acid phase digester would be required. This approach is not feasible due to space limitations.

Order of magnitude costs for these modifications as estimated in the 2002 report are summarized in Table 8.1. These capital construction costs are adjusted for 2005 prices using the Engineering News Record construction cost index (CCI) for Los Angeles and the following formula:

(Today's CCI / Past CCI) X Past Cost = Today's Approximate Cost.

Table 8.2 shows the cost of capital per wet ton of biosolids processed using the projected ultimate biosolids production.

Temperature Phased Anaerobic Digestion

Another approach to phased digestion that may achieve Class A standards is temperature phased anaerobic digestion. The first phase is a thermophilic (130°F) digester with a short detention time that typically achieves the majority of the volatile solids destruction. A second larger mesophilic phase achieves additional polishing and deodorizing. This takes advantage of the rapid thermophilic digestion rates while reducing the odor and foaming concerns with the second phase.

To implement this technology at JBLTP, the 2002 report proposed using the two smaller digesters for the thermophilic phase with a 4 day retention time and the larger digesters for the mesophilic phase with an 11 day retention time. Additionally an 18,000 gallon holding tank was recommended to operate the first digesters in the draw/fill/hold mode with a 4 hour hold time.

At the RTP, one of the digesters could be used for the thermophilic phase with a 4 day retention time and the other three for a 12 day mesophilic phase. The existing

sludge equalization tank can be used for the necessary holding time.

This approach could be implemented using the existing two digesters at Plant 3A. However, due to the lack of redundancy in the system, a plan for rerouting the biosolids to another plant would be needed if Class A treatment is required during digester shutdown.

Updated cost estimates for this technology are on Table 8.1 and 8.2. According to the 2002 report, operation and maintenance costs over the existing digester and solids handling operation may increase somewhat on the order of $100,000 per year at each facility.

Table 8.1 Advanced Digestion Upgrade Capital Cost Estimates

	Facility		
Alternative	**J.B. Latham WWTP**	**Regional TP**	**Plant 3A**
Two Phase (Acid/Gas)(1)	$972,000	$1,384,000	$548,000
Temperature Phased(1)	$1,169,000	$800,000	$444,000
Two Phase Temperature Phased(2)	$2,531,000	N/A	N/A
Thermal Hydrolysis(1)	$8,660,000	$8,660,000	$6,224,000

(1) Updated estimates from "Advanced Digestion Process Evaluation" (June, 2002)

(2) Updated estimates from "Preliminary Design Report-Miscellaneous Digester Upgrade Project" (June, 2003)

Table 8.2 Advanced Digestion Upgrade Cost Per Wet Ton*

	Facility		
Alternative	**J.B. Latham WWTP**	**Regional TP**	**Plant 3A**
Two Phase (Acid/Gas)	$8	$6	$17
Temperature Phased	$10	$3	$14
Two Phase Temperature Phased	$21		
Thermal Hydrolysis	$73	$37	$196

*Cost of capital for digester upgrade only. Does not include digester O&M cost or potential cost offset from reduced solids handling. Cost is per ultimate wet ton of biosolids processed.

Interest rate of 6%, 20-year life used in assumptions.

Thermal Hydrolysis (Cambi) and Anaerobic Digestion

The thermal hydrolysis process meets the thermal treatment requirement for Class A biosolids and would not require further demonstration or monitoring. In the thermal hydrolysis pretreatment process, the pre-dewatered biosolids are steam treated for at least 20 minutes at 340°F and 120 psig. Additionally, this process can increase the volatile solids destruction to greater than 60 percent because of the hydrolysis and cell rupture. The solids concentration to the digesters is 10-12 percent with a temperature of about 100°F. No additional heating is generally needed for mesophilic digestion. Available digester volume increases due to the decreased solids concentration.

This technology is an add-on process ahead of the digesters and requires sufficient space at the facility. Finding suitable space may be an issue at Plant 3A.

Updated cost estimates for this technology at each treatment plant are on Table 8.1 with capital costs per wet ton on Table 8.2. The report estimated that operation and maintenance would be reduced at the facility, but this is largely due to the assumption that the amount and the cost of solids disposal would be reduced.

PRELIMINARY DESIGN REPORT-MISCELLANEOUS DIGESTER UPGRADES PROJECT

The SOCWA report *Preliminary Design Report-Miscellaneous Digester Upgrade Project* (Carollo Engineers, June 2003) identified the potential location and costs to implement two phase temperature phased digestion at JBLTP. Other facilities could apply this approach to achieve a Class A biosolids product with low odor potential.

Two Phase Temperature Phased Anaerobic Digestion

This technology is a combination of the acid/gas phase digestion and the temperature phased digestion discussed before and incorporates advantages from both. The acid phase is conducted in the mesophilic range (98°F), unlike the previous two phase and temperature phased approaches. Experience shows that operating the acid phase in the mesophilic range eliminates some of the odorous compounds that are generated when the majority of the acid formation takes place in the thermophilic reactors. Methane formation can then take place at higher temperature with less formation of odorous compounds. After a thermophilic digestion, additional polishing and stabilization takes place in a mesophilic reactor.

The 2003 report developed a preliminary design for this technology at JBLTP. An acid phase digester with four chambers is proposed for installation before the four existing digesters. The larger digesters are used in parallel for a 20 to 27 day retention time thermophilic digestion. This would meet the current practices requirement for Class A biosolids with a 16 hour hold time by switching feed/draw between reactors on a cycle. The two small digesters would be used for a final mesophilic digestion with a 6.5 to 9 day detention. Although not analyzed in this report, a similar approach could be used with the four digesters at Regional. To increase thermophilic residence time, three thermophilic and one mesophilic stage could be used since the digesters at RTP are all of equal volume.

An updated capital cost estimate for implementing this technology at JBLTP is given in Table 8.1 and cost per wet ton in Table 8.2.

For the purposes of this update, two phase, temperature phased digestion will be considered for JBLTP. This process is easier to operate to meet Class A requirements as the additional tankage is designed specifically to meet the requirement of a batch feed process. A batch feed as compared to continuous feed would be required by the Environmental Protection Agency to meet the requirements for a Process to Further Reduce Pathogens. The two phase, temperature phased digestion is less likely to produce odors as compared to other thermophilic digestion processes.

The “Preliminary Design Report - Miscellaneous Digester Upgrade Project” was able to provide a more detailed evaluation of two phase, temperature phased digestion as compared to the “Advanced Digestion Evaluation” Report. This is based on the scope and available budget. Though not considered in the latter report, two phase, and temperature phased digestion is feasible for RTP. This process will be considered in subsequent chapters. Costs will be presented in Chapter 11.

As discussed previously, there is insufficient space to construct an additional digester at Plant 3A to implement two phased, temperature phased digestion. The phased digestion approach would not meet Class A requirements. Thermpholic digestion would be the only applicable advanced digestion process for Plant 3A.

EVALUATION OF ONSITE THERMAL DRYING FACILITY FOR BIOSOLIDS

Another SOCWA study evaluated the feasibility of building an onsite thermal drying facility for biosolids at the JBLTP and RTP. The report *Evaluation of Onsite Thermal Drying Facility for Biosolids* (Black & Veatch, March, 2005) concluded that heat drying could be implemented at each plant and operated within and in combination with the existing dewatering facilities. Thermal drying would produce a 503 Exceptional Quality/Class A product. The volume of the product is 20 percent of the dewatered cake volume significantly reducing the hauling costs and truck traffic at the wastewater treatment plants. The cost savings from these benefits are not analyzed in the report but will be considered further in Chapter 11. The proposed designs and construction and operating costs at each plant are discussed below.

Thermal Drying at J.B. Latham

At JBLTP, a rotary chamber dryer with indirect heating was proposed. This system has had many operating installations at wastewater treatment plants since mid-1990. The dryer has sufficient evaporative capacity (3900 lb H_20/h) for the solids at JBLTP. It may not have sufficient solids handling capacity (12 dry tons per day or 60 wet tons per day) during high solids months requiring excess amounts of dewatered cake to be diverted. A larger dryer was not permitted in the existing space.

In the design, dewatered cake from the existing centrifuges is conveyed to receiving bins. It is then conveyed to the dryer that operates on a 24 hour/ 5 day schedule. Digester gas and natural gas indirectly heat the dryer chamber and hot oil that circulates through the auger of the dryer. Dried product exits the dryer at 180-200°C, and it is cooled to 100°C with a cooling screw before conveyance to a storage silo. A condenser removes water and condensable gas from the dryer exhaust and a thermal oxidizer further treats the exhaust for odor control. Some modifications/reinforcement of the existing solids handling building would be needed to implement the design.

The capital and operating costs for this system were estimated, and they are summarized in Table 8.3.

Table 8.3 Thermal Treatment Cost Estimates

	Facility	
	J.B. Latham TP	**Regional TP**
Solids Processed	38 wtpd	67 wtpd
Capital Cost	$7,800,000	$10,800,000
Annual Operating Cost	$670,000/yr	$900,000/yr
Total Annualized Cost	$1,350,000/yr	$1,841,000/yr
Cost Per Wet Ton	$137/wt	$106/wt

Estimate from " Evaluation of Onsite Thermal Drying Facility for Biosolids" (March, 2005)
Interest rate of 6%, 20-year project life used in assumptions.

Thermal Drying at Regional Treatment Plant

The report proposed a similar rotary chamber dryer for RTP but with larger capacity. Both the evaporative capacity (6500 pounds H_20/hour) and the solids capacity (20 dry tons per day/100 wet tons per day) are sufficient to handle projected loads at the RTP.

This system was also designed for a 24 hour-5 day operation in conjunction with existing dewatering equipment. The parameters for operation are similar to the above system. Structural and slab reinforcement may be needed on the existing solids handling building to implement the design.

Costs for this system are summarized in Table 8.3.

PRIMA DESHECHA COMPOSTING FACILITY FEASIBILITY ASSESSMENT

A SOCWA feasibility assessment looked at the requirements and cost for constructing an enclosed composting facility at Prima Deshecha Landfill Site for co-composting of biosolids. The draft report *Prima Deshecha Composting Facility Feasibility Assessment* (Tetra Tech, 2005) detailed the construction of a shared site that would process 110 wet tons per day of biosolids, 50 percent from SOCWA and 50 percent from the Orange County Sanitation District. The facility would utilize locally generated yard waste for bulking agent to produce 35,000 tons per year of Exceptional Quality/Class A biosolids at 40 percent moisture content. The compost can be reused locally or can be disposed of by land application or landfill if needed.

The facility would be a totally enclosed aerated static pile (ASP) composting system. The ASP technology was chosen as a cost effective, space efficient and flexible process that minimizes odor potential. Aeration is provided by piping in the floor of the building and can be operated in a negative or positive pressure modes through the compost pile built on the surface. Processing time would be a minimum of 22 days of active composting and 28 days of curing. The facility would recycle amendments by screening the composted product. A biofilter treats the air from the building and the ASP to meet South Coast Air Quality Management District requirements for composting (Rule 1133).

Two alternatives were considered for the Prima Deshecha facility, the first meeting the constraints at a minimum of cost and equipment and the second with a greater amount of process automation and larger space and flexibility for a potentially higher quality product. The estimated capital and operating costs of both alternatives are summarized in Table 8.4. There were a series of assumptions made regarding this option that have a significant impact on the cost of the project:

- Nearly $10 million of the capital cost is to stabilize the soils and foundation at the selected site for the building. If a less challenging site were located, the capital cost would be greatly reduced.
- The projected costs did not include purchase or rental of the land.
- The costs in Table 8.4 include an allowance of $7 per wet ton for hauling to the site.
- There are no net costs for marketing the product included.

Table 8.4 Prima Deshecha Composting Facility Cost Estimates

	Approach	
	Alternative 1 (Basic Technology)	**Alternative 2 (Increased Automation)**
Solids Processed	110 wtpd (1)	110 wtpd (1)
Capital Cost	$25,133,000	$28,096,000
Annual Operating Cost	$1,421,000/yr	$1,437,000/yr
Total Annualized Cost	$3,281,000/yr	$3,511,000/yr
Cost Per Wet Ton	$82/wt	$87/wt

(1) 55 wtpd for SOCWA; 55 wtpd for Orange County Sanitation District

Estimate from " Prima Deshecha Composting Facility Feasibility Study" (July, 2005)

Interest rate of 6%, 30-year life for facilities, 7-year life for moving equipment used in assumptions.

- The cost estimate does not include any potential revenue from the sale of the compost. Nor is any cost assumed for disposal of the compost in the event that the material can not be sold for local reuse.
- The cost estimate was developed based on the assumption that the facility would be constructed and operated by SOCWA. However, the construction of the Prima Deshecha Compost Facility is apt to be constructed through an alternative delivery method such as design/build/operate (D/B/O).

SUMMARY

Evaluations in subsequent chapters will consider advanced digestion processes, heat drying, and the Prima Deshecha Composting facility. The following processes will be considered:

- Advanced Digestion - Two phase, temperature phased at JBLTP and RTP due to process advantages and reduced potential for odor complaints. Thermophilic digestion is the only applicable process at 3A due to space limitations.

- Heat Drying - Heat drying is feasible for JBLTP and RTP. There is not sufficient space to implement heat drying at 3A.

- Prima Deshecha Composting - This off-site project is applicable to all three plants.

INTRODUCTION

Chapter 8 identified and developed four sets of alternatives for the treatment of biosolids at SOCWA facilities. Two of these treatments options are based on either the continued use of the existing digestion system (no modification to the existing treatment scheme) or the implementation of advanced digestion. Each of these two treatment options assumes the final disposal of the biosolids will be through a third party contractor that hauls the solids away for disposal through landfilling, land application, composting or some other method. Advanced digestion would result in the generation of Class A Exceptional Quality biosolids that would theoretically create a wider array of the third party disposal options; as compared to the current situation at the J. B. Latham Treatment Plant where the solids do not meet Class B requirements. These third party disposal options are addressed in more detail in Chapters 6 and 10.

The remaining two treatment options identified in Chapter 8 involved composting (at the Prima Deshecha Landfill site) or heat drying (at the J. B. Latham and Regional Treatment Plants). These options are unique in that either option might involve either direct operation by SOCWA (more likely in the heat drying scenario) or operation by a third party contractor (a significant possibility in the case of the Prima Deshecha Compost facility). The reliability and the economics of biosolids product disposal is a significant issue with either option. One of the advantages that is cited for both alternatives is the generation of a biosolids product that is marketable for reuse value. However, if the reuse market is not competitively available then the product must be disposed by landfilling or land application. This has a dramatic impact on the economic feasibility of these options.

The purpose of this chapter is to summarize previous investigations into the market for the both compost and pellets (the heat drying product) in Southern California.

COMPOST

The proposed joint compost facility at the Prima Deshecha Landfill would process a maximum of 110 wet tons of biosolids per day. The capacity at the facility would be equally divided between SOCWA and OCSD. The facility would produce 63,000 cubic yards (cy) of compost per year or 35,000 tons per year. This represents the total product, including bulking agent. As part of SOCWA's feasibility study for the proposed compost facility, Tetra Tech (August 2003) prepared a (*Preliminary Market Research of Organics Products Targeting South Orange County Opportunities*) (MROP).

Tetra Tech's 2003 MROP addressed the potential marketing opportunities for compost proposed to be produced at the Prima Deshecha Landfill facility. The MROP was reviewed and updated as part

of scope of work for this Study. In review of the market, there have not been significant changes since completion of the 2003 report. The amount of product will increase as facilities come on-line such as the Synagro South Kern Industrial Center (SKIC) compost facility and the Inland Empire Utility Agency composting facilities. Some of the new capacity will offset be offset by the projected closure of the Synagro composting facility in Corona in 2008.

Additional compost market studies have been performed for many of the large wastewater agencies in Southern California. Market studies from the agencies listed below were also reviewed for this study:

- Orange County Sanitation District
- South Orange County Wastewater Authority
- Inland Empire Utilities Agency
- City of Riverside
- Santa Barbara County
- California Integrated Waste Management Board

Each report has been used in the market evaluations. The first two local studies were relied upon more than the others.

Compost Products

Compost products are generally marketed as soil amendments, erosion control materials, weed control mulch products, and as ingredients for blending with other products such as nursery planting mixes and topsoil.

When used as a soil amendment, compost is generally spread over the planting area and then incorporated with the native soils. Compost adds organic materials to the soil which increases water retention and makes the soil more friable. Biosolids-based compost also supply micronutrients and some organic nitrogen.

The use of compost for erosion and weed control potentially represents a significant market due to the high volumes necessary to prevent erosion and weed growth. Erosion and weed control (mulch) applications for compost require a 4 to 6 inch deep layer of material. The most commonly used erosion and weed control material is mulch produced from ground wood waste and/or greenwaste. The coarse texture of the material tends to hold it in place on slopes to control erosion and weed growth. It should be noted that biosolids-based composts require a coarse bulking agent to meet the requirements for erosion control.

Planting mixes are blends of topsoil, compost and other organics used by nurseries for planting. Nurseries want the planting mix to be as light as possible to reduce handling efforts and to reduce transportation costs. Typically, planting mixes are blended by individual nurseries to their specifications and contain 20 percent to 30 percent compost. Previous

market studies have identified the nursery and ornamental flower market as significant users of compost.

It is recommended that SOCWA consider producing several different compost products at its proposed composting facility. The compost market can be divided into two distinct categories, traditional and nontraditional. Traditional markets utilize compost to amend soil and provide organic fertilizer benefits. The particle size of compost produced for the traditional markets is usually smaller (one-half inch minus) to facilitate incorporation into the soil.

Nontraditional markets are not directly related to compost's ability to amend soils or provide fertilizer benefits. These markets include compost products for erosion and weed control. The particle size of compost produced for the nontraditional markets requires larger coarse particles (over one inch).

SOCWA may want to consider the development of a specialized product such as a compost filled erosion sock that can be marketed to control runoff and erosion at construction and excavation sites.

Biosolids Compost Public Acceptance Issues

Wastewater agencies have recently faced substantial opposition to biosolids reuse from the public and local governments. The negative public perception of biosolids reuse has been due to several factors: political issues related to the perceived dumping of urban biosolids on rural areas; potential odor issues; public health issues; concerns of adjacent property owners and increased truck traffic.

Although Class A EQ biosolids-based products do not pose the same level of potential negative impacts as Class B biosolids, there is still a negative public opinion of biosolids products. In most cases, biosolids-based products are sold at a discounted price in relation to its value and compared with other non-biosolids based products.

In 2003, Tetra Tech as part of its product market research performed a survey of disposal options and market opportunities for biosolids compost products based on current practices by Southern California wastewater agencies. The survey concluded that markets are distinctly different for biosolids-derived products as compared to those products that do not contain biosolids. According to the MROP, there are negative perceptions as to the safety of biosolids products and potential health risks with application to food crops. Therefore, it is recommended that SOCWA focus its market research on horticulture and landscape markets.

The key factor in the marketing of any biosolids-based product is public acceptance. In order to gain the required public acceptance, biosolids-based products (compost or dried pellets), must meet or exceed the expectations of the

end-users. The products must meet the same criteria for quality, esthetics, performance and handling as similar non-biosolids based products. In addition, the public needs to be educated as to the benefits of biosolids-based products and the environmental benefits of recycling organic materials.

Whether SOCWA ultimately decides to compost or pelletize its biosolids, there are marketing issues associated with biosolids-based products. Biosolids-based products, in general, are more difficult to market and have somewhat limited markets. Due to the negative public perception of biosolids, the marketing of biosolids-based products requires more effort and the development of niche markets for these products. The successful marketers of biosolids-based products have many years of experience and have developed long term relationships with their customers.

Review of Previous Market Studies

Previous studies by SOCWA (Tetra Tech's 2003 MROP) and Orange County Sanitation District (May, 2003) included preliminary market research to assess the capacity of the South Orange County marketplace to receive SOCWA's projected compost product. The market research focused on horticultural markets and outlets for the compost products. Horticultural products are principally used to establish flowering beds, amending soil for ornamental plantings in landscape, nursery field production, preparing mixes for container ornamentals and flowers, and improving topsoil for turf and sod production.

The viable markets for compost products produced at SOCWA's proposed composting facility include the following:

- Horticulture - Ornamental and Nursery, Lawn and Garden, Turf, and Blending and Bagging.
- Landscaping - Erosion Control, Soil Amendment and Mulch (weed control).
- Manufacturers - Fertilizer Manufacturers and Blenders.
- Distributors and Wholesalers - Compost Products and Soil Amendments.
- Retailers and Outlets - Fertilizers, Soil Amendments, Mulches.
- Landfill - Landfill Cover (ADC) and Direct Landfilling (fail-safe backup).

Previous market research studies identified the horticultural market (nursery, landscape, turf and home gardening) as being the primary outlet for biosolids-based products. The major horticultural customers are nurseries and ornamental growers, contractors, landscapers, wholesale and retail soil amendment suppliers, governmental agencies (cities, counties, school districts, CalTrans, etc.), golf courses and homeowners.

Two types of disposal/beneficial reuse options for compost products were previously evaluated by Tetra Tech in the MROP. The first type focused on the marketing of a revenue producing product to be sold to horticultural markets for use as a soil amendment.

The second option for compost products focused on fail-safe options for disposal of products generated by the biosolids management operation and the products that could not be sold in the reuse market. Fail-safe options include land application, landfilling and landfill ADC (alternative daily cover).

Compost produced at SOCWA's proposed composting facility could be marketed in bulk or sold in bags to wholesale and retail outlets. Bulk compost produced at the facility would likely be marketed to local horticultural users (nurseries, landscapers, homeowners). In addition, bulk compost could be sold to soil products companies which would in turn bag and market the compost under their trade names. SOWCA could also bag its own products under a trade name for distribution to local retailers.

Economics of Manufacturing and Marketing

The U.S. bulk compost industry usually sells its products locally due to the low value of the products related to transportation costs. Most compost and soil amendment products sold in bulk are produced and consumed within a 150-mile radius of the production facility.

Horticulture compost bulk products include basic topsoil blend, top soil blend with nutrients, basic screened compost (1" to 3/8"), planting mix, container mix, pre-plant blend, top dressing, tree box mix, bare root mix, and special blend nursery mix.

The marketability and price of compost products depends on the consistency of the product, nutrient value, and competitive products. In Southern California, the price for compost products range from $10 per cubic yard to $25 per cubic yard. Products are generally priced at FOB the processing facility and do not include transportation. Transportation costs play a significant role in the marketing of compost products, particularly with the current high prices of fuel. The value of bulk compost products for use in horticulture and agriculture is so low that product transportation beyond 150 miles is usually unprofitable.

The exact market size for bagged compost products in Southern California is unavailable due to the reluctance of private distributors to reveal their sales volumes. However, there are four firms; Kellogg Garden Products, Western Organics, Whitney Farms and Scotts Hyponex that sell thousands of tons of bagged compost products annually at retail outlets such as Home Depot, Lowe's, Wal-Mart, Target, etc. It is estimated that bagged compost products

sell for between $35 and $40 per ton, and bagging cost approximately $10 per ton.

Generally, the capital costs and operating costs for composting facilities exceed the amount that is received from marketing of its compost products. Therefore, private composting facilities generally rely on a significant "tipping fee" in order to generate profit. Public agencies that operate composting facilities generally operate at significant loss.

SOCWA has the option to operate its proposed composting facility with its own personnel or contract with a third-party operator. Although SOCWA would likely be able to operate the facility at a lower cost with its own personnel, there are several advantages to third-party operation of the facility. The third party operator would be experienced in managing the composting processes and would likely be responsible for marketing of the finished product.

The ability to market the compost on a consistent basis is the key to a successful biosolids composting operation. Third-party operators generally have developed local markets for compost products, which would assure that the compost produced at the SOCWA facility would not accumulate on the site.

Local Compost Markets

The 2003 MROP also cautioned that it was apparent that there will be increased competition for Southern California market share. Therefore, the report recommended that SOCWA focus its market development within Orange County rather than relying too heavily on export of compost products.

The MROP also identified potential markets for organic products in south Orange County. The market segments were identified and included local communities, water and wastewater districts, transportation departments, golf courses, cemeteries, school districts, stables, nurseries, and developers/landscapers. Table 9.1 lists the acreage of each of the identified market segment and the potential quantity of compost that could be utilized.

Of the nine potential market segments identified in Table 9.1, only three are potentially significant enough to justify further review and discussion. The market segments included for discussion in this study are local communities, transportation departments (CalTrans), and nurseries.

Local Communities

Tetra Tech's 2003 MROP surveyed twelve cities in Orange County to assess the interest in purchasing compost from the proposed SOCWA composting facility at the Prima Deshecha Landfill. The survey identified a potential 4,192 acres of parks and greenspace, which according to the MROP represented a potential compost market that ranged from 14,630 cubic yards (conservative application rates) to 78,000 cubic yards (normal application

Table 9.1 Potential Compost Markets

Market Segment	Acreage	Annual Quantity (cy/yr)	Annual Quantity (t/yr)
Local Communities	4,192	14,630 to 78,000	8,200
Transportation Departments (CalTrans)	1,818	0-122,000	68,000
Golf Courses	1,426	2,930	1,700
Cemeteries	65	1,180	660
School Districts	1,562	1,030 to 2,080	570 to 1,160
Stables	Not Available	Not Available	Not Available
Nurseries	Not Available	12,440	6,900
Developers	Not Available	Not Available	Not Available
Totals	8,891 Acres	32,210 to 218,630	86,030 to 86,620

Note:
The above information was based the MROP and a response from 51percent of the market research contacts that were made.

rates) of compost products for soil amendment on annual basis

The potential for local communities to utilize the compost produced at SOCWA's proposed market appears to be significant. The largest potential user identified in MROP survey was Mission Viejo at a potential 32,300 cubic yards of compost annually. However, according to the survey Mission Viejo did not have much interest in purchasing compost from the proposed SOCWA facility. The cities that were "very interested" (Laguna Beach and Laguna Niguel) in purchasing compost from the proposed SOCWA facility accounted for only approximately 1,000 cubic yards per year.

Most cities contract park and greenway maintenance to private landscape companies and would not currently directly purchase compost products from SOCWA. The cities could specify that compost products be used on city properties but it may not be possible to ensure that the landscapers would purchase SOCWA compost.

The communities that are served by SOCWA have city parks, schools, landscape medians, and golf courses that could benefit from the use of compost. In addition, compost products can be utilized for new municipal projects requiring landscaping (such as public building schools and athletic fields), private development projects, and compost demonstration projects.

Compost products can also be used as mulch for weed and erosion control, moisture retention, and visual enhancement of open areas and street medians. These nontraditional uses of compost were not fully addressed in previous SOCWA market studies, and they could represent a significant

additional local market for compost/mulch products. One of the advantages of using compost for nontraditional uses is that it is applied at depths ranging from 1 for to 6 inches. Application of compost traditional uses is normally at a depth of 1/4 inch.

There are sufficient application areas within the local communities to utilize all of the projected compost that would be produced by SOCWA at the proposed Prima Deshecha facility. This is based on the available acreage and traditional and nontraditional compost/mulch application rates. As stated above, the member agencies and cities either purchase compost products themselves or compost is purchased by city contractors for use on city-owned properties and facilities. In addition, member agencies or cities could also offer its residents compost for free or at a discounted price.

SOCWA should contact the local communities that it services and discuss SOCWA's proposed composting facility and the necessity to reuse the waste created by their communities. A major key to the success of the proposed SOCWA composting facility would be to convince the local communities to participate in a compost utilization program.

CalTrans

A major concern for CalTrans is erosion control and weed control within its rights of ways. The use of compost in areas of new road construction, and for existing slopes, can significantly reduce erosion and maintain moisture in the root zone of the soil. The MROP identified CalTrans as a potential user of 122,000 cubic yards of compost per year within Orange County.

In general, the primary suppliers of compost/mulch for erosion control are greenwaste compost operations. This is because a large woody fraction is required to provide a coarse structure that protects the soil from the impact of falling rain and the resulting runoff along the soil surface. Co-composting of biosolids and greenwaste would also provide a suitable erosion control product. Biosolids-only compost has particles that are too fine to provide enough structure to prevent slope erosion.

According to the 2003 MROP, CalTrans had performed studies using compost from recycled materials for erosion and re-vegetation purposes and found that excess nutrients were transported into the runoff from the amended areas. CalTrans stated that before agreeing to use the product, several pilot studies that measure the nutrient content of the runoff would need to be conducted.

However, in May, 2005, CalTrans and the Southern California Association of Compost Producers initiated a demonstration project at a freeway onramp in Pasadena, CA. Compost and mulch were applied to freeway right of way to fight erosion, control weeds and

reduce the need for herbicides, and cut water usage.

CalTrans District 7 Deputy Director of Maintenance Michael Miles, encouraged by the demonstration, offered his support of the reuse effort. "The District is interested in utilizing recycled materials where possible", he said. Compost and mulch limit the growth of weeds, reducing both erosion and the amount of material going to landfills.

Members of the Southern California Association of Compost Producers include City of Los Angeles-Biosolids Management, City of San Diego-Metro Biosolids, Inland Empire Utilities Agency, Kellogg Garden Products, Las Virgenes Municipal Water District, San Joaquin Compost, Orange County Sanitation District, Los Angeles County Sanitation Districts, Synagro, and SOCWA.

Compost produced at SOCWA's proposed facility could potentially be marketed to CalTrans for weed and erosion control. However, according to the California Integrated Waste Management Board, CalTrans' current use of compost represents only one percent or less of the total compost market in California. Therefore, it is not likely that CalTrans would be a significant customer in the short term.

In the future, due to the high cost of transporting compost in relation to its value, local compost producers would have a significant economic advantage if and when CalTrans contracts for compost products in Orange County. SOCWA should join the Southern California Association of Compost Producers and participate in educating CalTrans as to the value of compost products.

Nurseries

There are approximately 70 nurseries and ornamental flower growers operating in Orange County and they utilize significant volumes of compost in their potting mixes. San Diego County also has many nurseries and flower growers. A majority of these nurseries currently purchase compost, which is used to blend potting mixes. The regional nursery market is large enough to utilize the entire anticipated compost production from SOCWA's proposed facility. However, in order to gain a share of this market, SOCWA would have to produce an equal or superior compost product, and either hire marketing personnel or enter into an agreement with an experienced marketing company to sell its products.

Current Market Size

There are a number of major firms that manufacture and/or distribute biosolids-based products in Southern California. The firms include Scotts-Hyponex, Kellogg Garden Products, Western Organics, Whitney Farms, Synagro, and Inland Empire Composting. The consultant that prepared the MROP had discussions with all of the firms listed, which expressed a significant level of

interest in working with Southern California wastewater agencies in public/private partnership for treatment, disposal, and marketing of biosolids and related products.

There are approximately 130 retail stores in Orange County that sell garden products and soil amendments, including compost products. The top five stores are Target, Home Depot, Armstrong Nurseries, Wal-Mart and Lowe's.

In addition, Orange County and San Diego County have a substantial number of wholesale nurseries that utilize significant amounts of compost products. Although wholesale nurseries have been leaving Orange County over the past several years, the nursery and ornamental flower market in Southern California remains strong.

The total gross value of production in nursery, flowers, and foliage crops grown in Orange County exceeds $200 million per year. Although nurseries and flower growers have been leaving the County, there are approximately 70 separate companies operating in Orange County that produce 3 percent of the total U.S. production in nursery, flowers and foliage crops. According to a study performed by Slivka et al. (1992), the potential compost market for California exceeds 30 million cubic yards annually.

The previous marketing studies mentioned determined that Southern California consumers are purchasing approximately 1.8 millions tons (4 million cubic yards) of compost products each year. The total Prima Deshecha output represents about 2 percent of this figure. The total permitted capacity of the Southern California compost facilities is 2,453,350 tons per year or 5,451,888 cubic. Based on the previous studies, it appears that the demand for compost-based products is growing at a healthy pace.

In 2003, there were 35 firms and facilities permitted to operate composting facilities in the Southern California region that includes San Bernardino, Riverside, Los Angeles, Orange, San Diego and Ventura counties. Based on reported data, ten of the firms and facilities account for production of 80 percent of the compost products in the region.As discussed earlier in this Chapter, the main customers that should be targeted by SOCWA include local communities, CalTrans, and horticultural customers (nurseries, landscapers, etc.). Due to the relatively small volume of compost that would be produced at the proposed SOCWA facility, it would be unlikely that selling a bagged product to large national retail outlets would be feasible. In the future, it may be possible to bag a portion of the SOCWA compost production for sale at local nursery and specialty outlets. Also, if SOCWA contracts with a third-party operator that has access to retail space at large retail outlets then the compost could be bagged for sale.

Biosolids Compost Production in Southern California

According to the California Integrated Waste Management Board in 2003 there were 35 compost facilities permitted and operating in Southern California (San Bernardino, Riverside, Orange, Los Angeles, San Diego, Kern, and Ventura Counties). Of these 35 facilities, 6 utilized biosolids as a feedstock and are include in Table 9.2.

The biosolids compost market is dominated by several companies, Kellogg Supply, Hyponex, Western Organics Whitney Farms and SYNAGRO. Kellogg Supply sells the majority of bagged biosolids compost products in Southern California. Kellogg's and the other large compost producers and marketers are well-established and have highly experienced marketing staffs and products outlets. These companies, in most cases, have decades of experience in producing, blending, packaging, distributing and marketing organic products and fertilizers. It would be difficult for any public wastewater agency to compete with the private sector organic marketers without a significant marketing effort and financial commitment.

Previous market studies (2002 and 2003) performed by Southern California wastewater agencies listed previously identified compost facilities in the region and the compost produced by each facility. In general, there has been no significant change in the number of operating compost facilities or their production. The market for compost products has remained steady in the region and is expected to increase each year.

The retail bagged compost market in Southern California is still dominated by the same companies Kellogg Supply, Hyponex, Western Organics, and Whitney Farms. SYNAGRO, the largest biosolids management company in the U.S., is the primary producer and marketer of bulk compost products. Kellogg's and Synagro produce and sell a majority of the biosolids compost products in the region. Table 9.2 lists the biosolids compost producers and

Table 9.2 Biosolids Compost Producers

Producer	Location	2002 Tonnage	2002 Cubic Yards
Kellogg Supply	San Bernardino County	20,000	44,000
Hyponex	San Bernardino County	6,500	14,500
IEUA	San Bernardino County	54,750	122,000
Synagro	Riverside County	115,000	256,000
San Joaquin Composting	Kern County	115,000	256,000
City of Los Angeles	Los Angeles County	1,700	3,800
Totals		312,450	696,300

marketers and the compost produced in 2002.

Currently, there are two large composting facilities under construction (Inland Empire Composting Facility, San Bernardino County; Synagro's Southern Kern Industrial Center). These facilities could process up to 800,000 tons of organic materials annually, including biosolids.

Figure 5.1 indicates that the largest local compost production facility in close proximity to Orange County is the Synagro facility in Corona that is scheduled for closure in 2008. It is possible that the proposed SOCWA compost facility could fill some of void that will be left in the Southern California compost market when Synagro's Corona composting facility is closed in 2008. However, by the time that the Corona facility is closed the IEUA/Los Angeles County Sanitation District composting facility in San Bernardino County should be fully operational and producing more compost than the Corona facility. Therefore, it is not likely that the closing of Synagro's Corona facility would significantly benefit SOCWA proposed composting project.

Biosolids Compost – Private Firms

This section discusses each of the major biosolids compost processors in Southern California. These processors operate biosolids composting facilities that could potentially compete with SOCWA proposed composting facility. The private firms may also be candidates for third-party operators of the proposed SOCWA facility.

Synagro Compost Facilities

SYNAGRO is the nation's largest biosolids management company and it operates a composting facility in Corona, CA and a second facility in Arizona. SYNAGRO is also constructing a third composting facility in Kern County, the Southern Kern Industrial Center.

Corona Compost Facility

SYNAGRO operates a biosolids composting facility near the City of Corona, which SOCWA currently utilizes as part of its biosolids management. The facility has been ordered by Riverside County to close by December 2008. Table 9.3 details the wastewater agencies that utilize the facility and the volume of biosolids processed at the Corona facility in 2004.

Table 9.4 on the next page lists the types of products that were produced at the Corona site, the volume produced and where the product was marketed.

Table 9.3 Corona Facility - Tons Processed

Agency	2004 Tonnage
City of Corona	20,957
Coachella Valley	4,462
Eastern Municipal Water District	16,783
Elsinore Valley Municipal Water District	10,979
Fallbrook Public Utilities District	3,519
Inland Empire Utilities Agency	5,135
Irvine Ranch Water District	1,801
Los Angeles County San. District	68,388
SOCWA – Plant 3A	2,264
Orange County Sanitation Districts	7,330
Ramona Water District	1,006
Rancho California Water District	5,058
San Clemente	4,675
Santa Margarita Water District	4,945
SOCWA	7,184
Valley Center Municipal Water District	357
Western Riverside Municipal Water District	2,220
Total Tons Processed	167,063

Table 9.4 Corona Composting Facility - Product Sales Summary 2004

Product	Las Vegas Nevada	LA County	Orange County	Riverside County	Fresno County	San Bernardino County	San Diego County	Kern County	Ventura County	Total Tons per Year	Total Cubic Yards Per Year
Contractors Compost	2,530	116	144	234		107	263			3,394	11,845
Kellogg Garden Products		30,766								30,766	70,762
Soil Conditioner	994	19,257	11,625	22,477	431	3,484	15,934	371	194	74,767	164,487
Soil Mix		2,413	9,158	14,034	4,126	2,548	3,404			35,683	39,251
Top Dressing 1/4”		292	22	7,141						7,455	21,098
Top Guard 1/8”	853	1,789	1,161	1,322	293	168	1,044		131	6,761	14,739
Topsoil		2,761	8,076	12,370	116	193	1,156	371		24,672	26,399
Totals	1,847	57,278	30,042	57,344	4,966	6,393	21,538	371	325	180,104	348,581

Note: All values in wet tons per year unless noted otherwise

SYNAGRO Arizona Soils Composting Facility

SYNAGRO's Arizona Soils Composting Facility processed over 57,000 wet tons of biosolids from Southern California wastewater treatment plants in 2004. Table 9.5 below list the agencies that sent biosolids to the site in 2004.

Table 9.6 lists the recipients of the biosolids compost produced at the Arizona Soils facility in 2004. Western Organics is the major recipient of the compost produced at the facility and the company has a significant share of bagged soil amendment market in Southern California.

Table 9.5 Potential Compost Markets

Agency	2004 Tonnage
City of Corona	50
Beaumont, CA	474
Coachella Valley Water District	19,890
Eastern Municipal Water District	580
Inland Empire Utilities District	4,496
City of Los Angeles	262
Orange County Sanitation Districts	28,539
SOCWA	1,801
Western Municipal Water District	1,346
Total Tons Processed	57,436

Table 9.6 Potential Compost Markets

Name of Recipient	Volume (cubic yards)	Amount (wet tons)
Glen Mayberry, Salome, AZ	65	29
Bouse, AZ	345	155
Rogers Excavation, Phoenix, AZ	255	115
Vicksburg, AZ	5	2
La Paz County, AZ	80	36
Brenda, AZ	40	18
Western Organics, Phoenix, AZ	44,430	20,349
Total	45,220	20,704

Southern Kern Industrial Center

SYNAGRO is proposing to construct a new composting facility at a site in Kern County known as the Southern Kern Industrial Center. The facility has received the required state and county permits to construct and operate. According to company representatives the facility will process approximately 500 wet tons of biosolids daily for a fee of $54 per ton, including transportation. The facility is permitted to handle up to 397,000 tons of biosolids per year, which is 1,089 tons per day.

SOCWA has entered into a contract with SYNAGRO to transport and process 25 tons per day of the Agency's biosolids. Due to the distance to the Kern County facility, it is unlikely that the compost produced at the SYNAGRO facility would be sold in the Orange County market.

San Joaquin Composting

San Joaquin Composting processes approximately 500,000 tons of organics, including biosolids, at its Kern County facility annually. The facility charges wastewater agencies approximately $20 per wet ton of biosolids as a "tipping fee". San Joaquin Composting markets it compost for $3-$4 per cubic loaded onto the purchaser's truck (FOB) at the facility, transportation not included. According to company representatives a portion of the compost produced at the facility is sold on the open market and the remaining material is transported to a large farm in Kings County for agricultural application. The Kings County farm is owned by the McCarthy family, which also owns San Joaquin Composting. Since all of the firm's compost products are sold to local markets in Kern County or transported to the King's County farm it would not compete with SOCWA's proposed composting facility.

Large Scale Composting By Other Southern California Wastewater Agencies

City of Los Angeles

In 2004, the City produced 238,836 wet tons of biosolids at its two wastewater treatment plants (Hyperion and Terminal Island). Of this total, 1,714 wet tons were composted at Griffith Park. At this time it does not appear that the City of Los Angeles is pursuing composting as a viable alternative for its biosolids.

Sanitation Districts of Los Angeles County (LACSD)

LACSD has two large projects under development that include an option to purchase 14,500 acres of farmland and a proposed composting facility (Westlake Farms) in Kings County. The purchase is contingent on approval of the composting facility that could process up to 500,000

tons of the biosolids annually. The compost would be utilized on the farm acreage and not marketed off-site.

The second project is joint venture with Inland Empire Utilities Agency to construct and operate a large composting facility currently under construction in San Bernardino County. This facility is close enough to SOCWA proposed composting facility to compete for market share.

Orange County Sanitation District

Plans for composting other than the joint composting facility with SOCWA at the Prime Deshecha Landfill include another unidentified composting facility that would process up to 400 wet tons per day.

Inland Empire Utilities Agency

The Inland Empire Utilities Agency (IEUA) produces approximately 180 wet tons of biosolids daily. A major portion (150 wet tons) of the IEUA's biosolids is currently being composted at an agency-owned co-compost facility located in Chino.

As described previously, the IEUA and Los Angeles County Sanitation Districts are currently constructing an in-building compost facility in a former IKEA furniture store in San Bernardino County. The facility, Inland Empire Composting Facility, will be housed within a 410,000 square foot building on 24 acres, and it is expected to cost approximately $66 million to convert the building to a composting facility. The projected overall capacity of the indoor composting facility is 300,000 tons of biosolids, greenwaste and manure. The construction of the project began in June 2004 and is scheduled to be completed in late December 2005.

The facility will utilize aerated static pile composting, within an enclosed building. A biofilter will be installed at the facility to control potential odors from the process building. Biosolids, greenwaste, manure and other bulking additives will be composted at the facility, and the product will be marketed to local agriculture and/or horticulture markets. The Authority expects to utilize a private contractor to market the product.

This facility will be a direct competitor to the proposed joint SOCWA/OCSD composting facility at the Prima Deshecha Landfill. It is expected that the new IEUA/LACSD facility will market its compost to horticulture markets in Southern California through a private contractor. IEUA has been operating a co-composting facility in Chino that currently composts the Agency's biosolids and local dairy manure.

Las Virgenes Municipal Water District

Las Virgenes Municipal Water District operates an in-vessel composting facility that produces approximately 12,000 cubic yards (4,200 tons) of compost annually. The District currently gives away compost to local citizens through a Saturday program where residents pickup the compost at the

facility. In addition, compost is sold ($9 per cubic yard) in bulk to landscapers and horticulturists for local uses. The District has recently entered into an agreement with a private contractor to market a majority of its compost at a price that is less than $9 per cubic yard

Marketing Strategies

The marketing of biosolids-based compost products is generally more difficult than other compost products due to the public's negative perception of biosolids. Figure 9.1 indicated that the development of the Prima Deshecha Compost Facility could be done with either SOCWA or a private third party as the operator. The first option considers SOCWA as the facility operator. It is particularly difficult for public agencies that have no experience with product marketing to compete with companies that have been marketing organic soil amendment products for many years. Therefore, it is recommended that SOCWA follow the strategies provided in the 2003 MROP and listed below for municipal biosolids product marketing:

- Develop strategic partnerships, alliances, or distributorship with the most successful of the firms holding reasonable market share.
- Initiate public relations campaign in conjunction with Orange County Sanitation District to promote the benefit of biosolids based compost.
- Attempt to access the bulk agriculture market for a portion of products that will ensure diversity of market placement.
- Maintain an active role in product research and development, including how better to serve the organic products industry and the development of high quality products.
- Closely monitor increasing competition for compost-based products that will likely increase pricing and market-share pressure on compost manufacturers, wholesalers, and distributors.
- Continue development of fail-safe markets that can afford SOCWA absolute and complete access for their compost products.
- The above strategies consider that SOCWA implements, operates, and markets the compost production. It must be noted that this will create the need for hiring staff at SOCWA.

The second scenario described in Figure 9.1 is based on design, build, operate, and product market by a private contractor. In this scenario, the private contractor would market the Prima Deshecha compost product in the overall supply/demand arena in Southern California. The private contractors are already actively engaged in these activities.

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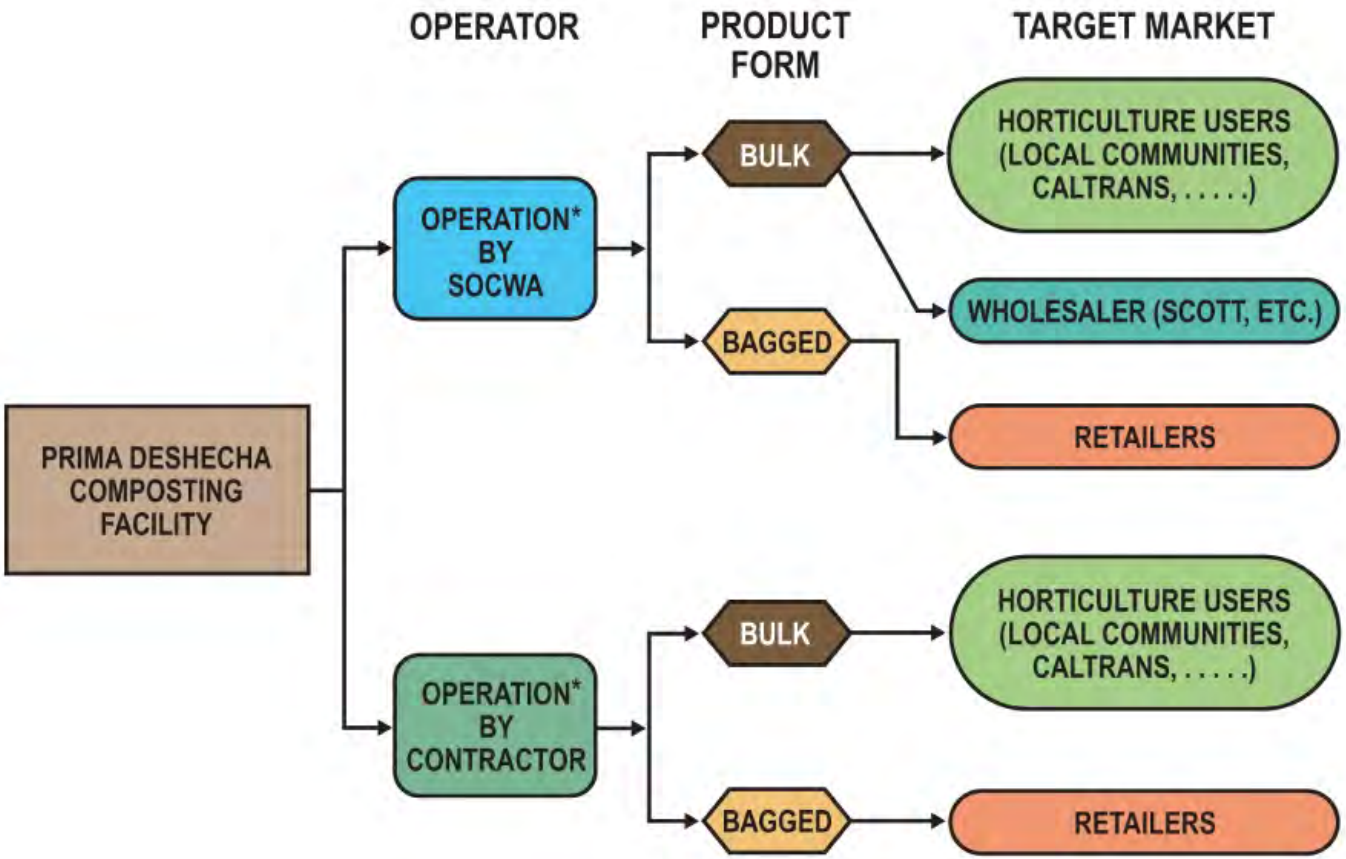

*Operation includes marketing and sale of product.

COMPOST OPERATION AND MARKETING OPTIONS

FIGURE 9.1

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

Compost - Summary

The planned SOCWA composting facility at the Prima Deshecha landfill would produce approximately 26,000 cubic yards per year (11,600 tons per year). In relation to other composting operations, this represents less than 5 percent of the compost produced by other Southern California operators.

The MROP prepared in 2003 suggested that SOCWA should focus it marketing effort on local communities, CalTrans and horticultural users (nurseries, landscapers, etc.). Based on information contained in the MROP there is sufficient demand in Orange County to market all of the compost produced at the proposed SOCWA.

It appears that the current demand for compost in Orange County is being met by the existing compost producers in the region. Therefore, unless new markets are developed by SOCWA it must compete with existing compost producers for customers. Price and product quality will determine whether SOCWA will be successful in gaining the necessary market share in the region. It should be noted that biosolids compost can be more difficult to market due to public perception issues related to sewage treatment based products.

The most competitive market for SOCWA would likely be horticultural markets in the region, particularly nurseries. Another market that SOCWA should pursue is nontraditional use of compost that includes erosion control and weed control on CalTrans rights of way and community landscape medians.

Due to the relatively low volume of compost to be produced at SOCWA's proposed composting facility it is not likely that SOCWA can compete in the large retail bagged compost market. It is assumed that SOCWA would market its compost in bulk form to local markets. Currently local compost needs are most likely being met by greenwaste composters that operate in the region.

SOCWA should consider producing several different products at its facility to diversify it market options. Tradition and nontraditional compost markets require compost products with different characteristics. Traditions markets (soil amendment and fertilizer) require a product with small particles for turf applications and incorporation into native soils. Nontraditional markets (erosion and weed control) require a product with a coarse texture and larger particle size.

A major consideration for SOCWA is whether the Agency would operate the proposed facility with its own personnel or contract with a third-party operator. Although it may be more economical for SOCWA to operate the facility, SOCWA's lack of experience and expertise in operating a composting facility and marketing product may justify third-party operation of the facility. The most important aspect of a successful biosolids composting operation is marketing the

product. A third-party operator would be responsible for the marketing and would likely have existing outlets for the product.

DRIED PELLET MARKET STUDY

In addition to the proposed compost facility at the Prima Deshecha Landfill, SOCWA also evaluated the feasibility of heat drying its biosolids at the Joint Regional Treatment Plant (RTP) and the J.B. Latham Wastewater Treatment Plant (JBL). Black and Veatch recently completed (March 2005) a study of the feasibility of heat treatment at the SOCWA wastewater treatment plants. The purpose of this section is to identify the potential market for a dried pelletized biosolids product that would be manufactured at the proposed biosolids drying facilities.

There is currently only one biosolids thermal dryer operating in California, which is located at the Sacramento Regional Wastewater Treatment Plant. In Southern California, the City of Corona has recently completed a thermal drying facility and the Encina Wastewater Authority is expected to begin construction of a thermal drying facility in 2006.

The following wastewater agencies have prepared market studies for dried pelletized biosolids product, which were reviewed for this study.

- Encina Wastewater Authority
- City of Corona
- Sacramento Regional
- Orange County Sanitation District

Heat Drying Technology

Heat drying has been utilized by Publicly Owned Treatment Works (POTWs) in the U.S. over the past 20 years. Until recently, most heat drying facilities were operated in the Northeastern U.S. where application of biosolids to agricultural lands is not economical due to winter weather conditions and high transportation costs. To overcome the transportation costs, biosolids are dried, pelletized, and are generally shipped to Florida for use on citrus crops.

Until recently, heat drying has not been utilized in the Western U.S. due to availability of agricultural lands for biosolids application. It has only been in the last five years that POTWs in California have seriously considered alternatives to the land application of Class "B" biosolids.

There is one heat drying facility operating in California at the Sacramento Regional Wastewater Facility. It has been operating since January of 2005 and produces approximately 20 dry tons of product per day. The product is marketed by a private contractor. The City of Corona is currently constructing the first private or public heat drying facility located in Southern California. Table 9.7 lists the heat drying facilities that are currently operating in the U.S., and also

Table 9.7 Biosolids Heat Drying Facilities

Start-Up	Location	Dryer Manufacturer
1982	Clayton County, GA	ESP
1985	Tampa, Fl	ESP
1992	Boston, MA	ESP
1993	New York City, NY	ESP
1994	Waco, TX	Andritz
1997	Ocean County, NJ	Andritz
1997	Baltimore, MD	Swiss Combi
1999	Sumter, SC	Andritz
1999	Windsor, ON	Swiss Combi
2000	Aiken, SC	ESP
2000	Minneapolis, MN	Swiss Combi
2001	Upper Occoquan, VA	Andritz
2002	Louisville, KY	Andritz
2002	Jacksonville, FL	Andritz
2003	Pinellas County, FL	Andritz
2005	Sacramento, CA	Andritz
2005	Corona, CA	US Filter
2007	Carlsbad, CA	Andritz

lists the proposed drying facility at Encina Wastewater Authority's Carlsbad treatment plant

Product Market Potential

The U.S. market for fertilizers is approximately 55 million tons per year, with almost half being nitrogen products. More importantly, it is estimated that 95 percent of all fertilizer sales are to agriculture, with the remaining 5 percent sold for horticultural and turf applications. Pelletized products have traditionally been sold to citrus growers in bulk and to the turf industry in bags. It can be assumed that the major markets in Southern California for palletized biosolids would be horticultural (nurseries, landscapers) and turf (golf courses, parks, citrus, and cemeteries).

Previous studies have found that pelletized biosolids products are traditionally distributed by private companies and brokers involved in fertilizer marketing. These companies may blend the dried pellets with other chemicals to enhance the final product.

The Encina Wastewater Authority's (EWA) pelletized market study used the

2001 Fertilizing Materials Licensee List, to identify fertilizer companies that were located within 200 miles of Carlsbad. EWA also contacted turf growers in the region that could be interested in using a pelletized biosolids product. Six companies listed in Table 9.8 expressed an interest in purchasing pelletized biosolids in bulk or in bags, depending on price and quality of the product.

EWA's 2002 study also identified three companies (Agri-Pacific, High Tech Turf and Irrigation, and LCM Fertilizer) that were purchasing Milorganite and were very interested in a similar product that could be purchased at a lower cost ($320/ton in 2002). Milorganite is dried, pelletized biosolids that have been marketed for over 80 years. These three companies indicated that the main market for locally produced pellets would be the turf market (mainly golf courses). However, they did mention that it may be possible to sell the product to other markets that they serve.

The EWA study also noted that the Scotts Company was potentially interested in purchasing a pelletized biosolids product in Southern California. At that time, Scotts was willing to pay up to $100/ton for a pelletized product that met their needs. Scotts thought their demand for the product would be 10,000 to 40,000 tons per year.

Potential Revenue

The marketability and price of the products will depend on the consistency of the product, nutrient value, pellet size, odor, and competitive products. Although there are no pelletized products being produced in Southern

Table 9.8 Potential Pellet Customers

Company Name	Location	Estimated Demand (tons/yr)	Product Requirements
Agri-Pacific, Inc, (Toby Sanders)	9960 Indiana Ave. #12 Riverside, CA 92503	300+ tons/yr	Greens Grade (SGN 100) 50 lb. bags.
Grow More (Jon Awtil)	15600 New Century Dr. Gardena, CA 90248	Unsure	Standard sizing, must retain size, shape through a blending process.
High Tech Turf and Irrigation	74773 Joni Drive Palm Desert, CA 92260	20+ tons/yr	Standard sizing for blending or greens grade bagged 50 lb.
Imperial Grain Growers	5 Shank Road Brawley, CA 92227	Unsure	Must meet all regulation for an agricultural fertilizer.
L&M Fertilizer	28690 Las Haciendas Temecula, CA 92590	500+ tons/yr	1/4” or smaller pellets.
Scotts Company	Marysville, OH	10,000-40,000 tons/yr	Must work as a pesticide carrier.

California currently, there are biosolids-based fertilizer products such as Milorganite being marketed in the region.

Encina Wastewater Authority's (EWA) 2002 Biosolids Strategic Plan included a section that addressed potential product sales of pelletized product in California. At that time Milorganite was selling for approximately $8.00 per fifty pound bag ($320 ton). Currently Milorganite is selling for approximately $10.50 per fifty pound bag ($420 ton).

Fertilizer value in terms of NPK (nitrogen, phosphorus, potassium) is a major factor in estimating the market value of a fertilizer product. The value of a product can be estimated by placing a commodity value on the percentage of nutrients available in the product. For instance, Milorganite has an NPK percentage of 6 percent nitrogen, 2 percent phosphorus and 0 percent potassium. Based on these percentages a ton of Milorganite contains 120 pounds of nitrogen and 40 pounds of phosphorus. A value of the product can be estimated by multiplying the pounds of nutrients times the current commodity cost of nitrogen and phosphorus.

In 2002, when EWA's Strategic Plan was completed, the price of nitrogen was $0.14 per pound and phosphorus was priced at $0.33 per pound. It was determined that a dried pelletized product with an NPK value of 6/2/0 had a potential value of $30 per dry ton (95 percent solids).

In today's market, nitrogen (urea, ammonium nitrate, ammonium sulfate) is priced at approximately $0.30 per pound and phosphorus is priced at approximately $0.49 cents per pound. Based on current commodity prices it could be assumed that the current value of product would be $55 per dry ton.

However, the EWA study assumed that the nitrogen availability in urea and the nitrogen availability in the pelletized biosolids product were the same. Nitrogen in urea, ammonium nitrate and ammonium sulfate is water soluble and available to the plant immediately and is used extensively in agriculture. It is estimated that 95 percent of the nitrogen sold in the U.S. is this "quick release" form.

On the other hand, the nitrogen contained in dried pellets is primarily in an organic form and must be broken down by soil microbes before the nitrogen is available to plants. Therefore, it is not possible to directly compare the common forms of nitrogen (urea, ammonium nitrate and ammonium sulfate) used in agriculture with a "slow release" pelletized biosolids product.

However, a document prepared by Florida Department of Agriculture compared the prices of "quick release" fertilizers used in agriculture to "slow release" chemical and organic fertilizers. At that time quick release nitrogen fertilizers were selling in the range of $0.24 to $0.28 per pound and slow

release fertilizers were selling in the range of $0.65 to $0.79 per pound. Therefore, it appears that the slow release fertilizers have a value that is almost three times that of typical nitrogen fertilizers.

The 2002 EWA study stated that SYNAGRO was selling high quality pelletized biosolids in the blended fertilizer market for between $40 and $70 per ton FOB the blending plant. Pelletized product was being sold in bulk at between $30 and $40 per ton delivered and spread on agricultural sites. EWA's study concluded that potential users in Southern California may be willing to pay a premium price for locally produced pellets. However, EWA's study also noted that in 2002 the Jackson Electric Authority in Florida awarded a contract to a local distributor to market its pelletized biosolids for $5 per ton. The City of Corona is planning to initially pay a private contractor to remove and manage its pelletized product.

Product Acceptance

As mentioned earlier, the key factor in the marketing of any biosolids-based product is public acceptance. In order to gain the required public acceptance of biosolids-based products, the products must meet the same criteria for quality, esthetics, performance and handling as similar non-biosolids based products. In addition, the public needs to be educated as to the benefits of biosolids-based products and the environmental benefits of recycling organic materials.

Although Class A EQ biosolids-based products do not pose the same level of potential negative impacts as Class B biosolids, there is still negative public opinion of most biosolids products. In most cases, biosolids-based products are sold at a discounted price in relation to its value and compared with other non-biosolids based products.

The most successfully marketed biosolids-based products have been sold through large soil products dealers such as Kellogg Garden Supplies. The key is that these dealers have gained the public trust in their products over the years and incorporated biosolids as an ingredient. These products are generally sold in bags and it is possible that the buyer is unaware of the biosolids content of the product.

Product Marketing

There are several marketing options available to SOCWA if it decides to proceed with a heat drying and pelletization facility. SOCWA has the option of managing the marketing of the pelletized product in-house, contract the marketing of the product with a fertilizer broker/dealer, or a combination of the two.

In order to market a pelletized product in Southern California, one or more of the following actions would need to be initiated: sell the product as filler to fertilizer blenders for the bag market, sell the product to horticulture and turf markets, hire a fertilizer distributor to

market the product or create a marketing program to educate potential buyers of the benefits of pelletized biosolids.

Since there are no pelletized biosolids products being manufactured in Southern California today, the market for the product has not been tested. Milorganite, a bagged pelletized product from the City of Milwaukee has been marketed successfully in the U.S., including Southern California. Milorganite has been marketing its products for decades and has developed significant customer loyalty and product recognition.

Whether SOCWA markets its own product or contracts with a private marketing company, it will take time to develop a local market for the pelletized product. The usual difficulties in developing new product markets are compounded by the negative public perception of biosolids-based products.

Product Success Stories

As mentioned above, the City of Milwaukee has successfully marketed Milorganite in the U.S. for decades. In addition, SYNAGRO has also successfully marketed a pelletized biosolids product known as Granulite over the past 15 years.

Milorganite

The most successful pelletized product is manufactured by the City of Milwaukee, WN and marketed under the trade name of Milorganite. Milorganite has been sold mainly to turf growers since the 1920s. Approximately 55,000 tons of Milorganite is sold each year through fertilizer distributors. Milorganite is a quality product and has gained public acceptance over a long period of time.

Granulite

SYNAGRO owns and operates several heat drying facilities on the East Coast and markets approximately 180,000 dry tons of pelletized biosolids product annually. The market for the pellets include bulk delivery to agriculture through blended fertilizer, commercial-retail/specialty markets (golf courses, lawn and garden shops, chemical, etc.) and direct application of bulk product to agriculture (generally citrus trees). SYNAGRO has marketing alliances with many of the leading fertilizer companies throughout the U.S. which allows the company various marketing alternatives for Granulite products. The largest market for Granulite products is bulk sale to agriculture. However, sale prices for bulk material are generally less than the company receives from fertilizer blenders and commercial retail markets.

Potential Uses and Markets

Pelletized biosolids can be utilized in two market categories; fertilizer markets and non-fertilizer markets.

Agriculture market. This market is generally limited to non-food crop agriculture, where slow release organic nitrogen would provide economic benefits. The crops would include orchard crops and vineyards.

Horticulture. This market includes nurseries, home gardeners, landscapers, and golf courses.

Construction Materials. Dried biosolids can be used in the manufacture of light-weight aggregate products.

Fuel Energy Product. Dried pellets have a BTU value of approximately 6,000 per pound and can be used as fuel at biomass power generation plants.

Landfill Cover (ADC). As a fail-safe option, when there are no other alternative markets, dried pellets could be used at landfills for alternative daily cover (ADC).

HEAT DRYING BY OTHER SOUTHERN CALIFORNIA WASTEWATER AGEMCIES

Encina Wastewater Authority

The Encina Wastewater Authority (EWA) is a public powers authority (JPA) owned by six agencies; the City of Carlsbad, City of Vista, City of Encinitas, Leucadia Wastewater District, Vallecitos Water District, and the Buena Sanitation District. EWA produces approximately 28,000 wet tons of biosolids annually and currently has a contract to land apply their Class "B" biosolids to agricultural fields in Arizona.

The EWA prepared a "Biosolids Strategic Plan" in March of 2002 to determine it future plan for biosolids management. It was concluded by EWA that a heat drying process best met EWA's biosolids management goals. EWA's 2002 Plan was reviewed as part of this SOCWA study.

Encina's biosolids are currently hauled to Arizona and applied to farmland that is owned and operated by Ag Tech. Ag Tech has been managing biosolids for Southern California wastewater agencies for approximately 20 years.

EWA is pursuing the development of a thermal drying and pelletization facility at their Carlsbad wastewater treatment plant. After several years of study, Encina decided that heat drying was the most desirable technology for the Authority's long-term biosolids management program.

Construction of the heat drying facility is scheduled to begin in 2006 and completion is scheduled for late 2007. EWA is also planning to update its pelletized biosolids marketing study next year.

City of Corona

The City of Corona has recently completed a biosolids thermal drying system at the City's wastewater treatment plant. The thermal dryer has a capacity of approximately 110 wet tons per day and

will use waste heat from a new electric co-generation plant to dry the biosolids. The City currently produces approximately 60 wet tons of biosolids per day.

Corona's facility has been completed and should be operating on a limited basis in August 2005. The facility cost approximately $10 million and is not located within a building. Initially, the facility will be operated with City personnel.

Corona will select a private contractor to manage the dried biosolids that will be produced at the thermal drying facility. The City will initially pay a private contractor to manage the pelletized biosolids and is hopeful that it can eventually develop a local market for the pelletized product to offset production costs.

HEAT DRYING PELLETS - SUMMARY

The market for dried pellets may also be limited. The City of Corona will initially pay to have their product removed and marketed. It is recommended that SOCWA observe the evolution of the marketing of the pellets at EWA and the City of Corona to determine the future market for this product.

REFERENCES

Slivka, D.C., McClure, T.A., Buhr, A.R., and Albrecht, R., (1992). Compost: United States supply and demand potential. Biomass and Bioenergy 3 (3-4): 281-299.

INTRODUCTION

Chapter 6 included a discussion of a wide range of biosolids treatment and disposal/reuse options. Eleven different treatment alternatives were considered including anaerobic digestion as a base-case. Six disposal or reuse options were discussed. Of these, alternative daily cover at the Prima Deshecha Landfill was eliminated. Representatives of the County of Orange have indicated that they are not interested in using biosolids for the alternative daily cover.

On May 25, 2005, Workshop No. 1 was held to discuss the preliminary matrix of treatment and disposal/reuse options. The participants at Workshop No. 1 agreed that SOCWA should maintain a minimum of three disposal/reuse options available for each treatment plant. This is currently available at each plant through the availability of the following three disposal options for the dewatered solids:

- Haul by SOCWA truck to the Prima Deshecha Landfill.
- Contracted hauling/disposal by SYNAGRO to either land application (not available for J.B. Latham Plant) or composting at the Corona facility.
- Contracted hauling/disposal by Waste Markets to landfills in Arizona.

It may be desirable to have more than three options when (1) one or more disposal contracts are nearing the end of term or (2) one or more disposal options have availability issues (e.g. Prima Deshecha Landfill closure during wet weather events).

The alternatives were ranked based on twelve criteria. The criteria were given a weighting factor, and a total score was developed. From this procedure, a reduced matrix of biosolids management scenarios was developed. This resulting matrix is presented in Table 10.1.

It should be noted that the current biosolids management approach using anaerobic digestion and centrifuge dewatering could still be utilized to meet the goal of a minimum of three disposal/reuse options. This approach simply requires the procurement of additional contracts with private biosolids firms for disposal/reuse in combination with continued hauling to Prima Deshecha Landfill. However, there is a growing tendency among these private contractors to require a minimum guaranteed daily disposal rate. An example is SOCWA's recent contract with SYNAGRO for the proposed South Kern County composting facility. SOCWA has guaranteed to ship an average 25 wet tons per day to this facility when it begins operation.

Chapter 8 presented a summary of past reports prepared for SOCWA concerning

Table 10.1 Biosolids Management Scenarios

Plant/Treatment	Disposal Option				
	Landfill	Class B Land	Class A Land	Compost Class A	Reuse
J.B. Latham					
Anaerobic Digestion	√			√	*
Phased Digestion	√		√		
Heat Drying	√				√
Regional Treatment Plant					
Anaerobic Digestion	√	√		√	*
Phased Digestion	√		√		
Heat Drying	√				√
Plant 3A					
Anaerobic Digestion	√	√		√	*
Thermophilic Digestion	√		√		
Prima Deshecha Compost Facility	√		√		√

* Contracts with private firms such as EnerTech.

modified biosolids treatment. The potential facilities identified are applicable to the above matrix. The advanced digestion options, phased digestion or thermophilic digestion, would produce a Class A biosolids. It is assumed that conversion to advanced digestion would only be done if needed for Class A land spreading. For this reason, the available Class B land spreading option was not noted in the matrix for advanced digestion treatment. This chapter discusses the matrix by treatment plant and the proposed SOCWA composting facility that would be located at the Prima Deshecha Landfill.

J.B. LATHAM WASTEWATER TREATMENT PLANT

The J.B. Latham Wastewater Treatment Plant (JBLTP) currently produces 23.6 tons per day (wet) of biosolids. The ultimate biosolids production is projected to increase to 27.1 tons per day. The biosolids are anaerobically digested and dewatered by centrifuges.

Anaerobic Digestion

There are four anaerobic digesters. Two 45-foot diameter digesters were constructed in 1971 and two 65-foot diameter digesters were completed in 1974. The larger digesters (Nos. 1 and 2)

are being retrofitted with new covers and internal pump mixed systems. This construction is expected to be completed around the end of 2005. The digester volumes are summarized in Table 10.2. These volumes have been used to determine the feasibility of meeting Class B biosolids with all four units in operation.The current volume of primary sludge and thickened waste activated sludge is about 86,000 gallons per day. When the con-struction project is completed, all four digesters will provide an active volume of 1,619,000 gallons. This would provide over 18 days of hydraulic detention time. With one of the larger digesters out of service, the detention time drops to about 12 days. This is lower than the Class B requirements. Unless the other available options discussed below are implemented, options that will accept the non-Class B biosolids need to be maintained.

Considering the existing quality, the disposal options available for the JBLTP include the Prima Deshecha Landfill, private contractors for composting and landfilling (including the existing contract for the SYNAGRO South Kern Industrial Center (SKIC) composting facility), private contractors for further processing / beneficial reuse (such as EnerTech) or the proposed Prima Deshecha Composting Facility.

Phased Digestion

The Preliminary Design Report-Miscellaneous Digester Upgrade Project identified the potential location and costs to implement phased digestion. This alternative would provide for Class A biosolids. In addition to the landfill, implementation of phased digestion would allow disposal at Class A or Class

B sites in California and Arizona. As discussed in Chapter 4, Class B land spreading is approaching an effective ban in California due to County ordinances and local land use restrictions. There is currently sufficient capacity in Arizona for land spreading of either Class A or Class B biosolids.

Heat Drying

The report *Evaluation of Onsite Thermal Drying Facilities for Biosolids,* March 2005, concluded that heat drying could be implemented in the existing solids dewatering buildings. The resultant product would meet Class A biosolids requirements. The product could

Table 10.2 Existing Digester Volumes

	Dig. 1	Dig. 2	Dig. 3	Dig. 4
Operating Volume (cf)	79,639	79,639	28,628	28,628
Cone Volume (cf)	9,955	9,955	3,181	3,181
Total Volume (cf)	89,594	89,594	31,809	31,809

be bagged for reuse. The product could also be disposed of at the landfill or by land spreading at sites requiring either Class A or Class B. The report did not include discussion of pelletizing the dried material. The volume of the dried biosolids would be reduced to 20 percent of the wet cake volume.

REGIONAL TREATMENT PLANT

The Regional Treatment Plant (RTP) currently produces 42.6 tons per day (wet) of biosolids. The ultimate biosolids production is projected to increase to 53.1 tons per day. The sludges include primary and waste activated sludge from the Coastal Treatment Plant and waste activated sludge from the El Toro Water District Water Reclamation Plant. The biosolids are anaerobically digested and dewatered by centrifuges.

Anaerobic Digestion

The RTP biosolids meet Class B requirements. Disposal options include the Prima Deshecha Landfill, private contractors for composting, landfilling and Class B land application (including the existing contract for the SYNAGRO South Kern Industrial Center (SKIC) composting facility), private contractors for further processing/beneficial reuse (such as EnerTech) or the proposed Prima Deshecha Composting Facility.

Phased Digestion

The report *Advanced Digestion Process Evaluation,* June 2002 identified phased digestion as a viable process at the RTP. The process would be operated in an acid-gas mode. There is the opportunity to produce Class A biosolids. This would increase disposal options to those discussed for the JBLTP.

Heat Drying

The March 2005 report identified a drying project at the RTP similar to the JBLTP. The same disposal options would exist as discussed previously for the JBLTP.

PLANT 3A

Plant 3A also processes sludges by anaerobic digestion followed by centrifuge dewatering. The dewatered cake is handled by smaller roll-off bins as compared to trailers. The current biosolids production is 7.3 tons per day. This could increase to an ultimate production of 8.4 tons per day.

Anaerobic Digestion

The anaerobically digested biosolids at Plant 3A currently meet Class B requirements.

Thermophilic Digestion

The June 2002 report identified thermophilic digestion as a potential process to produce Class A biosolids. Phased digestion would probably not be

capable of producing Class A biosolids. There are only two digesters. Phased digestion would require multiple tanks for a Class A product. There is no space for additional processes or structures.

With thermophilic digestion, the biosolids could be disposed of at the landfill or at Class A site. The disposal options would identical to the other two plants for phased digestion.

PRIMA DESHECHA COMPOSTING FACILITY

The proposed composting facility would provide additional pathogen reduction for the biosolids produced by any of the three plants. The resultant product is expected to meet Class A requirements suitable for reuse. The facility is being planned for a capacity of 110 tons per day. Half of this capacity would be owned by the Orange County Sanitation District. The remaining capacity for SOCWA plants would be 55 tons per day.

The volume of the compost product would be greater than the dewatered biosolids. However, the mass would be less. The compost could be reused locally as discussed in Chapter 9. Alternatively, it could be disposed of at the landfill or by Class A land spreading.

MANAGEMENT SCENARIOS

Scenario Development

Management options for SOCWA can be broken down into a series of management scenarios. Figure 10.1 represents the simplest of the scenarios (Management Scenario No.1). This scenario assumes no modification of the existing solids treatment at the SOCWA facilities. The capability of the existing anaerobic digestion system at each treatment plant defines the classification of the biosolids. SOCWA can continue to pursue private contracts for composting, landfilling, Class B land application (RTP and 3A only) and further treatment/reuse. This option reflects the 25 tpd commitment to the Synagro SKIC composting facility. This option also includes the continued disposal of 12 tpd at the Prima Deshecha Landfill. It should be noted that this scenario is referred to in Chapter 11 as Management Scenario No.1 for the private contracting for composting, landfilling and land application and Management Scenario No.4 for the private contracting for further treatment/reuse.

One element missing from the Figure 10.1 is the disposal of biosolids through partnering or contracting with another public agency. An example would be contracting for capacity at the joint IEUA/LACSD Compost Facility. This has not been included as SOCWA staff is not currently aware of any opportunities with

any other public agency (other than the proposed joint composting facility with OCSD at Prima Deshecha). Staff will, however, continue to explore this option, especially with IEUA and OCSD.

The second management scenario is based on the development of the Prima Deshecha Compost Facility. This scenario is depicted in Figure 10.2 (Management Scenario No.2). It is noted that the anticipated capacity of the Prima Deshecha Compost Facility is 55 tpd. This leaves over 25 tpd to be handled through other options (including the 25 tpd commitment to the Synagro SKIC composting facility). Thus Figure 10.2 shows that the remaining solids must be dealt with in a manner similar to the first management scenario depicted in Figure 10.1. This management scenario is subsequently defined as Scenario No.2.

The modification of the anaerobic digestion system at the JBLTP forms the core of the third management scenario. The implementation of acid phased digestion at the JBLTP would allow that facility to produce biosolids that meet Class A requirements. This provides a somewhat wider array of disposal options as the biosolids could be used for Class A rate land applications. Figure 10.3 shows the third scenario schematically (Management Scenario No.3). Land application of the biosolids from the JBLTP is currently not possible as the facility does not produce Class B biosolids. It should be noted that this management scenario does not include the implementation of acid phase digestion at the RTP or thermophilic digestion at Plant 3A. The production of Class A biosolids through advanced digestion at all facilities is not seen as currently offering a significant economic advantage to SOCWA at this time. However, the flexibility will be maintained to consider this option in the future. The implementation of phased digestion at the JBLTP is described as Scenario No.3 in Chapter 11.

The fourth management scenario as described previously is the same as Management Scenario No.1 except for an emphasis on disposal by private contracting through a firm that provides specialized treatment and reuse of biosolids (such as EnerTech).

The fifth management scenario is described in Figure 10.4 (Management Scenario No.5). This scenario was based on the implementation of heat drying at a SOCWA treatment facility. As noted it has been determined that there is not sufficient space to construct a heat drying facility at Plant 3A. It should also be noted that it would also not be appropriate to construct a heat drying facility at both the JBLTP and the RTP in the near future. SOCWA has contracted with Synagro to handle 25 tpd of solids for the next 10 years at the SKIC Composting Facility. SOCWA would not be able to meet the guaranteed delivery to SKIC facility if heat drying was

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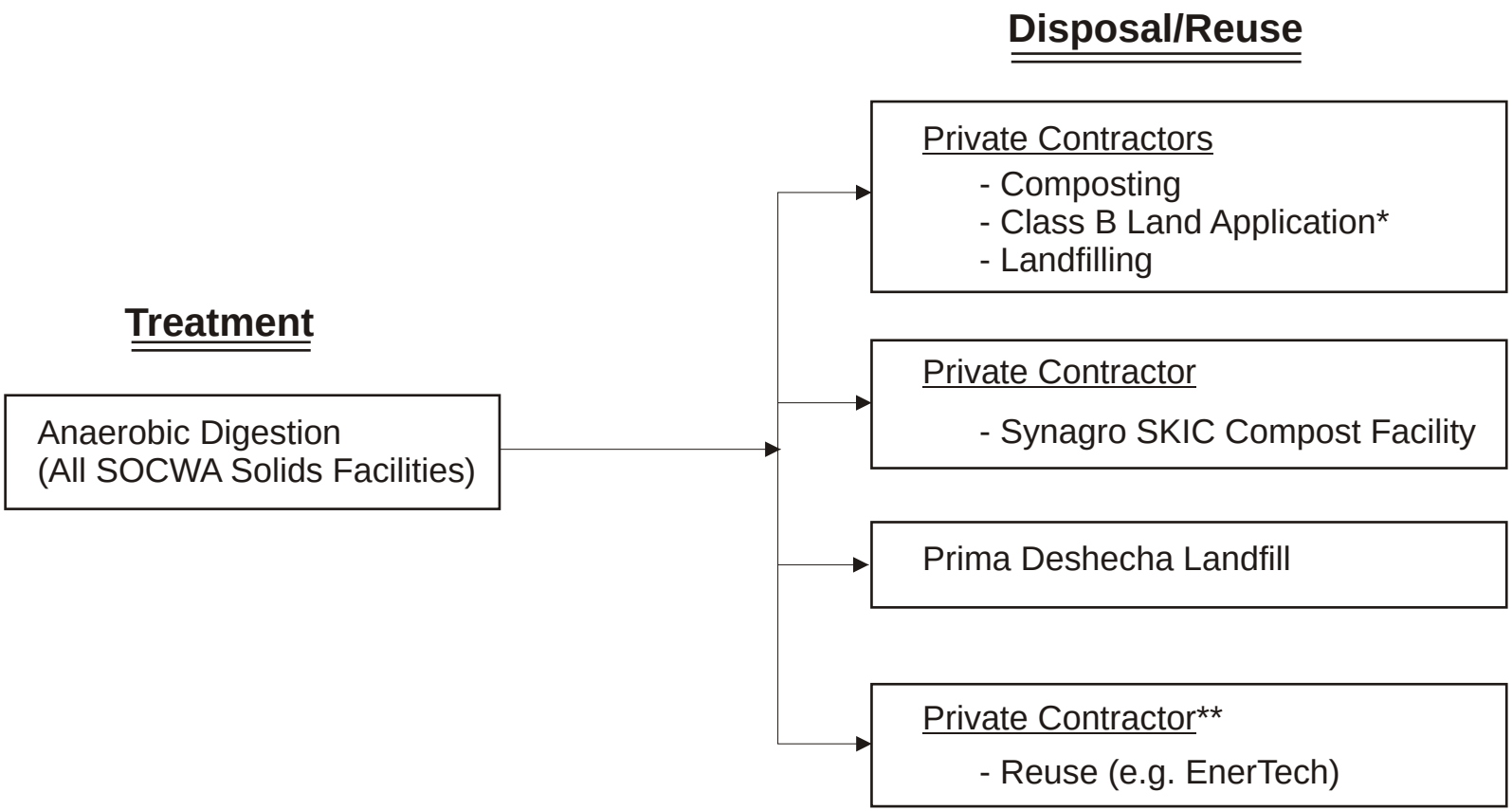

* Class B Land Application only for RTP and 3A Biosolids
** Management Scenario No. 4 focuses on the use of a private reuse contractor.

MANAGEMENT SCENARIO NO. 1 - NO TREATMENT MODIFICATION

FIGURE 10.1

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

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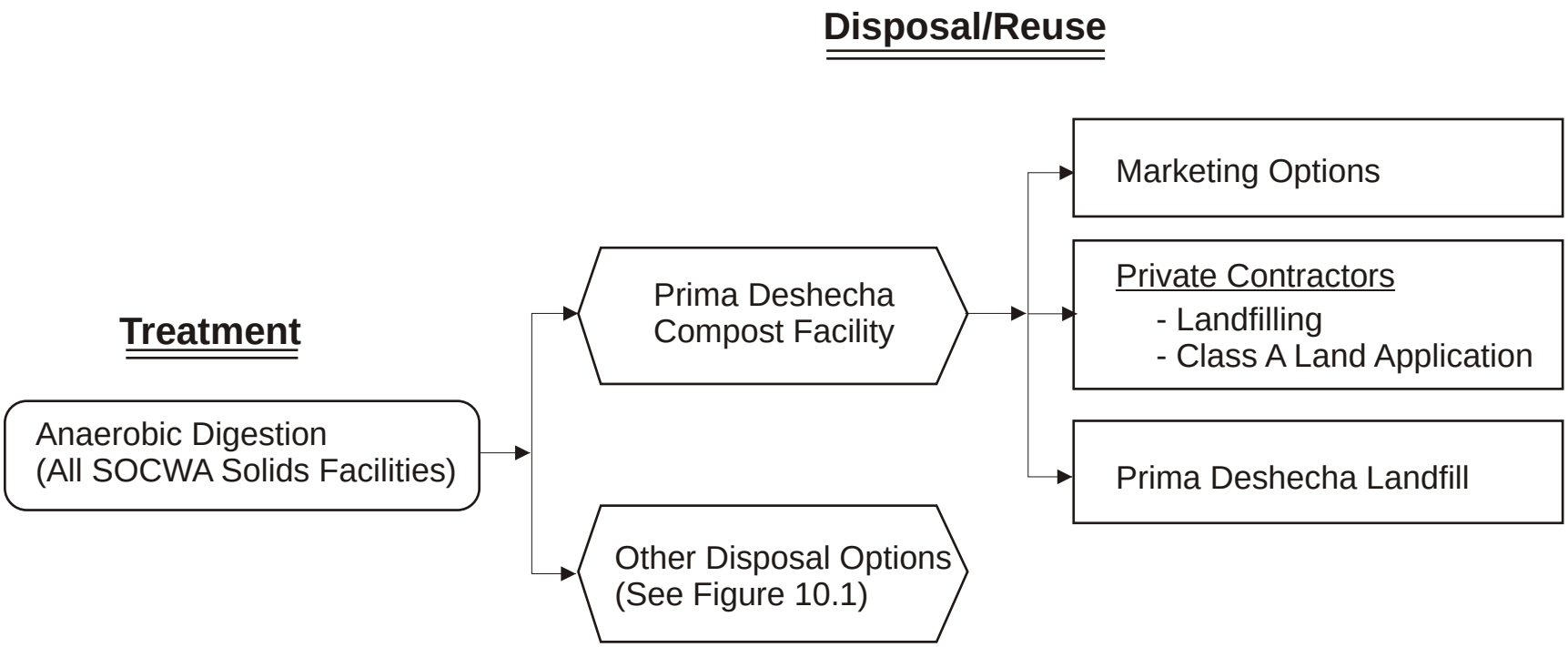

MANAGEMENT SCENARIO NO. 2 -
PRIMA DESHECHACOMPOST FACILITY

FIGURE 10.2

SOCWA
South Orange County Wastewater Authority
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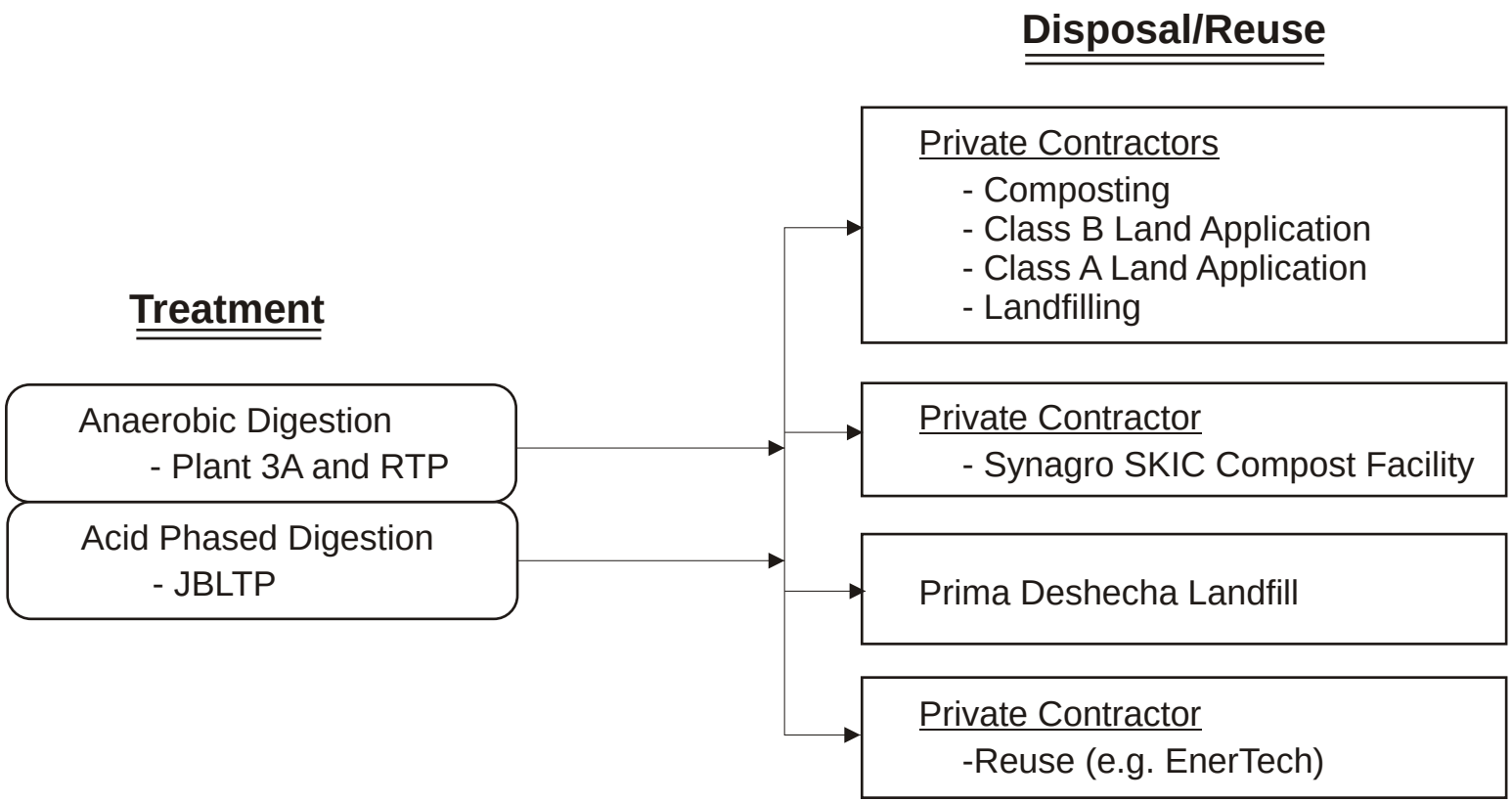

MANAGEMENT SCENARIO NO. 3 - PHASED DIGESTION

FIGURE 10.3

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

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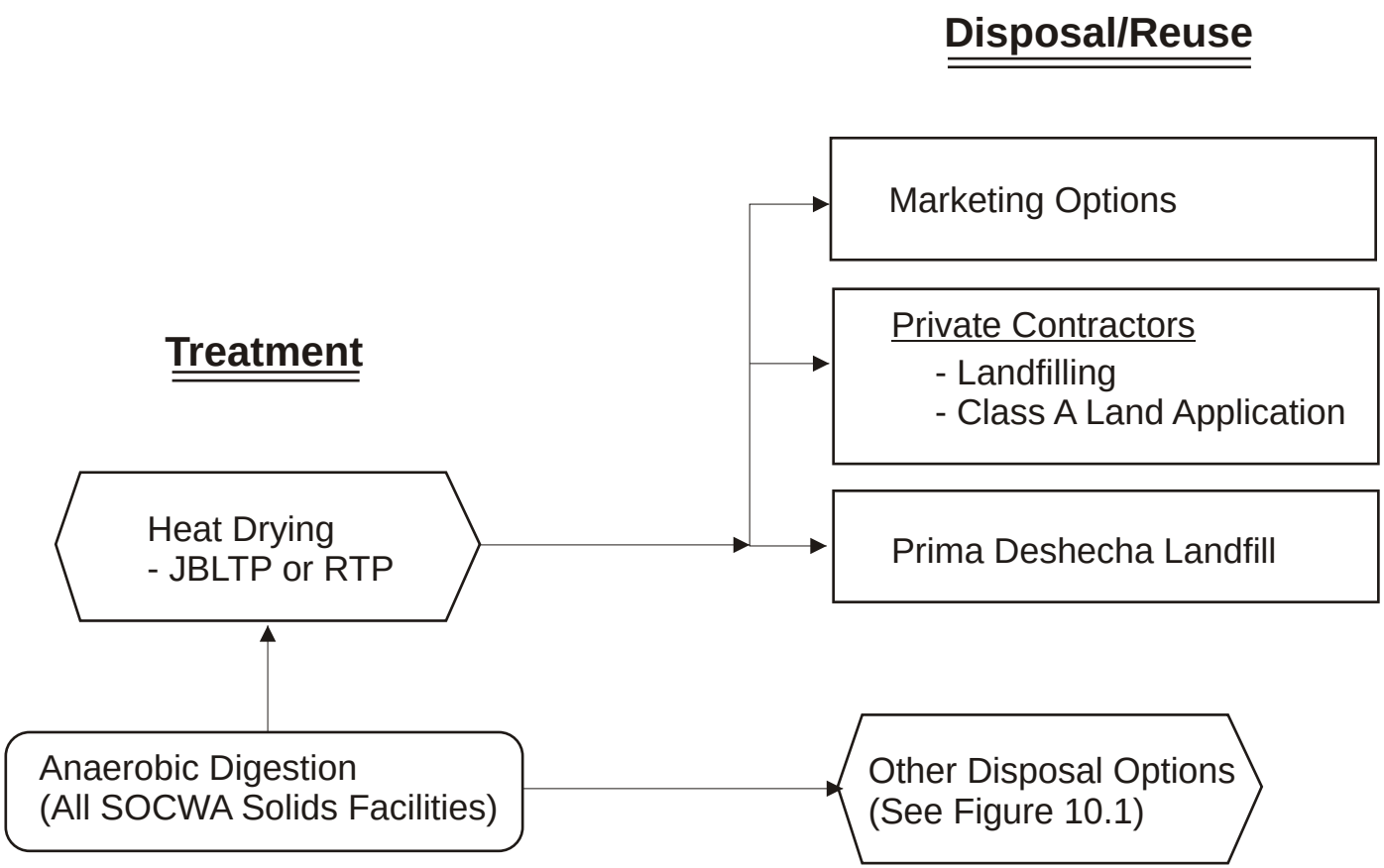

MANAGEMENT SCENARIO NO. 5 - HEAT DRYING

FIGURE 10.4

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
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implemented at the two larger facilities. The implementation of heat drying at either the JBLTP or the RTP is described as Scenario No.5 in subsequent chapters.

Maintaining Multiple Disposal/Reuse Options

One of the goals stated in Chapter 2 was that a minimum of three disposal options must be maintained for each treatment facility. The Biosolids Strategic Plan Update has focused on the primary management scenario for long term biosolids handling. However, the evaluation of the management scenarios needs to reflect the need for back-up disposal options.

An example of depth of disposal options is presented in Figure 10.5, which shows a case example based on the implementation of the Prima Deshecha Composting Facility (Alternative 2). The normal operating circumstance shows 55 tpd being handled at the Prima Deshecha Composting Facility; 25 tpd being handled by the Synagro SKIC Compost Facility; and the remainder being hauled to the Prima Deshecha Landfill. Back-up planning is based on the failure of the largest component in normal operation – in this case the Prima Deshecha Composting Facility. Disruption of this facility could be caused by problems marketing the product or political pressure based on neighborhood concerns. The back-up plan is based on hauling the 55 tpd to the Prima Deshecha Landfill. However, this back-up option is probably unfeasible due to the following reasons:

- The landfill is closed to biosolids disposal during wet periods.
- The landfill limits the biosolids according to the ratio with standard refuse.
- SOCWA does not have the trucking capability to deliver this amount of biosolids to the landfill. A temporary trucking contractor would be needed.

Figure 10.5 shows a second back-up plan for the 55 tpd that involves the maintenance of a contractor to provide hauling and disposal (options as shown in Figure 10.1). This back-up contract is apt to be at a premium price as SOCWA will not be able to guarantee a daily, monthly or annual delivery amount.

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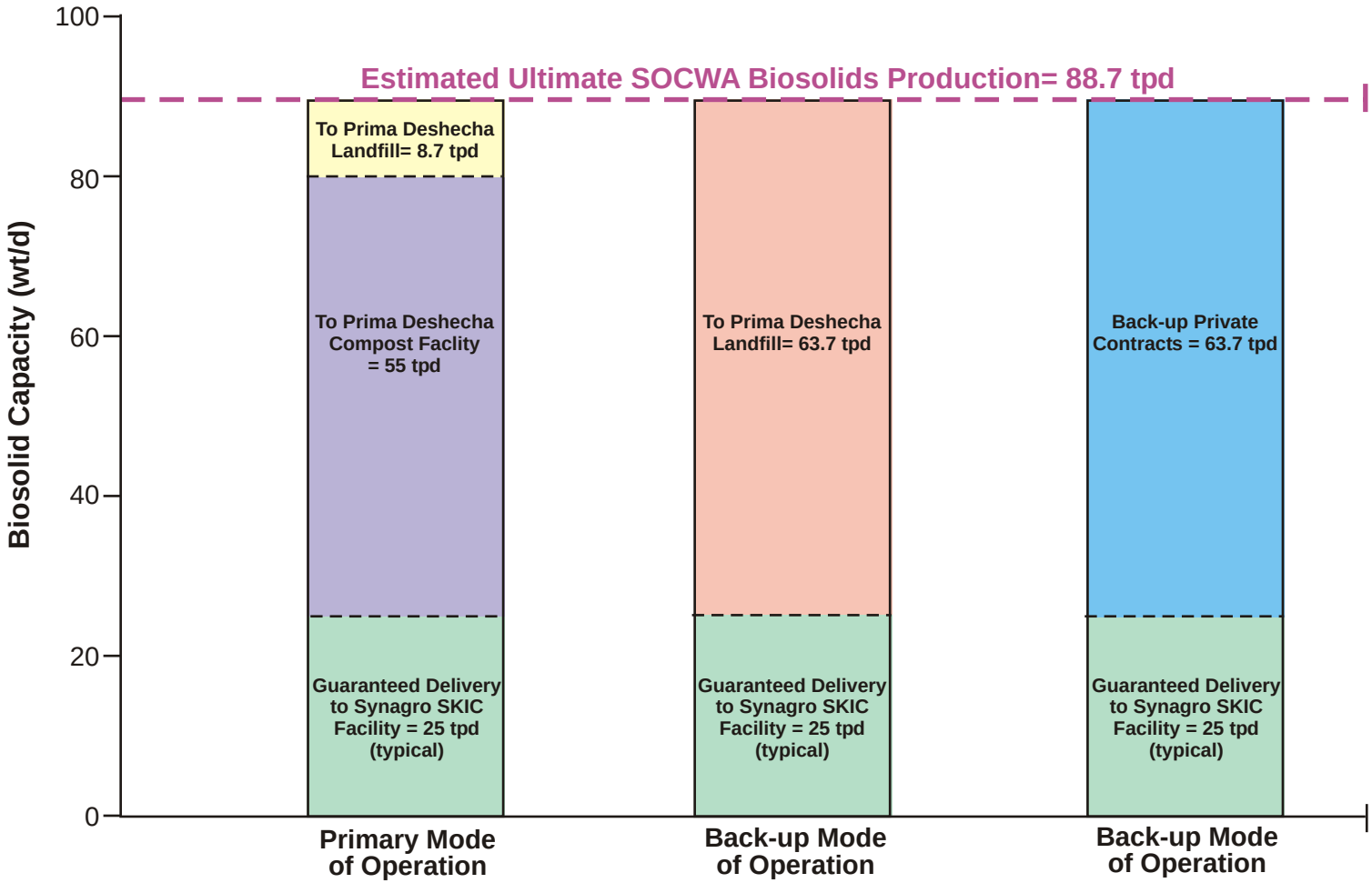

MAINTAINING BACK-UP OPTIONS

FIGURE 10.5

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

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South Orange County Wastewater Authority
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INTRODUCTION

This chapter presents a cost analysis for the biosolids management scenarios identified in Chapter 8. In addition to those alternatives, the privately developed EnerTech facility has been included as an option. This facility will be located in Rialto, CA. The Orange County Sanitation District has recently entered into a contract with EnerTech which is comparable in costs to the Prima Deshecha composting facility. The EnerTech option would not be subject to the future local ordinances restricting land spreading in California.

The costs are presented as estimated capital costs, operations and maintenance costs, and ultimate disposal costs. Lifecycle costs over a 20-year operating period and an equivalent cost per ton are developed.

The cost estimates are from past projects completed by Carollo Engineers and from the biosolids studies completed for SOCWA. These studies were summarized in Chapter 8. Disposal costs are based on current SOCWA contracts and the data compiled in Chapter 6. All costs have been adjusted to today's cost level.

TREATMENT COSTS

This section presents the costs for the treatment options considered at each site. The present value and annualized cost over a 20-year operating period and an effective cost per wet ton of biosolids handled are also estimated. Additionally, alternative treatment methods can result in a reduced amount of biosolids for subsequent disposal so this is also considered. The base case is the current anaerobic digestion system at the three plants therefore only operation and maintenance costs beyond the existing system are considered.

The following assumptions are embedded in the present value analysis:

- Construction and operations and maintenance costs are presented in 2005 dollars.
- Construction costs are incurred in 2005, constructed in 2006 and operational to 2025. The annual cost is based on a 5.75 percent discount rate for capital costs and a 20 year life.
- Biosolids quantities at each plant increase by 3 percent per year from 2004 levels reaching ultimate production levels by 2010 and remaining constant for subsequent years.

J.B. Latham Wastewater Treatment Plant

Alternative treatment options considered for the J.B. Latham Wastewater Treatment Plant (JBLTP) include phased digestion and heat drying.

For phased digestion, the two-phase temperature phased system described in Chapter 7 can be implemented at JBLTP.

Carollo Engineers has had success with this system in the past and believes that it will be the most likely type of phased digestion to achieve a high quality biosolids product that meets Class A standards with minimum odors. Operating experience has shown that implementing phased digestion can increase volatile solids destruction/gas production and improve dewatering performance. For the analysis, a 2 percent increase in volatile solids destruction and no benefit to dewatering were assumed. Construction costs include the construction of a new acid-phase digester and equipment to convert two existing digesters for the thermophilic operation[1]. Operational costs include incremental maintenance and energy costs[2]. The costs and biosolids output are shown on Table 11.1 for comparison with the baseline system.

Heat drying of biosolids can be implemented at JBLTP and operated with the existing dewatering facilities. Thermal drying would produce a 503 Class A product. The volume of the dried product is 20 percent of the dewatered cake volume significantly reducing disposal costs and truck traffic at the wastewater treatment plant. Expected biosolids output from a dryer plant is shown on Table 10.1 for comparison with the baseline system. Construction and operational costs for an on-site dryer facility at JBLTP are also shown on Table 11.1. Operational costs include labor, electricity, natural gas, maintenance, and dust control chemicals for operating the dryer on a 24-hr/5-day schedule.[3]

Table 11.1 J.B. Latham Treatment Cost Estimates

	J.B. Latham WWTP		
	Anaerobic Digestion	**Phased Digestion**	**Heat Drying**
Biosolids Produced*, wtpd	27.1	26.6	6.4
Solids Content, %	22	22	92
Bulk Density, lbs/yard	1600	1600	1180
Capital Cost	-	$2,531,000	$7,800,000
Annual Operating Cost	-	$89,000	$622,000
Total Present Worth Costs	-	$3,620,000	$15,905,000
Annualized Cost		$301,000	$1,275,000
Cost Per Wet Ton		$35	$148

*Current biosolids production, ultimate production increases by 15% achieved by 2010.

[1] Capital cost estimated from the *Preliminary Design Report-Miscellaneous Digester Upgrade Project* (SOCWA, 2003). Escalated to 2005 values.

[2] Operational costs estimated from the *Advanced Digestion Process Evaluation Report* (SOCWA, 2002). Cost for operating the two-phase temperature phased digestion assumed equivalent to temperature phased digestion as defined in this report. The operational cost of standard anaerobic digestion was subtracted to present the cost differential. Escalated to 2005 values.

[3] Costs from *Evaluation of Onsite Thermal Drying Facility for Biosolids* (March, 2005). Operating costs (electricity, natural gas and chemicals) were adjusted for expected biosolids production at JBLTP.

Regional Treatment Plant

The biosolids treatment alternatives applicable for the Regional Treatment Plant (RTP) are phased digestion and heat drying.

Implementing two-phase temperature phased digestion at RTP would also be feasible and deliver the greatest benefits of alternative digestion systems. While the cost is not directly estimated in the SOCWA reports, it is assumed that the system proposed for JBLTP can be

scaled for implementation at RTP. The construction cost would include the development of a new acid phase digester and conversion of existing digesters to thermophilic operation.[4] Incremental operational costs are also estimated.[5] Cost and output estimates are shown on Table 11.2.

The cost of developing a heat drying facility at RTP is also estimated6. Construction and operations cost along with biosolids production are shown on Table 11.2.

Table 11.2 Regional Treatment Plant Treatment Cost Estimates

	Regional TP		
	Anaerobic Digestion	**Phased Digestion**	**Heat Drying**
Biosolids Produced*, wtpd	53.1	52.1	12.6
Solids Content, %	22	22	92
Bulk Density, lbs/yard	1600	1600	1180
Capital Cost	-	$4,954,000	$10,800,000
Annual Operating Cost	-	$77,000	$827,000
Total Present Worth Costs	-	$5,742,000	$21,546,000
Annualized Cost		$492,000	$1,731,000
Cost Per Wet Ton	-	$30	$103

*Ultimate biosolids production, achieved by 2010.

[4] Capital costs for JBLTP system from the *Preliminary Design Report-Miscellaneous Digester Upgrade Project* (SOCWA, 2003) scaled by the amount of biosolids production at RTP.

[5] Operational costs estimated from the *Advanced Digestion Process Evaluation Report* (SOCWA, 2002), assumed equivalent to temperature phased digestion at RTP.

[6] Costs from *Evaluation of Onsite Thermal Drying Facility for Biosolids* (March, 2005). Operating costs (electricity, natural gas and chemicals) were adjusted for expected biosolids production at RTP.

Plant 3A

The only treatment alternative feasible for Plant 3A (3A) is thermophilic digestion.

Implementing thermophilic digestion at the plant would involve modifying the existing digesters for higher temperature operation. The capital cost and incremental operational cost for this system are estimated[7] in Table 11.3. No reduction in biosolids production is assumed with implementation of the system. While this is a feasible alternative, there are operational and odor concerns for thermophilic digestion. These factors will need to be considered carefully if Class A biosolids are required in the future. If the Prima Deshecha composting facility is implemented, the 3A biosolids can be processed to Class A without implementing advanced digestion.

Composting

The proposed composting facility at the Prima Deshecha landfill is considered as further treatment for biosolids generated at the wastewater plants.

The proposed facility would compost 55 tons per day of biosolids from SOCWA and 55 tons per day from Orange County Sanitation District (OCSD). The facility would utilize locally generated yard waste for bulking agent to produce 35,000 tons per year of Exceptional Quality/Class A biosolids at 40 percent moisture content.

The cost for constructing and operating the facility were developed in a previous report to SOCWA[8]. It was noted in the report that a large portion (nearly 50

Table 11.3 Plant 3A Treatment Cost Estimates

	Plant 3A	
	Anaerobic Digestion	**Thermophilic Digestion**
Biosolids Produced*, wtpd	8.4	8.4
Solids Content, %	22	22
Bulk Density, lbs/yard	1600	1600
Capital Cost	-	$444,000
Annual Operating Cost	-	$20,000
Total Present Worth Costs	-	$696,000
Annualized Cost	-	$57,000
Cost Per Wet Ton		$21

*Ultimate biosolids production, achieved by 2010.

[7] Costs estimated from the *Advanced Digestion Process Evaluation Report* (SOCWA, 2002). The operational cost of standard anaerobic digestion was subtracted to present the cost differential. Escalated to 2005 values.

percent) of the capital cost is for site stabilization and capital cost might be reduced if a more suitable site could be found. Facility operation costs include labor for 6-day a week operation, equipment, maintenance, electrical and other miscellaneous operating costs. Compost marketing costs are not included. The cost of hauling biosolids from SOCWA facilities to Prima Deshecha was separately computed assuming a truck can haul four 20-ton loads of biosolids from SOCWA facilities to the Prima Deshecha Landfill per day and the daily labor and operating cost for the truck is $550, or a cost of $7 per ton. This is a higher than used in the final feasibility report.

The $550 figure assumes:

1) Burdened labor rate of $50 per hour.
2) Truck maintenance, insurance replacement, etc. at $110 per day.
3) Truck operating costs at $0.50 per mile.
4) Twenty mile average round trip.
5) Up to four trips per day.

Production amounts and costs for operating the proposed composting facility are shown in Table 11.4. Both design alternatives described in the original report are included (Alternative 2 is based on a higher level of automation). The unit cost assumes a 20-year life for the project. The feasibility report assumed a less conservative 30-year life. The feasibility report costs did not include transportation. This is the reason for the higher cost used in this evaluation

Table 11.4 Prima Deshecha Composting Treatment Cost Estimate

	Prima Deshecha Composting Facility	
	Alternative 1	**Alternative 2**
Biosolids Processed, wtpd	110	110
Compost Produced, wtpd	96	96
Compost Solids Content, %	60	60
Bulk Density, lbs/yard	1150	1150
Capital Cost	$25,133,000	$28,096,000
Annual Operating Cost	$1,365,000	$1,381,000
Total Present Worth Costs	$45,079,000	$48,131,000
Annualized Costs	$3,468,000	$3,732,000
Composting Cost Per Wet Ton	$86	$93
Biosolids Hauling Per Wet Ton	$7	$7
Total Cost Per Wet Ton	$93	$100

[8] Cost from Prima Deshecha Composting Facility Feasibility Assessment Report (SOCWA, 2005).

Other assumptions for the costs reported in Table 11.4 include:

1) No cost for bulking agents. This is an important factor that would need to be confirmed prior to implementation.

2) No net cost or credit for marketing the compost product.

3) All products can be reused. No costs for landfill disposal or hauling for land spreading.

4) Inclusion of the higher foundation costs outlined in the feasibility report.

5) No costs for conditions that could be incorporated into the agreement with the County of Orange such as annual rent.

DISPOSAL AND BENEFICIAL USE COSTS

The cost for various biosolids disposal and beneficial use options were discussed in Chapter 6. The current costs and capacities for the various options are reviewed below.

Landfill

SOCWA has a long-term contract for disposal of biosolids at Prima Deshecha landfill. The gate fee for disposal at the landfill is $27 per wet ton. The approximate disposal capacity of 12 wet tons per day is based on historical disposal records. As discussed in previous chapters, disposal is limited by the available solid waste to achieve a ten to one ratio of refuse to biosolids. The biosolids cannot be disposed of in wet weather. The historical disposal rate will be used in overall cost projections. The goal is to maximize this low cost disposal option.

SOCWA must transport biosolids from the treatment plants to the landfill on a daily basis. Biosolids are hauled in 20-ton loads by truck to Prima Deshecha at an estimated cost of $7 per wet ton as described for the composting facility.

Alternative landfill disposal in Arizona would involve greater hauling distances and higher costs. It is estimated that the total cost for landfill alternatives is $56 per wet ton including transportation. Table 11.5 shows the estimated cost for landfill disposal.

Table 11.5 Landfill Disposal Cost Estimates

Landfill	Prima Deshecha	Backup Landfill Simi Valley or Arizona
Disposal Capacity, wtpd	12	-
Disposal Fee	$27	-
Transport Cost	$7	Included
Total Cost	$34	$56

Class B Land Application

Class B land application sites are available in some California locations although the future of this practice is being limited by county ordinances. In effect, land spreading of Class B biosolids in California is not a viable option. Additional sites in Arizona are available for Class B land application. Many of the land application operators charge flat management fee for land application that includes transportation and the current market rate seems to be $40 - $45 per ton but has been rising recently due to higher fuel costs. These costs were reported in Chapter 6. For operators that do not include transportation, the transportation cost is estimated as $700 for 10-hr round trip with a 20-ton truckload of biosolids to most California or Arizona sites, or an estimated cost of $35 per ton. Table 11.6 shows land application operators with sites that have disposal capacity and include the disposal and transportation fees.

Class A Land Application

Class A Land Application is available at all sites that allow Class B application. It is anticipated that some of the sites listed may require Class A biosolids in the future if mandated by county ordinance.

Compost Class A Facilities

Several private composting facilities accept biosolids and process them into a Class A/Exceptional Quality compost product. Some facilities arrange for biosolids transport and include that in the management fee. In the cases where the transport fee is not included, it is assumed as above that transport to Central Valley or Arizona sites will cost $35 per ton. Table 11.7 shows compost facility operators with sites that have capacity.

Table 11.6 Land Application Cost Estimates

Operator	Synagro	Solid Solutions	Tule Ranch	USA Transport	AgTech LLC	Biosolids Management	Avra Gro
Site Locations	Maricopa County, AZ	La Paz Maricopa Yuma Counies, AZ	Kern County, CA Maricopa County, AZ	Kern County, CA	Yuma County, AZ	Maricopa County, AZ	Maricopa County, AZ
Biosolids Accepted	Class A&B	Class A&B	Class A&B	Class A&B	Class A&B	Class A&B	Class A&B
Capacity, wtpy	50,000	450,000	440,000	76,800	300,000	160,000	1M+
Mgmt. Fee	$45	$45	$45	$8.50	$45	$45	$45
Transport Cost				$35			
Total Cost	$45	$45	$45	$43.50	$45	$45	$45

Table 11.7 Composting Facility Cost Estimates

Operator	SYNAGRO	SYNAGRO	SYNAGRO *	San Joaquin Compost	Yakima Co.
Site Locations	Corona, CA	La Paz County, AZ	Kern County, CA	Kern County, CA	La Paz County, AZ
Capacity, wtpy	180,000	180,000	200,000	786,000	300,000
Compost Price, $/yard^3	$7	$7	$7	$4	$0
Management Fee	$41.51	$43.48	$40	$20	$14
Transport Cost			$14	$35	$35
Total Cost	$41.51	$43.48	$54	$55	$49

*Proposed Facility, Not Constructed.

Beneficial Use

Reuse of Exceptional Quality compost or dried biosolids in the local soil amendment market is the preferred management option if facilities are constructed to make these products. Compost would be available at the Prima Deshecha facility and dried biosolids at the treatment plant. Several marketing strategies can be considered and are outlined in Chapter 9. The projected value of these products can be anywhere from $15 per ton to free for pickup at the site. Generally marketing and transport costs increase for higher value off-site markets. For the current analysis, it is assumed that the marketing and transport costs offset the price for the product. This is typically reported by operations in these markets. Therefore, the net disposal cost is assumed to be $0 per ton of product.

EnerTech Energy Facility

Another option for biosolids utilization may become available in the near future in Rialto, CA. EnerTech is planning a conversion facility that will process biosolids and other organics into fuel slurry that can be utilized for energy production. The construction cost for the plant is estimated at $70 million. Currently EnerTech is seeking long-term agreements for biosolids supply in the region for a capacity of 675 tons per day. The minimum contract amount would be 25 wet tons per day. The Orange County Sanitation District is considering executing a contract with EnerTech for a $69.50 per ton management fee including transportation. The Board of Directors has authorized their general manager to execute the agreement. The estimated total cost for a contract with EnerTech for biosolids management is assumed to be $80 per ton for the cost analysis.

OVERALL BIOSOLIDS MANAGEMENT COSTS

This section summarizes the costs for the overall treatment and disposal options. For disposal/reuse costs, existing SOCWA contracted arrangements or the

lowest cost disposal option was selected. The costs are compared in terms of dollars per wet ton of nominal biosolids

production by standard anaerobic digestion. The annualized capital cost and operations and maintenance cost are also shown on a per wet ton basis. The costs are presented in Table 11.8. The disposal/reuse costs include the applicable treatment costs. Anaerobic digestion costs are considered the base case and are not included.

The current biosolids options include a SYNAGRO contract that is due to expire in 2006. This is for Class B land spreading in Needles and Arizona and for the Corona composting facility. The Corona composting facility is scheduled to cease operation in 2008.

From the cost matrix, seeking contracts with other private composting facilities may be the next best option, for example the SYNAGRO South Kern facility, at about $54 per ton. The SYNAGRO facility is expected to produce a product that will not rely on land spreading for final disposal. The next least costly option would be to upgrade to phased digestion at JBLTP to produce Class A or Class B biosolids for land application. This is estimated to cost about $80 per ton. The next option would be a contract with EnerTech for a similar price of about $80

Table 11.8 Biosolids Management Costs[1]

				Disposal / Beneficial Use Option[2]					
Plant/Treatment	**Capital Cost**	**O&M Cost**	**Total Treatment Cost**	**Landfill**	**Class B Land**	**Class A Land**	**Compost Class A**	**Reuse**	**EnerTech**
J.B. Latham									
Anaerobic Digestion	-	-	-	$34			$54		$80
Phased Digestion	$25	$10	$35	$68		$74			
Heat Drying	$76	$72	$148	$156				$148	
Regional Treatment Plant									
Anaerobic Digestion	-	-	-	$34	$45		$54		$80
Phased Digestion	$25	$5	$30	$62		$68			
Heat Drying	$54	$49	$103	$111				$103	
Plant 3A									
Anaerobic Digestion	-	-	-	$34	$45		$54		$80
Thermophilic Digestion	$14	$8	$22	$55		$61			
Prima Deshecha Compost Facility	$59	$34	$93	$122		$127		$93	

1. All costs in $/wet ton
2. Disposal/Reuse costs include applicable treatment costs

per ton, however this does involve some risk since construction of the facility has not begun. Construction and operation of the Prima Deshecha Compost Facility would be an option that would give SOCWA more control over the product and operation costs. Cost would be on the order of $96 per ton with local beneficial reuse. As stated in the SOCWA report, the capital cost of this project may be reduced by selecting a more suitable site and could bring the cost into the range of $80 per ton or lower. Based on costs, heat drying should only be considered as a future option. Production of Class A biosolids is not expected to be required in the near-term. The advanced digestion options, with the exception of phased digestion at JBLTP, are also future options.

Alternative Biosolids Management Plans

Considering the relative costs, several alternative management scenarios have been developed.

Management Scenario No. 1 -- Current Operation

Management Scenario No. 1 serves as an extension of existing operation. There is no modification to the treatment stream. The ability of Plant 3A to produce Class B Biosolids would be confirmed. As discussed previously, an average historical disposal rate of 12 tons per day to the Prima Deshecha Landfill is assumed in the cost estimate. The SYNAGRO South Kern facility or another private composting/Class A land spreading facility would accept the biosolids from JBLTP. The remaining biosolids would be disposed of by Class B land spreading. The estimated costs for Management Scenario No. 1 are presented in Table 11.9.

Table 11.9 Projected Overall Costs-Biosolids Management Scenario No. 1

	Disposal/Reuse Option		
	Landfill	**Compost Class A**	**Class B**
Disposal Location	**Prima Deshecha**	**SYNAGRO South Kern County or Other Private Facility**	**Class B Land Disposal Site**
Disposal Capacity (tpd)	12	25	N/A
Projected Disposal Quantity (tpd)	12	25	51.7
Unit Cost ($/ton)	$34	$54	$45
Annual Cost ($)	$149,000	$493,000	$849,000
Total Annual Management Cost	$1,491,000		
Costs are in current 2005 dollars.			

Management Scenario No. 2 -- Prima Deshecha Composting Facility

Another proposed future biosolids management scheme for SOCWA is presented in Table 11.10. This projection assumes completion and operation of the SYNAGRO South Kern facility and the Prima Deshecha Composting Facility. This option maximizes local beneficial use of biosolids and removes the uncertainty of the future of direct land application of biosolids. The costs for the Prima Deshecha Composting Facility are subject to the unknowns described in Chapter 8.

Management Scenario No. 3 -- JBLTP Class B Biosolids

This alternative assumes that the biosolids produced at the JBLTP meet at least Class B requirements. For the purposes of this evaluation, the costs reflect construction and operation of the phased digestion project. With Class B biosolids, SOCWA could consider the less costly land spreading options in Arizona. Management Scenario No. 3 is presented in Table 11.11.

Table 11.10 Projected Overall Costs-Biosolids Management Scenario No. 2

	Disposal/Reuse Option		
	Landfill	**Compost Class A**	**Beneficial Use**
Disposal Location	**Prima Deshecha**	**SYNAGRO South Kern County**	**Proposed Composting Facility**
Disposal Capacity (tpd)	12	25	55
Projected Disposal Quantity (tpd)	8.7	25	55
Unit Cost ($/ton)	$34	$54	$93
Annual Cost ($)	$108,000	$493,000	$1,867,000
Total Annual Management Cost	$2,528,000		

Costs are in current 2005 dollars.

Table 11.11 Projected Overall Costs-Biosolids Management Scenario No. 3			
	Disposal/Reuse Option		
	Landfill	**Compost Class A**	**Land Application**
Disposal Location	Prima Deshecha	SYNAGRO South Kern County	Arizona Class B Land Spreading
Disposal Capacity (tpd)	12	25	Not Limited
Projected Disposal Quantity (tpd)	12	25	51.7
Unit Cost ($/ton)	$34	$54	$45
Annual Cost ($)	$149,000	$493,000	$849,000
Added Phased Digestion at JBLTP	$346,000		
Total Annual Management Cost	$1,837,000		
Costs are in current 2005 dollars.			

Management Scenario No. 4 -- EnerTech

EnerTech serves as an example in this analysis of emerging private firms that SOCWA could contract with. These firms would haul SOCWA's Biosolids off-site for further treatment and reuse. This option considers the EnerTech facility in lieu of land application in Arizona. This alternative would not rely on any form of land application. This alternative assumes that SOCWA could contract for 51.7 wet tons per day of the 675 wet tons per day facility capacity. The minimum reported amount that EnerTech will consider is 25 wet tons per day. The entire capacity is not contracted for at this time. Further discussions with EnerTech would need to take place. Other private options may emerge in the next few years that would provide cost competition. The costs are presented in Table 11.12.

Table 11.12 Projected Overall Costs-Biosolids Management Scenario No. 4			
	Disposal/Reuse Option		
	Landfill	**Compost Class A**	**Private Disposal**
Disposal Location	Prima Deshecha	SYNAGRO South Kern County	EnerTech
Disposal Capacity (tpd)	12	25	N/A
Projected Disposal Quantity (tpd)	12	25	51.7
Unit Cost ($/ton)	$34	$54	$80
Annual Cost ($)	$149,000	$493,000	$1,510,000
Total Annual Management Cost	$2,152,000		
Costs are in current 2005 dollars.			

Management Scenario Comparison

The costs for the four management scenarios are compared in Table 11.13. Management Scenario No. 1 would result in the lowest annual biosolids management costs. These costs are reported for comparison purposes only. The alternatives are compared further in Chapter 12 as to reliability, permitting, environmental, and other factors

Table 11.13 Biosolids Management Alternative Cost Comparison

Management Scenario	Annual Biosolids Management Cost
No. 1 Current Operation	$1,491,000
No. 2 Prima Deshecha Composting Facility	$2,528,000
No. 3 JBLTP Phased Digestion – Land Spreading	$1,837,000
No. 4 EnerTech	$2,152,000

INTRODUCTION

Chapters 10 and 11 identified four biosolids management scenarios. These alternatives are summarized in Table 12.1.

The Prima Deshecha Landfill was incorporated into each of the management scenarios as it offers the lowest cost disposal option. The landfill contract with the County of Orange runs through 2014. The only limitation is wet weather restrictions and the ten to one refuse to biosolids ratio.

The SYNAGRO South Kern composting facility is included in each option. SOCWA has a contract with SYNAGRO that would require use of the facility when constructed. This site can accept the non-Class B biosolids from JBL. An option that does not require Class B biosolids is an important element of an overall, reliable plan.

Management Scenario No. 1 assumes that the biosolids from JBL would be processed at the SYNAGRO South Kern composting facility. The contracted capacity is greater than the current JBL biosolids production rate. The 3A and RTP biosolids would go to the landfill or a Class B land spreading site. This alternative would result in the lowest annual biosolids management costs.

The key element of Management Scenario No. 2 is the Prima Deshecha Composting Facility. The costs assume no net cost or credit for use or disposal of the product. There would be no land spreading in this scenario.

Management Scenario No. 3 is based on implementation of temperature phased digestion at JBL. This is the only difference from Management Scenario No. 1. It allows the flexibility to dispose of the JBL biosolids at any land application site. The costs are included for the annual

Table 12.1 Biosolids Management Scenario Summary

Manage-ment Scenario	Reuse/Disposal Elements			Annual Biosolids Management Cost
No. 1	Prima Deshecha Landfill	SYNAGRO South Kern	Class B Land Spreading	$1,491,000
No. 2	Prima Deshecha Landfill	SYNAGRO South Kern	Prima Deschecha Compost Facility	$2,528,000
No. 3	Prima Deshecha Landfill	SYNAGRO South Kern	JBL Phased Digestion/Class B Spreading	$1,837,000
No. 4	Prima Deshecha Landfill	SYNAGRO South Kern	EnerTech	$2,152,000

capital cost and the ongoing operations and maintenance costs. This would provide a Class A biosolids, and this would allow land spreading in eastern California or Arizona.

Management Scenario No. 4 considers a potential contract with EnerTech. No capital expenditures would be required by the SOCWA member agencies. There have been preliminary discussions with EnerTech as to contract capacities. The minimum capacity that EnerTech would contract is 25 wet tons per day. The alternative cost estimate considers 55 wet tons per day. Construction has yet to begin as EnerTech has not completed all of the contractual arrangements. Management Scenario No. 4 could include other private management options as they develop in the future.

The other treatment options including heat drying and advanced digestion at the Regional Treatment Plant (RTP) and Plant 3A were not considered in the management scenarios. This was based on projected costs for heat treatment. The advanced digestion processes at RTP and 3A are not required based on the available disposal options. These treatment options need to be retained in planning to allow implementation if dictated by future disposal limitations

SENSITIVITY ANALYSIS

The recommendation of a biosolids management scenario is complicated by the number of assumptions underpinning each scenario. As noted throughout this report the conditions impacting biosolids management in the United States are in flux. A desirable management option in the current state of costs, regulations and politics may be no longer be favorable in the near future. This chapter therefore presents a sensitivity analysis to identify how the comparison of scenarios may be impacted by the change of key factors.

The factors believed to be the most significant in the sensitivity analysis are presented in Table 12.2. It should be noted that most of the factors presented in Table 12.2 are interrelated (e.g. regulatory uncertainty has an impact on cost).

Reuse Market

The reuse market factor focuses on the compost product. The land spreading and landfilling options do not require reuse markets. The ‘beneficial reuse’ concept of a private enterprise such as the proposed EnerTech operation is generally based on a predetermined contractual relationship for that reuse.

Each scenario is impacted by the compost market as each alternative includes SOCWA’s commitment to utilize 25 tons per day of capacity at the proposed Synagro SKIC Composting Facility. This facility is seen largely as

Table 12.2 Significant Sensitivity Analysis Criteria

Criteria	Description
Reuse Market	How does the ability to market compost affect costs and ability to dispose of biosolids?
Regulatory Uncertainty	Is the alternative subject to closure or disruption caused by changes in local regulations?
Political Uncertainty	Could political considerations lead to the loss of a disposal option?
Contractual Uncertainty	Are the SOCWA contracts vulnerable to cancellation?
Cost	How could dramatic cost increases affect the viability of a management option?

taking the place of the Synagro composting facility in Corona that is scheduled for closure in 2008. Therefore, this facility is seen as taking up an existing share of the market. There may be some impact on this facility due to political pressures in Kern County (see discussion below). In any event any market impact on the Synagro facility would be shared equally by the four scenarios.

Marketing of the compost from the planned SOCWA Prima Deshecha Composting Facility may prove challenging due to the many competing sources of compost supply. Local communities did not express an interest in purchasing the compost when contacted as part of the 2003 market survey. The local demand is not much greater than the planned production rate. Compost sales were not considered as a source of revenue in this analysis. The sensitivity of this option could be somewhat dampened by the utilization of an outside facility operator such as Synagro that already has a marketing operation established. Public education regarding the value and safety of biosolids based compost might also help to reduce the sensitivity of the market. The Orange County Sanitation District has embarked on an aggressive compost public relations program in the north and central parts of Orange County.

Management Scenario No. 2 would be most susceptible to the changes in the reuse market due to the dependence of this alternative on composting. It should be noted, however, that a major negative incident in the regional compost market would have a negative impact on all of SOCWA management options as other public agencies would likely turn to private land application and landfilling. This would generate an inflationary impact on regional biosolids management.

Regulatory Impacts

Chapter 4 indicated that new biosolids regulations were not expected in the short term future at either the Federal or State (California or Arizona). However, the trend of county and other local ordinances is expected to continue. Land spreading in California may continue to become more restrictive. This is evidenced by the planned initiative process to ban the land spreading of biosolids in Kern County. This initiative is scheduled for the June 2006 ballot. This ballot may have impacts on the economics of Synagro's SKIC facility. At this time, there is no organized opposition to land spreading of biosolids in Arizona. However, it is reasonable to believe that there may be impacts in the future.

Land spreading will continue to have the highest degree of regulatory uncertainty at the local level. Landfill disposal would not be expected to be affected by new regulations for the foreseeable future although potential legistation may eventually drive requirements to increase landfill diversion rates. Discussions with County of Orange staff have not indicated any inclination towards a biosolids ban at the Prima Deshecha Landfill.

Management Scenario No. 1 is the most sensitive to the regulatory climate. An increase in the number of local bans will increase the cost of other land application and landfill options.

There is a very strong link between regulatory and political impacts as it is typically political pressure that results in local regulations.

Political Impacts

The prior section noted how local political impacts could have an impact on local regulations. This section addresses the influence of political forces on a new facility. Permitting has been completed for the Synago SKIC Composting Facility and the EnerTech Rialto Facility. Therefore, the alternative that appears to be the most vulnerable to local political impacts is the Prima Deshecha Composting Facility. The area surrounding the Prima Deshecha site is currently undergoing development for residential purposes. The implementation of a new compost facility might raise the following concerns:

- Truck traffic to the new compost facility along the Ortega Highway and LaPata Road.
- Aesthetic impacts for new neighbors along the ridgelines surrounding the Prima Deshecha site.
- Integration of the compost facility into landfill closure plans that might include a regional park.

It is believed that each of these items can be mitigated. However, there remains the potential that resistance at either the neighborhood or local government level

(City of San Juan Capistrano) could either delay or stop the construction project.

Contractual Impacts

In Management Scenario No.1 and No.3 contracts with private management firms for land spreading should not be difficult to secure. However, it is likely that these contracts would have cost escalation and termination clauses similar to the Synagro contract for the SKIC facility. These contracts could also limit SOCWA's operation flexibility by having requiring guaranteed delivery quanitities.

The Prima Deshecha Composting Facility in Management Scenario No. 2 will require an agreement with the County of Orange Integrated Waste Management Board. The Board has approved the project as a "Project for Consideration". Potential terms of an agreement, such as initial or ongoing fees, have not been discussed. An additional contract would be required for a private firm acting as contractor.

The EnerTech venture (or other private reuse firm) in Management Scenario No.4 will be vulnerable to the necessary contracts for both the energy and the residual products.

Cost

SOCWA's existing biosolids handling approach to utilize a combination of private contractors with hauling to the Prima Deshecha Landfill has been historically a very cost effective approach. However, these costs have undergone a rapid escalation over the past ten years. Class B land disposal remains the lowest cost option with the exception of the Prima Deshecha Landfill. The land application disposal costs have been estimated at $45 per wet ton, including transportation. The future costs could be impacted by local restrictions to land spreading as discussed in Chapter 4.

In 2002, Carollo Engineers prepared a summary of historical and projected land disposal costs for Southern California agencies. The average unit cost from 1989 through 2002 is shown on Figure 12.1. In the late 1980's, the cost averaged about $40 per ton. This cost continued to drop until 1997. This decrease is probably due to increase in the number of private contractors and disposal sites. Costs then rose significantly from 1997 to 2002. A cost projection was made as part of the mentioned 2002 report. That cost projection is shown on Figure 12.2. The cost projections were based on a review of agency contracts. The projected cost in 2005 was about $41 per ton.

Chapter 6 reviewed private disposal and reuse options. This study identified eight new firms not identified as part of the 2002 Strategic Plan. Of these, many are Class B land disposal options in Arizona. The current management fee for these firms was in the $40 per ton price range. The projected cost shown on Figure 12.2 is very close to actual costs. Not considering other sensitivity criteria, it

would appear that there are sufficient land disposal options available to prevent a major increase in costs for the short term.

There remains significant concern about what will happen to the cost of land application in the long term (5 to 20 years). Over the longer time the cost of land application may undergo a significant inflation due to the impact of local bans and the reduced number of sites. Figure 12.3 presents a cost sensitivity analysis based on changing land application costs. This figure indicates that the costs of the current contracts must almost double before Management Scenario Nos. 2 and 4 become more cost competitive. It should be noted that the disposal costs associated with Management Scenario No.3 (upgrade of digestion at the J B. Latham Treatment Plant) are not different from the disposal costs of Management Scenario No.1. The upgrade in digestion only provides a greater degree of flexibility in terms of procuring private contracts.

Chapter 8 indicated that there were a significant number of unknowns associated with the cost of the Prima Deshecha Composting Facility. Of the alternatives listed in Table 12.2, Management Scenario No. 2 has the greatest degree of uncertainty as to final cost. There are uncertainties as to the ability to market the product. If the compost had to be disposed at the landfill, the added cost to Management Scenario No. 2 would be approximately $475,000 per year. Costs could also increase if the County of Orange added fees to the project such as rent. The cost analysis assumes that bulking agents will be available at no cost. Figure 12.4 provides a cost sensitivity analysis based on the varying cost of the Prima Deshecha Compost Facility. This option is apt to remain the most expensive

alternative in the short term regardless of the outcome of the uncertainties.

The contract amount with Synagro for the South Kern facility was set at $54/wet ton. However, the contract included an escalation clause for the both the varying Consumer Price Index (CPI) and for other potential impacts on the facility. Changes in the SKIC cost will impact each alternative equally. Figure 12.5 shows how variations in the SKIC facility unit cost would impact each of the four alternatives.

Summary

The comparison of the sensitivity of each alternative is very subjective. Table 12.3 is provided as a simplified comparison.

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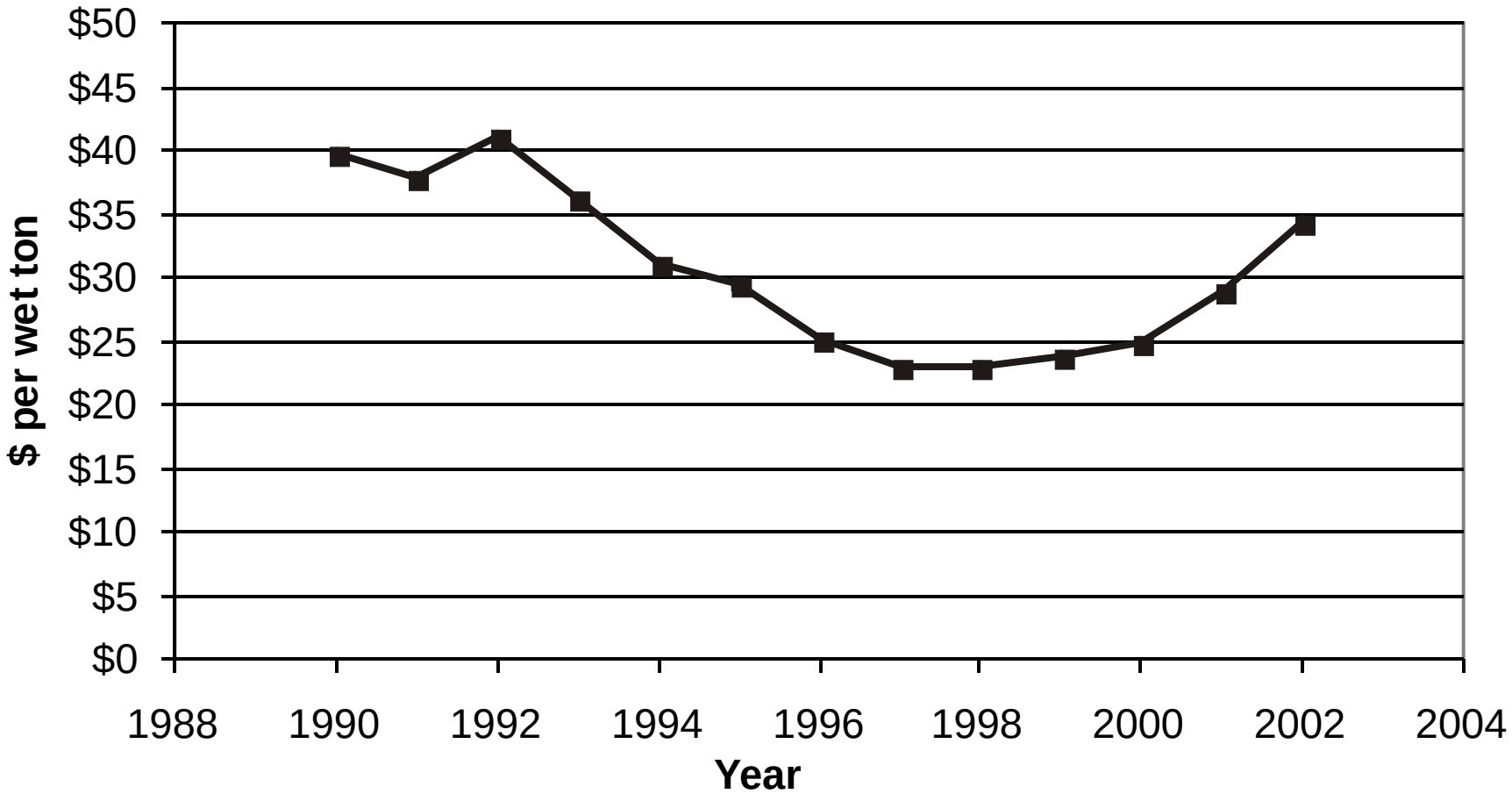


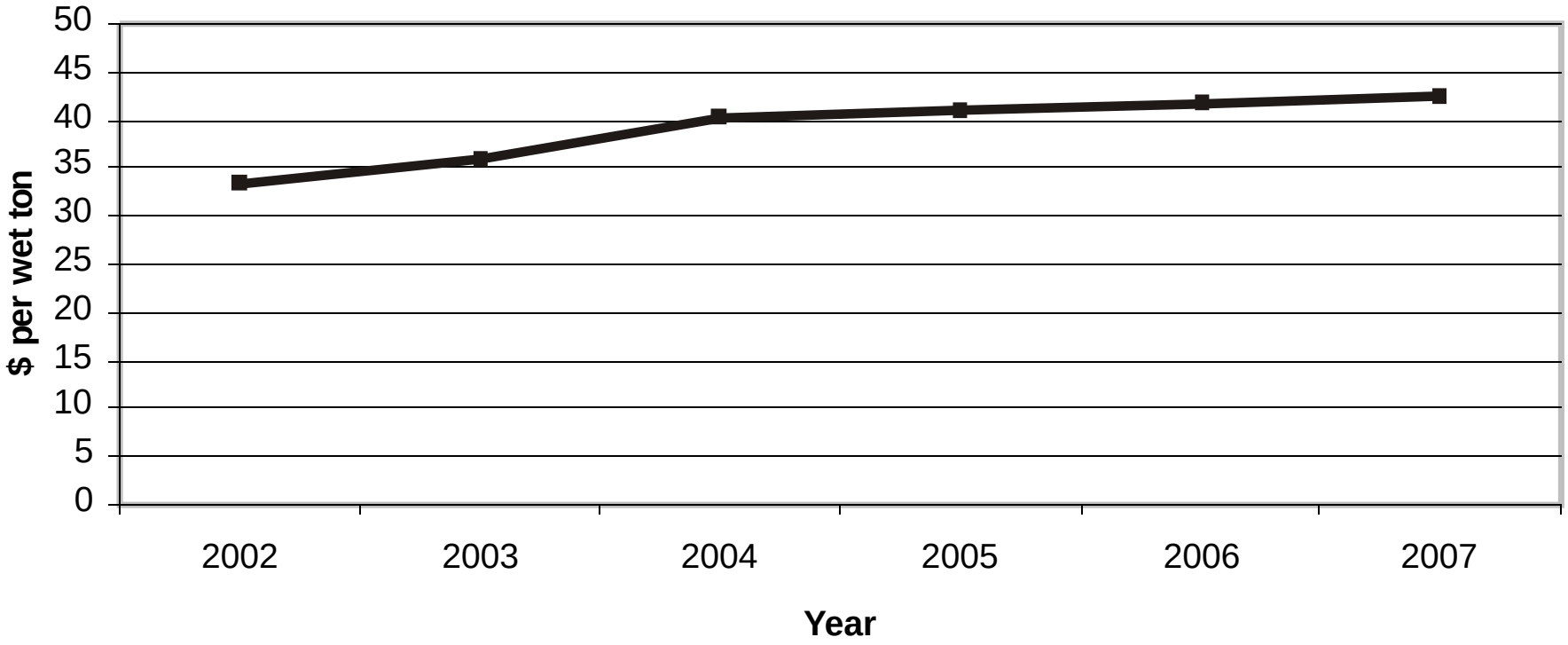
HISTORICAL SOUTHERN CALIFORNIA BIOSOLIDS LAND APPLICATION AVERAGE COSTS

FIGURE 12.1

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

20-SOCWA11-05F12.2-7178A00.CDR



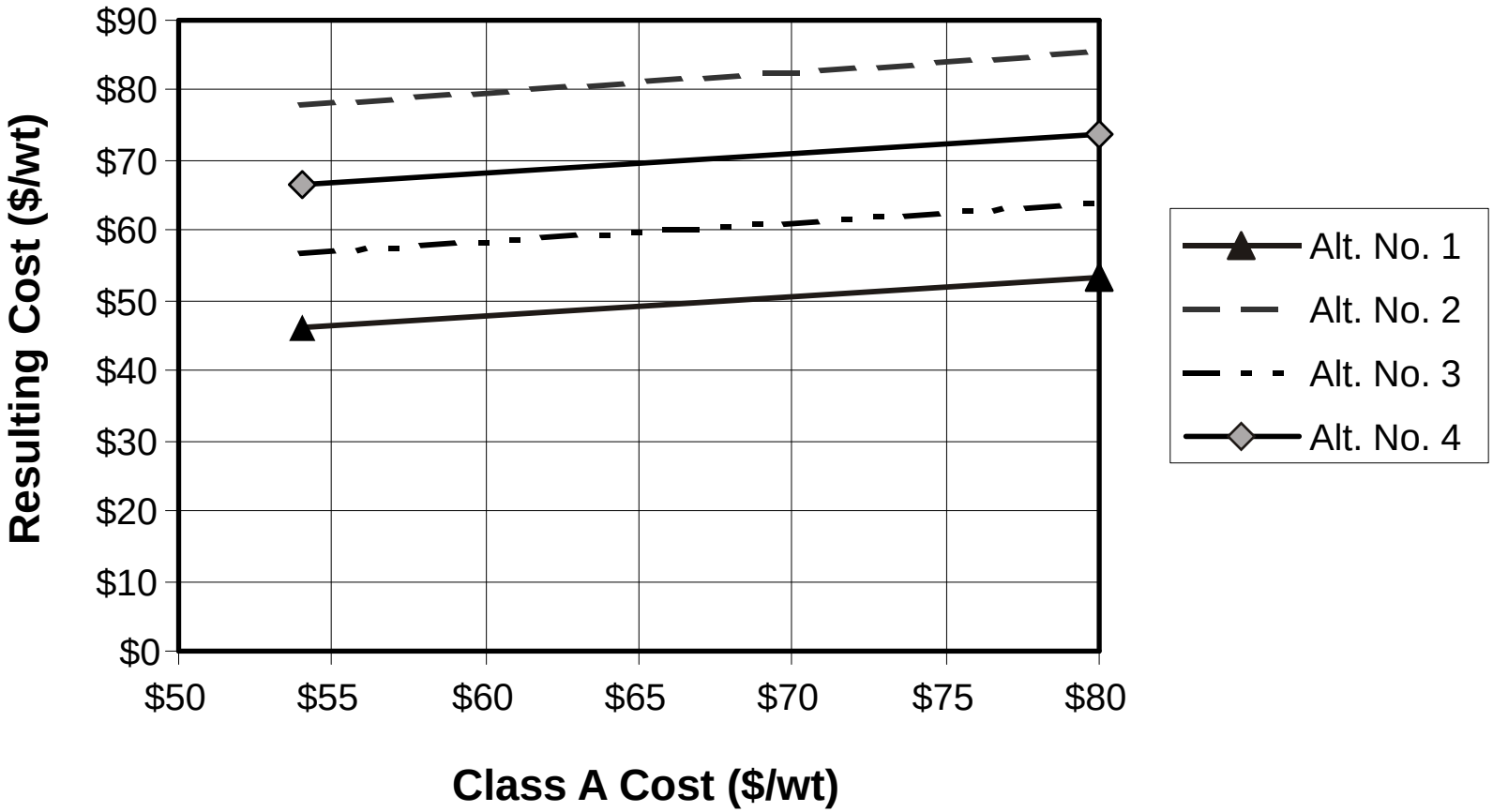
PROJECTED SOUTHERN CALIFORNIA BIOSOLIDS LAND APPLICATION COSTS

FIGURE 12.2

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

20-SOCWA11-05F12.3-7178A00.CDR



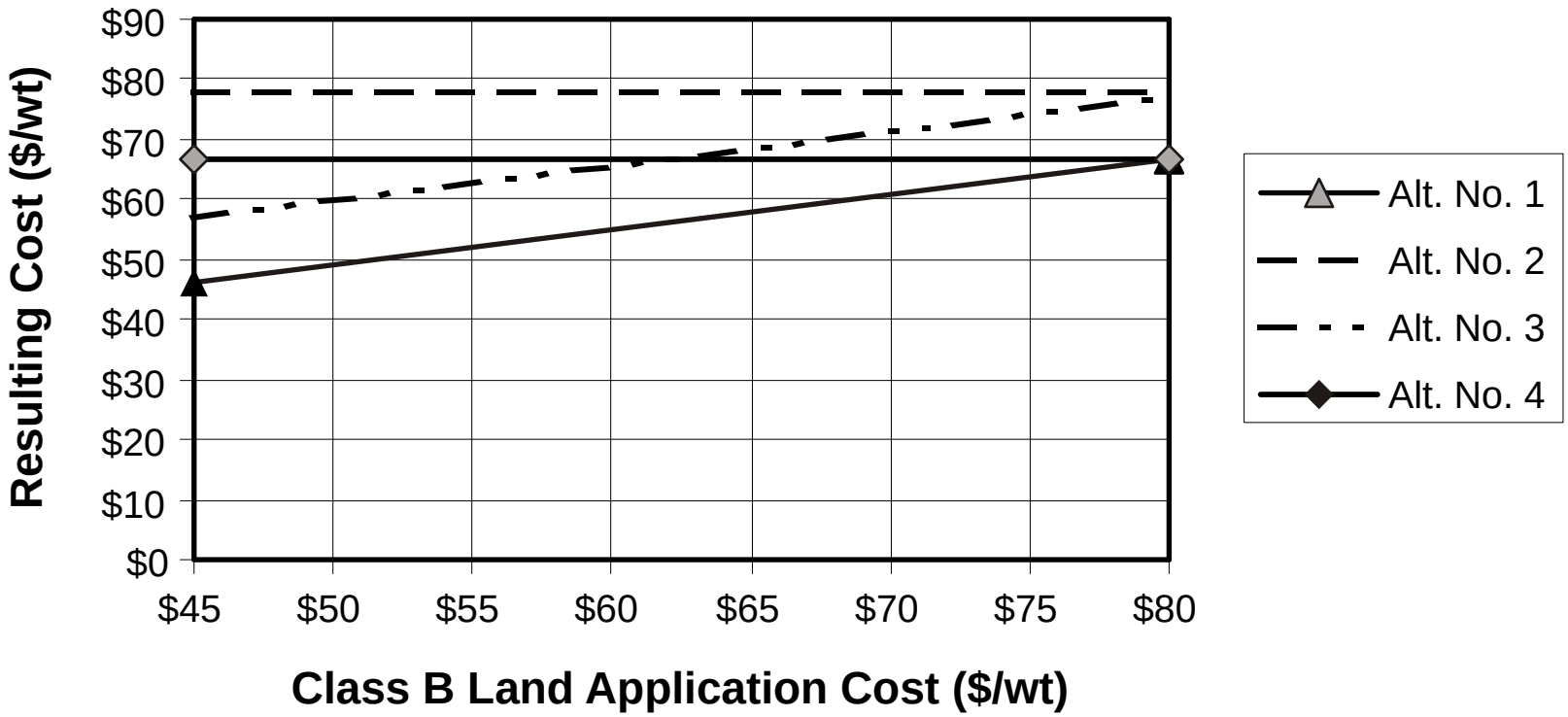
IMPACT OF VARYING SKIC COMPOST COST

FIGURE 12.3

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

20-SOCWA11-05F12.4-7178A00.CDR



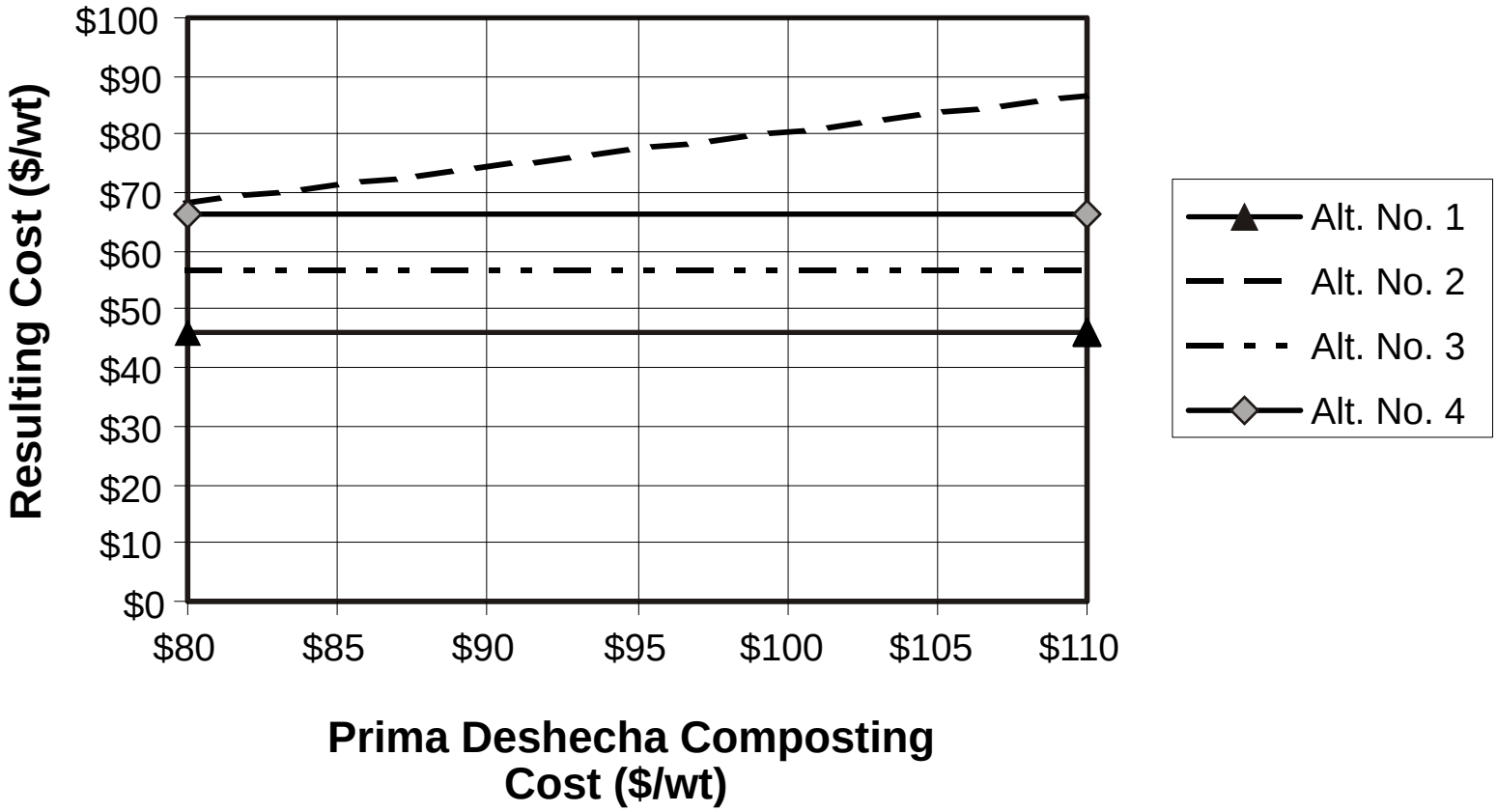
IMPACT OF VARYING CLASS B LAND APPLICATION COST

FIGURE 12.4

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

20-SOCWA11-05F12.5-7178A00.CDR



IMPACT OF VARYING PRIMA DESHECHA COMPOST FACILITY COST

FIGURE 12.5

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
BIOSOLIDS MANAGEMENT STRATEGIC PLAN UPDATE

SOCWA
South Orange County Wastewater Authority
34156 Del Obispo Street • Dana Point, CA 92629

BIOSOLIDS DISPOSAL DIVERSITY

In performing a sensitivity analysis, it is important to understand how the biosolids from each of the plants could be disposed of by each of the available options. The current biosolids production from the three plants is 77.1 wet tons per day. Of this, the MANAGEMENT SCENARIO is produces 23.6 tons per day of non-Class B biosolids. A non-Class B option such as the SYNAGRO South Kern County facility or the SOCWA Prima Deshecha composting facility must be maintained in the mix of management options.

Diversity of disposal options is important in that it insulates SOCWA to some degree from political or market forces that might impact any one disposal option. An example is a management scenario that is focused on land application will be sensitive to the growing trend of local laws that effectively ban land application. Similarly, a management scenario that focuses on composting diversity may be vulnerable to fluctuations in the compost market.

Table 12.4 shows the distribution of disposal options for each management scenario. It should be noted that this table reflects only the primary mode of biosolids disposal. As stated in Chapter 10 it will be necessary to have back-up contracts available to maintain a minimum of three disposal options for each SOCWA facility. The maintenance of back-up contracts for disposal may increase the diversity of disposal methods for each alternative

Table 12.3 Comparison of Management Scenario Sensitivity

Alternative	Reuse Market	Regulatory Impacts	Political Impacts	Contractual Impacts	Cost
No. 1	0	--	-	0	0
No. 2	--	0	-	0	-
No. 3	0	-	-	0	0
No. 4	0	0	0	-	-

Note: 0 is neutral, - is slightly disadvantageous, -- is very disadvantageous

Table 12.4 Disposal Method by Alternative

Management Scenario	Landfill	Composting	Class A or Class B Land Application	Reuse
No. 1 - Anaerobic Digestion /Private Contractor for Reuse	X	X	X*	
No. 2 – Prima Deshecha Compost Facility	X	X		
No. 3 – Upgrade of Digestion at JBLTP	X	X	X	
No. 4 – Anaerobic Digestion /Private Contractor for Reuse	X	X	X*	X

* - Not applicable for J. B. Latham Treatment Plant

CHAPTER 13 EVALUATION AND IMPLEMENTATION OF THE PRIMA DESHECHA COMPOST FACILITY

INTRODUCTION

The development of the Prima Deshecha Compost Facility was set forth in the 2002 Biosolids Strategic Plan as a means for SOCWA to have less dependence on outside private contracts for biosolids disposal/reuse. This project has been subject to various studies in the period between 2002 and 2005. The most significant of these efforts was the Technical Feasibility Study completed by Tetra Tech in 2005. The findings of this study were summarized in Chapter 8 of this report. The Prima Deshecha Compost Facility offers a unique, though costly, biosolids management option for SOCWA and its project partner, the Orange County Sanitation District (OCSD). As Orange County nears complete residential and commercial development there is very little land available for the development of a regional biosolids handling facility within the County. Implementing this facility would to some degree achieve the SOCWA goal of a greater level of control over biosolids management.

However, a final decision regarding the implementation of the Compost Facility is hampered by a series of unresolved issues. Some of the issues may reveal a fatal flow in project development. The key issues include the following:

- Facility Siting. Negotiations between the County of Orange and SOCWA/Orange County Sanitation District resulted in the selection of a site along the perimeter of the Prima Deshecha Landfill. Although the site itself does not overlie refuse it does rest on the fill material along the landfill edge. This is a poor quality site from a geotechnical perspective that resulted in high foundation cost as reflected in the Technical Feasibility Study.

- Geotechnical Evaluation: There is no actual geotechnical test data regarding the proposed site. This resulted in the cost estimate within the Technical Feasibility Study being based on a series of assumptions which need to be substantiated.

- Agency Agreements: Agreements must be negotiated between OCSD and SOCWA to determine responsibility, ownership capacity and cost sharing.

- Site Fee: The costs used in this analysis do not include either a lease or a tipping fee to be charged by the County for the new compost facility. Negotiations have not proceeded to the point where the County would propose a user fee.

- Material Availability: The operation of the composting facility requires a fixed amount of bulking material and amendments. The Technical Feasibility Study was prepared with the assumption that these materials would be available to SOCWA at no cost based on a proposed nearby materials recovery facility (MRF) to be operated by the private company CR&R.

- Compost Technology: The scope of the Technical Feasibility Study was to evaluate a single compost technology based on the presumption of what the most likely technology. The technology used in this analysis was aerated static pile (ASP) composting. The ASP technology was believed to be the most proven, cost effective technology for this application. There may be alternative technologies that may be more cost effective especially given the foundation conditions of the site.

- Permitting/Local Issues: There is apt to be sensitivity regarding the compost facility given the local perception of aesthetics and traffic impacts.

- Facility Operator: The Technical Feasibility Study was based on the assumption that the composting facility would be operated by SOCWA. However, the possibility of alternate delivery methods remains including various options in which a private firm would operate the compost facility.

- Market for Compost: The Technical Feasibility Study (as well as the cost analysis in this study) is based on the assumption that there would be neither revenue from the sale of the compost nor cost to dispose of the compost through land application or landfilling.

The work needed to resolve these issues and implement the Prima Deshecha Compost Facility are described in the following sections of this chapter. It is recommended that the proposed additional analysis be performed to either develop the project to the point of opening bids or to the point at which a fatal flaw in the project is identified.

FACILITY SITING

A final siting evaluation for the proposed compost facility is necessary both for the environmental process and economic assessment of the project. One of the early steps in the process is the completion of the California Environmental Quality Act (CEQA) certification process. This process involves an alternative siting study as well

as the routine considerations of the environment and natural resources potentially affected by the project. Alternative siting also has a significant impact on project economics due to the unique geotechnical attributes of the landfill site.

SOCWA staff has conducted ongoing discussions with County of Orange staff regarding the potential siting of the facility over the past four years. A location near the center of the landfill was originally identified for the proposed project as shown in Figure 13.1 This location was subsequently abandoned due to concerns about impact on wildlife habitat. The focus than shifted to two sites along the western perimeter of the landfill. These two sites, labeled Site 1 and Site 2, are also shown in Figure 13.1. A preliminary geotechnical screening indicated that Site 1 was the preferred location. The site served as the basis for Tetra Tech's Technical Feasibility Study. However, even this preferred site was noted to have significant foundation costs due to the depths of piles needed to reach native material.

Further discussions with the County took place during the preparation of this Strategic Plan Update. These discussions identified one more potential site located at the landfill behind the new Household Hazardous Waste Collection Facility. This site is identified in Figure 13.1 as Site 3.

The final siting of the compost facility has a significant impact on the economic viability of the project. A Compost Facility Siting Study is proposed to further evaluate Site 3 as an Alternative to Site 1. This work will be performed in conjunction with the geotechnical investigation described in the following section.

The 2005 Biosolids Strategic Plan Update (and previous work) is based on the assumption that the County of Orange Prima Deshecha Landfill is the only property that is available for the proposed composting facility. The property to the northeast of the landfill site is part of the Talega Ranch development that is currently under development. It has been assumed that there would be significant sensitivity regarding the location of a composting facility within this new development. This property falls within the service area of the Santa Margarita Water District. Representatives of the SMWD will make preliminary contact with the Ranch management regarding the potential siting of a compost facility within the development.

GEOTECHNICAL EVALUATION

The geotechnical work performed as part of the Technical Feasibility Study was only a screening of existing published information. This information is

not adequate for the final design process. The scope of services for a full scale field investigation was proposed as part of the Technical Feasibility Study. This scope includes the following tasks:

- Site 3 screening.
- Field investigation preparation.
- Geologic mapping.
- Mapping physical limits of buried solid waste.
- Exploratory drilling and soil sampling.
- Laboratory analysis.
- Engineering analysis.

The field drilling was assume to consist of two bucket auger borings (one to a depth of 120 feet and one to a depth of 75 feet) and two hollow stem auger boreholes. This information will be utilized in the development of the project bidding documents. This investigation will also determine if there are any potential fatal flaws with the project site.

AGENCY AGREEMENTS

Both SOCWA and OCSD must independently reach a policy decision regarding the feasibility, implementability and consistency with their respective Biosolids Master Plans. If both parties agree to proceed then the agencies need to extend their Memorandum of Understanding (MOU) regarding their respective roles and responsibilities in the implementation of the project.

An important element of the interagency agreement will be the establishment of capacity ownership in the facility. The original premise of the project is that OCSD and SOCWA would evenly split the 110 wet ton per day (tpd) capacity of the facility. However, as indicated elsewhere in this report it may be desirable for SOCWA to limit its commitment to 25 tpd. Therefore, negotiations must be carried with either OCSD or other potential parties to identify potential users for the remaining 30 tpd of capacity at the Compost Facility.

SITE LEASE FEES

SOCWA/OCSD would need to obtain a long-term lease of the land from the Orange County Integrated Waste Management Department for the project site. This agreement will establish the site lease fee. The formal land lease agreement will identify the obligations of the various parties to this proposal. One potentially significant requirement between SOCWA/OCSD and IWMD will be the revision of the Landfill General Development Plan and related documents. Discussions IWMD staff have indicated that the cost of completing this

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PRIMA DESHECHA LANDFILL SITE

FIGURE 13.1

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
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update will fall in some part to SOCWA and its project partners.

MATERIAL AVAILABILITY

The Technical Feasibility Study was based on the assumption of the availability of a fixed amount of bulking material and amendments being provided on-site by the private company CR&R at no cost to SOCWA/OCSD. CR&R indicated that southern Orange County is underserved for local materials recovery and recycling. To remedy the recovery of green waste, construction-demolition debris, and other recyclables, a materials recovery facility (MRF) was informally proposed to the County of Orange Intergrated Waste Management Department (IWMD). According to CR&R an ideal location for the facility could be closely situated to the proposed SOCWA/OCSD composting facility.

SOCWA staff needs to be in communication with the staff of both CR&R and IWMD to determine the status of the proposed MRF. A subsequent negotiation to secure an agreement for a guaranteed delivery of materials would be the next step. This is necessary before the development of bidding documents for the Compost Facility. If an agreement relative to the CR&R MRF can not be secured than the bidding documents must indicate that the securing the bulking material and amendments will be the responsibility of the bidder (which will be reflected in the bid amounts).

COMPOST TECHNOLOGY

As noted previously there are a variety of alternative approaches to the composting technology (as well as other facility features) that may result in a lower facility cost as compared to the costs identified in the Technical Feasibility Study. The preparation of the 30% design for the bid will screen some of these options and determine if they appropriate for the proposed project. It should be noted that the intent of the bidding documents will not be to limit the bidders to a single compost technology or construction type. The bidding documents will however set criteria for basic facility performance as well as setting constraints for what is allowable within the bid.

ENVIRONMENTAL ANALYSIS AND PERMITTING

The Technical Feasibility Study further identified eight additional permits that would need to be obtained as part of the permitting process. These permits, along with the expected times to obtain, are presented in Table 13.1.

Table 13.1 Prima Deshecha Compost Facility Permitting

Permitting Agency	Type of Permit	Duration to Process & Approve Permit
1. SOCWA/City of San Juan Capistrano	CEQA Certification	9-15 months
2. City of San Juan Capistrano	Conditional Use Permit	9-15 months concurrent with CEQA
3. San Diego Regional Water Quality Control Board	Waste Discharge Requirements	6-8 months
4. California Integrated Waste Management Board & County of Orange Health Care Agency, Environmental Health Division	Solid Waste Facility Permit for Composting Facility	6-8 months overlapping with RWQCB
5. California Integrated Waste Management Board & County of Orange Health Care Agency, Environmental Health Division	Revision and Update of PDL Solid Waste Facility Permit to accommodate Facility	6-8 months overlapping with RWQCB & SWFP
6. South Coast Air Quality Management District	Authority to Construct	6-8 months overlapping with RWQCB
7. South Coast Air Quality Management District	Permit to Operate including engine permits	6-8 months
8. Orange County Fire Authority	Facility Fire Protection Permit	4-6 months
9. Orange County Public Facilities and Resources Department	Building & Occupancy Permits	4-6 months

OPERATOR PROCUREMENT

The recommendation for a contract operator for the Prima Deshecha Compost Facility based on the market analysis presented in Chapter 9 of this report. Different stakeholders in this process have expressed varying criteria for selecting the facility operator. SOCWA would prefer to find an operator with a broader national and regional standing with biosolids based compost that covers a large number of operations. This offers both financial stability as well as the ability to respond to fluctuations in local compost markets. The IMWD has expressed a preference for operators with proven local experience such as Tierra Verde Industries and CR&R. The 30% design will include a preselection process for facility operators to identify potential firms that meet the criteria of each of the interested parties.

MARKETING COMPOST

There are a number of options available to SOCWA for marketing the compost. The passive approach would be to allow the bidding process to determine the local market for compost. This allows firms with experience in handling compost to evaluate the market for themselves. The submitted bids will reflect the private companies evaluation of the market. The aggressive marketing approach would be to actively solicit local communities, nurseries and CalTrans for commitments to contract for the compost product. OCSD has undertaken an active campaign of working with cities within the OCSD service area to promote the benefits of biosolids based components. This approach would help to generate a market for the private contract operator. It is recommended that SOCWA work with OCSD to establish a similar marketing program in southern Orange County.

PREPARATION OF BIDDING DOCUMENTS

The need for a contract operator for the Prima Deshecha Compost Facility is identified elsewhere in this report. There are a number of alternate project delivery methods that could result in the procurement of a contract operator. However, this report has been prepared based on the assumptions that the project would be developed with a design/build/operate approach. This approach will allow the preparation of the bids that reflect alternative technologies and operational methods. It would also allow the bids to reflect the bidders' assessment of the local compost market. The design/build/operate bidding documents are typically referred to as a 30% design. A consultant would be hired to prepare these documents that describe the basic make-up and constraints of the facility.

IMPLEMENATION SCHEDULE

Figure 13.2 presents a proposed implementation schedule for the project. This schedule indicates that it would take approximately 24 months from the decision to proceed with the preliminary phase of the project to the opening of the design/build/operate bids. An additional 24 months is expected from the notice of award to the start-up of the compost facility. The implementation of this project includes a series of institutional arrangements as well as involved permitting process. The actual implementation project may therefore extend beyond the anticipated 4 years.

IMPLEMENATION COSTS

Chapter 11 included a broad calculation of the project costs for the Prima Deshecha Compost Facility. A series of specific costs will be incurred in developing the project to the point of bid opening. These costs are included in Table 13.2.

These costs would be divided evenly between OCSD and SOCWA (or based on another determined capacity split). These costs do not include either internal staff or legal costs. These costs also do not reflect a potential biosolids based compost marketing campaign.

Table 13.2 Prima Deschecha Compost Facility Preliminary Implementation Costs

TASK	ESTIMATED COST
Alternative Siting Assessment	$ 15,000
Geotechnical Site Assessment	$ 60,000
Project Delivery Analysis	$ 15,000
CEQA Development	$125,000
Permitting Assistance	$ 40,000
Development of 30% DBO Documents	$250,000
TOTAL	$505,000

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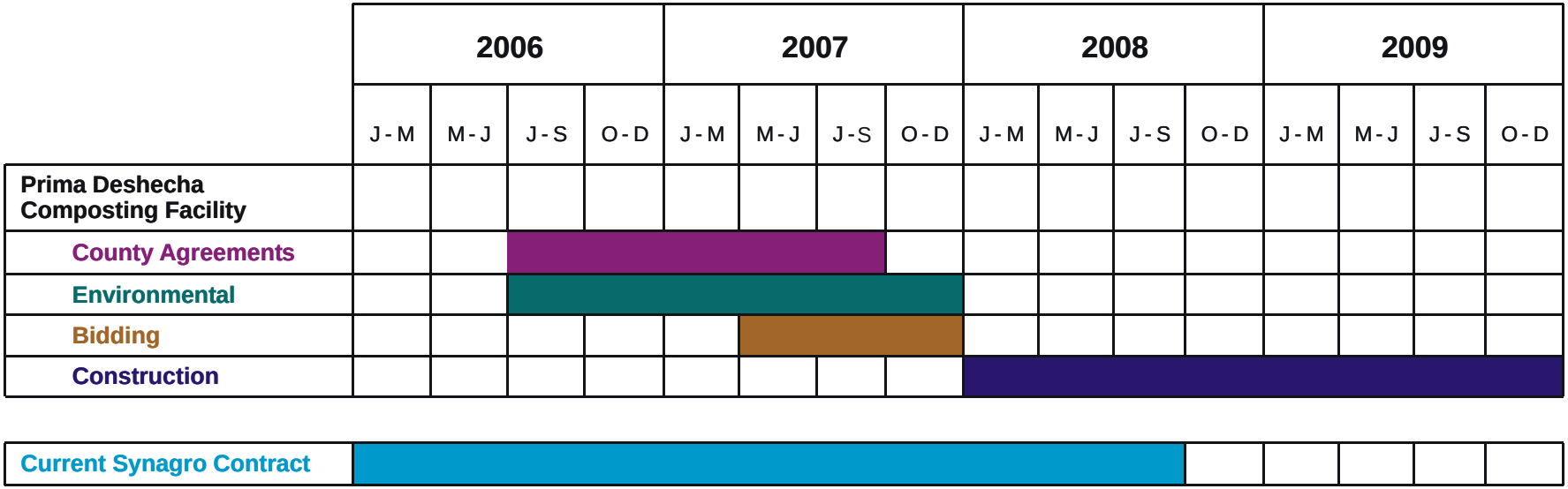

PRIMA DESHECHA COMPOST FACILITY IMPLEMENTATION TIMELINE

FIGURE 13.2

SOUTH ORANGE COUNTY WASTEWATER AUTHORITY
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ALTERNATIVES AND GOALS

A series of goals were defined for SOCWA's Biosolids Management Plan in Chapter 2. Each of the four alternatives proposed in the Strategic Plan Update has minimal impact on the plant's existing neighbors. All of the alternatives are environmentally sound. Each alternative will maintain three methods of disposal for each treatment plant (although this will require maintaining back-up contracts with private firms similar to the existing contract with Waste Markets). There are some key differences among each of the four alternatives with regard to the three remaining goals:

- The program should maximize SOCWA control. Options should include both reuse and disposal within the County.
- The beneficial reuse of biosolids is to be promoted; however, this goal does not outweigh the need for a program that strives for long term economic responsibility.
- The Biosolids Management Strategic Plan needs to remain flexible and should be updated every two years to reflect the rapidly changing biosolids market.

The goal of maximizing SOCWA control over biosolids reuse/disposal is, in part, a reaction to the volatile local politics that have both limited the number of land applications within the State of California and hampered the implementation of new facilities such as the Synagro South Kern Industrial Complex (SKIC) Compost Facility. SOCWA is concerned about the impact of these forces on both the reliability and cost of private contracts for disposal. These contracts include the provisions for cancellation and for cost escalation as protection for the private contractors. The private contracts of Management Scenarios No.1, No.3 and No.4 share this exposure to some degree. The Prima Deshecha Compost Facility of Management Scenario No.2 was envisioned as a means of providing greater local control over SOCWA's biosolids management. However, the SOCWA control of even this approach is limited. As noted in Chapter 9 it is likely that SOCWA will need to use a private contractor to operate the facility and market the compost effectively. SOCWA will have some control over the potential bidders for this operation; however, this is not the same level of control as a facility operated by SOCWA (which, in turn, might not be able to effectively market the compost product).

It should be noted that the most control that SOCWA can exert over its biosolids would come through the minimization of those biosolids. None of the four alternatives achieve any differing degree of biosolids reduction. This would come through treatment technologies such as heat drying (as identified in Chapter 10 as

a back up option for SOCWA) or incineration.

All of the alternatives involve the beneficial reuse of biosolids through composting and land application. None of the alternatives place a higher reliance on the landfilling of biosolids (although the focus of Management Scenario Nos. 1 and 3 on private contractors could theoretically result in more landfilling). There is a marked economic difference between the four management scenarios. As noted in Chapter 12 the Prima Deshecha Composting Facility (Management Scenario No.2) is the most costly option over the next five to ten years. Although not as costly as the proposed Composting Facility, the beneficial reuse approach of Management Scenario No.4 (as embodied by the proposed EnerTech option) also represents a cost increase over other private contracting disposal methods over at least the next five years.

Given the mixed goals of the Strategic Plan the need to maintain flexibility is important. Flexibility might be interpreted as maximizing the number of disposal options and limiting the time commitment to those options. There is an opposite impetus to commit to long term contracts or options as a means of securing a fixed price and of reserving space in a given disposal site. However, as noted elsewhere in this analysis many private contracts are currently being written with clauses that allow the escalation of the contracted cost to reflect both the impacts of inflation and potential regulatory changes. It should also be noted that between the 2002 and the 2005 SOCWA Biosolids Strategic Plans there does not appear to have been a decrease in the number of private contractor disposal options. Each of the four alternatives includes a fixed long term (10 year) commitment of 25 wet tons per day (tpd) to the Synagro SKIC facility. Management Scenarios No.1 and No.3 provide somewhat greater flexibility than their counterparts through the ability to set the size and duration of their contracts. Management Scenarios No.2 and No.4 placed a greater emphasis on a large commitment to the Prima Deshecha Composting and EnerTech Recycle facilities. In each case these would be long term commitments (10 or more years). The minimum size of outside contract is expected to be about 25 wet tons per day. This is approximately equivalent to one truckload. Management Scenarios No. 2 and No.4 would provide a greater degree of flexibility if the commitment to these options were limited to 25 tpd.

It is therefore recommended that the development of the Prima Deshecha Compost Facility be contingent upon limiting the initial delivery commitment to 25 tpd as opposed to the 55 tpd identified in Chapter 13. This will require a negation with the Orange County Sanitation District (OCSD) or other parties to commit to the 30 tpd remainder.

IMPACT OF TIME ON BIOSOLIDS MANAGEMENT

A timeline for the implementation of the Prima Deshecha Compost Facility was presented in Chapter 13. This timeline indicated a period of 4 to 5 years before the proposed facility could be in operation. This option can not be implemented prior to the expiration of SOCWA's existing Biosolids management contracts with Synagro and Waste Markets. SOCWA staff has been therefore negotiating successor contracts with different private contractors. These negotiations have indicated a range of hauling costs between $45/ton to $65/ton. The optimal duration of these contracts is from 2 to 5 years (beginning in December, 2006).

The Prima Deshecha Compost Facility does not appear to be economical over the next 5 to 10 years. However, this facility may represent a unique opportunity for both greater SOCWA control over biosolids management and in-county disposal of biosolids. The ideal situation would be to delay the implementation of the compost facility for 5 to 10 years to allow for a more favorable economic situation. However, the need to pursue this option in the short term is based on the following:

- County of Orange management is currently amenable to the potential facility.
- The area surrounding the Prima Deshecha Compost Facility is largely undeveloped. However, a significant level of residential development is expected over the next 10 years. It is possible to construct a compost facility that will be a good neighbor to surrounding residences. However, it is likely that there will be more resistance with increased residential development.
- Performing more detailed geotechnical investigations now provides information critical to the design process.
- Early development of the design for the facility will allow integration of the concept into the County of Orange/City of San Juan Capistrano closure plan for the site.

The recommendation for and implementation of the Prima Deshecha Compost Facility is hampered by the large number of unknowns about the project as identified in Chapter 13. However, the amount of time required to define the project to the point where it is a biddable project may be beneficial to SOCWA for the following reasons:

- The two years necessary to get the project to a biddable phase will allow SOCWA the opportunity to assess other opportunities and to

evaluate the status of private contracting costs.

- The relative economics of the Compost Facility (as compared to other options) are apt to improve over time.

The negotiation of longer (10 year) contracts remains an option. Opportunities may arise such as contracting for an additional 25 tpd (beyond the already contracted amount of 25 tpd) at the Synagro SKIC Facility.

These options may not be available for long as the contractors are seeking commitments to take advantage of the full capacity of the facilities. The SKIC options do not appear appropriate for SOCWA as this places the reliance of SOCWA's management program on one facility. Similarly, the short term economics do not favor contracting with the EnerTech operation.

DEFINING THE PLAN

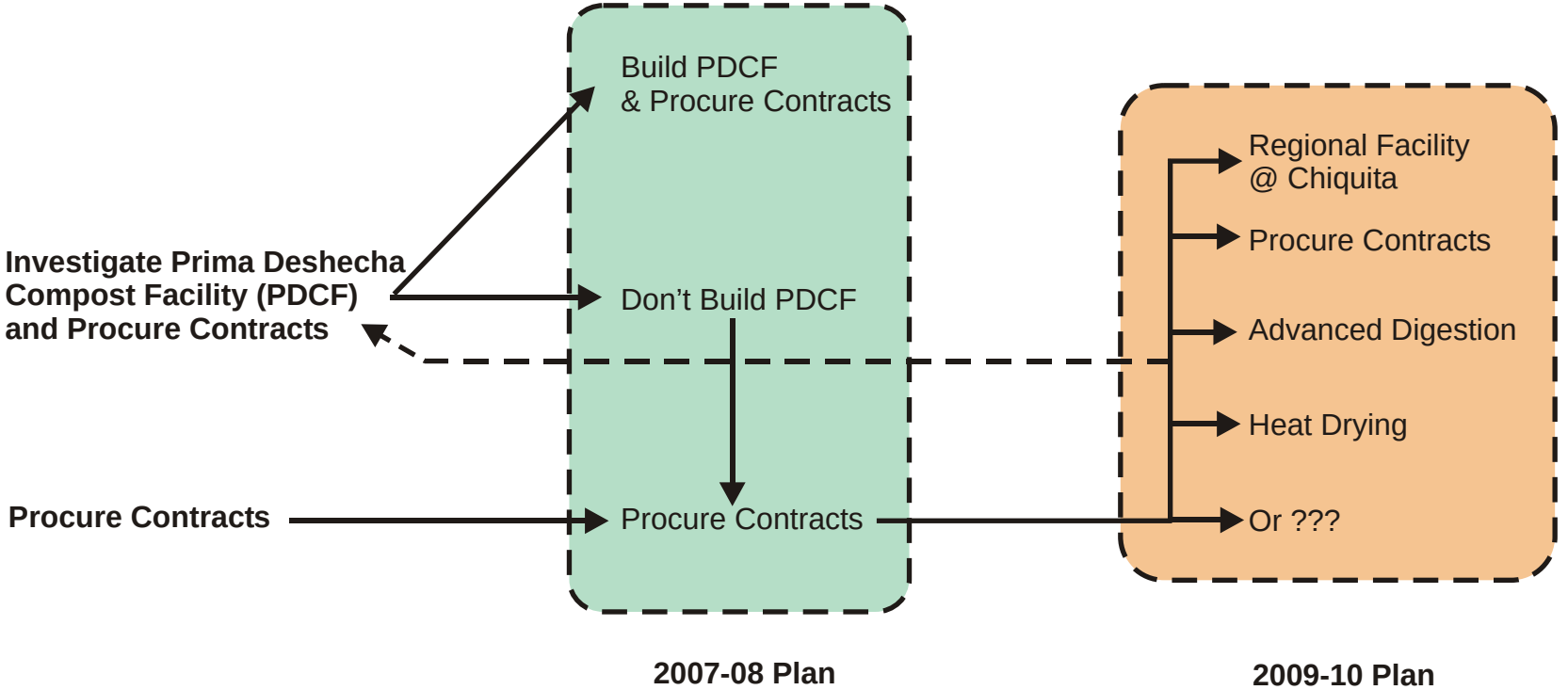
The SOCWA Biosolids Management Strategic Plan is not based on the recommendation of a single alternative as described in the previous chapters. The Plan is based on a flexible approach as dictated by the goals set forth in Chapter 2. Figure 14.1 presents the decision path for implementing the Plan. There are currently two courses of action:

- Procure New Private Contracts.
- Procure New Private Contracts and Investigate Prima Deshecha Compost Facility.

The steps for developing the Prima Deshecha Compost Facility are as described in Chapter 13. The development process could result in the opening of bids for the final design/construction/operation of the proposed compost facility. As noted in Chapter 13 it would take approximately two years to reach this stage. The development process could also be terminated at earlier point if the geotechnical investigation, the contract negotiations or the environmental assessment identify a fatal flaw in the project.

The goal of the current negotiation for new private disposal contracts is to provide coverage through 2008 - 2009. Longer contracts will be negotiated if beneficial terms can be obtained.

The expected duration of both the Prima Deshecha Compost Facility development process and the new private disposals contracts indicates that SOCWA should review the Biosolids Strategic Plan again in late 2007 - early 2008. The decisions to be made at this juncture in time are identified in Figure 14.1. The key points will be the final decision to proceed with the Prima Deshecha Compost Facility and the type/duration of new private disposal contracts to procure. A decision not to build the Prima Deshecha Compost Facility will lead to continued reliance on


Build PDCF
& Procure Contracts
Investigate Prima Deshecha
Compost Facility (PDCF)
and Procure Contracts
Don't Build PDCF
Procure Contracts
Procure Contracts
Regional Facility
@ Chiquita
Procure Contracts
Advanced Digestion
Heat Drying
Or ???
2007-08 Plan
2009-10 Plan

private disposal contracts. A no-go decision would also lead to a crucial update of the Biosolids Strategic Plan in late 2009 - early 2010.

The intervening four years between now and the proposed '09/'10 Biosolids Strategic Plan Update will provide new information that will be helpful in determining a long term plan. This anticipated information includes the following:

- Trend in biosolids land applications limitations - particularly with respect to the political/regulatory climate in the State of Arizona.
- Inflation in private disposal contracts due to both regulatory and consumer price index effects.
- The effectiveness of heat drying operations at the Encina Wastewater Agency and the City of Corona.
- The conceptual development of biosolids management plans for the Santa Margarita Water District Chiquita Water Reclamation Facility.
- The development of new and the evolution of existing solids handling technology.
- The identification of new partnering and contracting opportunities.

This information will be needed in defining a plan if the Prima Deshecha Compost Facility is not implemented.

Figure 14.1 also shows a flow path if a decision is made not to pursue the development of the Prima Deshecha Compost Facility at this time. This approach again places the reliance of SOCWA's biosolids management program on the procurement of private contracts. The dashed line in Figure 14.1 indicates a potential future return to the concept of the Compost Facility. It is not known whether the County of Orange would be open to this concept in the future. Increasing obstacles to a delayed implementation of the Prima Deshecha Compost Facility were identified earlier in this chapter.

The development of the Prima Deshecha Compost Facility is a unique opportunity for SOCWA to obtain a slightly greater level of control over its biosolids management program by providing an in-county solution. The costs for the development (up through bidding) of the Prima Deschecha Compost Facility are not significant compared to the current annual cost of SOCWA's biosolids handling. It is therefore recommended that SOCWA pursue the decision path in Figure 14.1 that begins with 'Investigate PDCF and Procure Contracts'. The investigation of the Prima Deshecha Compost Facility should be done in a methodical way such that the rationale for proceeding is reviewed after each step in the process. The initial recommended

action in the process is an evaluation of potential alternate locations on the landfill site.

FUTURE UPDATES TO THE BIOSOLIDS MANAGEMENT STRATEGIC PLAN

Figure 14.1 indicated updates to the Biosolids Strategic Plan Update in 2007/2008 and 2009/2010. There are several issues that were not within the scope of the current update that should be considered in subsequent updates. These items are as described below.

Solids Handling at the Coastal Treatment Plant

The primary and thickened waste activated sludge from the Coastal Treatment Plant are currently pumped to the Regional Treatment Plant. The replacement of the existing two 4-inch force mains has been in the planning stage for the past 15 years. An alignment study is currently being performed. The results of the Alignment Study and the subsequent negotiation with the County of Orange may indicate that the replacement of the force mains is not feasible. This would leave SOCWA with the option of trucking sludge from the Coastal Treatment Plant to the Regional Treatment Plant. In this scenario SOCWA should review the feasibility of implementing some form of solids minimization at the Coastal Plant as a means of reducing the level of truck traffic from the plant.

Solids Handling at Plant 3A

The design of the new Plant 3A in the late 1980's was based on the premise of performing the solids handling at Plant 3A. However, during the initial seven years of operation the primary sludge and the thickened waste activated sludge were either bypassed into the Oso-Trabuco Sewer for processing at the J. B. Latham Treatment Plant or trucked to the Regional Treatment Plant. This process was ended in the late 1990's with the installation of the solids dewatering system at Plant 3A.

Some of the different technologies for waste minimization place less reliance on the anaerobic digestion stage. These technologies include heat drying and incineration. These technologies were considered to be too expensive for the Latham Plant and too space intensive for Plant 3A in the current analysis. However, a future analysis may indicate cost savings with one of these technologies by adding the solids from Plant 3A to the solids load at the Latham Treatment Plant.

Solids Handling at the Chiquita Water Reclamation Facility

The Santa Margarita Water District (SMWD) is currently in the preliminary stages of developing concepts for solids management at the Chiquita Water Reclamation Facility. This facility is different from the SOCWA plants in that there is more space

available for the accommodation of solids handling/treatment systems. Heat drying and incineration are among the alternatives that the SMWD is reviewing. SMWD is considering the implementation of a new technology when the utilization of the existing anaerobic digestion system at the Chiquita Water Reclamation Facility is nearing capacity. This is not anticipated within the next five years.

The handling of some portion of SOCWA's biosolids load could offer an economy of scale benefit to SMWD. This possibility has been discussed with the SMWD; however, they are currently too early in their planning process to evaluate this option. It must be emphasized that SMWD is not currently planning a regional solids handling facility at the Chiquita WRF. This concept would require significant environment analysis and approval. However, the concept merits further consideration as part of a subsequent update to the SOCWA Biosolids Strategic Plan.

INTRODUCTION

The Biosolids Strategic Plan Update has identified four potential management scenarios as Management Scenarios 1 through 4. Chapter 14 of this report discussed the methodology for implementing these alternatives. This methodology is based on the continued pursuit of short term private contracts (Management Scenario No.1) while continuing to refine the approach and the cost for the implementation of the Prima Deshecha Compost Facility (Management Scenario No.2). The purpose of this chapter is to identify the potential budgetary impacts of the four management scenarios on each of the member agencies.

ALLOCATION BASIS

The budget for biosolids hauling and disposal (Budget Task No. 21-B) in Project Committees 2, 3A and 17 is based on unit costs shown in Table 15.1. The unit cost is averaged across all of the SOCWA treatment facilities. This approach avoids the potential inequity of one facility monopolizing the least cost disposal method (e.g. the Prima Deshecha Landfill). The biosolids budget for each facility is then apportioned to the respective member agencies through the following methods:

- J. B. Latham Treatment Plant (Project Committee 2): The percentage solids loading in the influent flow to the treatment plant. Note that the solids loadings are based on a monthly field sampling program.
- Plant 3A (Project Committee 3A): The percentage of flow loading to the plant.
- Regional Treatment Plant (Project Committee 17): The percentage solids loading in the influent flow to the treatment plant. based on averaged daily measurements of solids concentration. The measurements for the pumped solids from the Coastal Treatment Plant are based on daily measurements of the export sludge flow taken at the Coastal Plant. The measurements of the El Toro Water District are based on measurements taken for each truck delivery to the Regional Treatment Plant.

These values are shown in Table 15.2 for the Fiscal Year 2005/2006 Budget. The Fiscal Year 2005/2006 SOCWA Budget was based on the plant loadings for Fiscal Year 2004/2005. These values also serve as the basis for Biosolids Strategic Plan Update.

COST ALLOCATION

Tables 15.3 through Table 15.9 compare the fiscal impact of the management scenarios for each member agency. These tables show the relative increase of each biosolids management scenario compared to the current (Fiscal Year

'05/'06) budget for Task 21-B for biosolids hauling and disposal. The other portions of solids cost allocation are assumed to remain relatively constant regardless of the selected biosolids management scenario.

Table 15.1	**Biosolids Handling Budget Fiscal Year '05/'06**			
Project Committee	**2**	**3A**	**17**	
Facility	J. B. Latham Treatment Plant	Plant 3A	Regional Treatment Plant	TOTAL
Budget Task No.	21-B	21-B	21-B	
Tons Per Month	750	241	1390	2381
Months Per Year	12	12	12	
Biosolids Hauling and Disposal Unit Cost	$42.767	$42.767	$42.767	
Percent Solids Handling Facility/SOCWA	31.50%	10.12%	58.38%	
Biosolids Hauling and Disposal Total Cost	$384,900	$123,700	$713,400	$1,222,000

Table 15.2	Basis For Solids Cost Allocation			
Project Committee	**2**			
Facility	**J. B. Latham Treatment Plant**			
	Current[1]		Ownership	
Member Agency	Loading (lb/day)	% Loading	Loading (lb/day)	% Loading
CSJC	6681	33.68%	11572	30.00%
MNWD	2906	14.65%	8340	21.62%
SCWD	5692	28.69%	7715	20.00%
SMWD	4560	22.99%	10946	28.38%
Total	19839		38573	
Project Committee	**3A**			
Facility	**Plant 3A**			
	Current[1]		Ownership	
Member Agency	Flow (mgd)	% Loading	Flow (mgd)	% Loading
MNWD	2.324	71.64%	5.75	71.875%
SMWD	0.92	28.36%	2.25	28.125%
Total	3.244		8	
Project Committee	**17**			
Facility	**Regional Treatment Plant**			
	Current[1]		Ownership	
Member Agency	Loading (lb/day)	% Loading	Loading (lb/day)	% Loading
CLB	5909	13.55%	5605	11.22%
EBSD	248	0.57%	295	0.59%
SCWD	3981	9.13%	4480	8.96%
ETWD	6973	15.99%	10200	20.41%
MNWD	26506	60.77%	29395	58.82%
Total	43617		49975	

Notes:

1. Based on Fiscal Year '05/'06 Budget

Table 15.3 Fiscal Impact On Emerald Bay Services District

Operation Scenario	Annual Operating Budget ($/Year)	Increase Over Current Annual Operating Budget ($/Year)
Current[1]	$4,056	-
Alternative No.1 - Current Operation Private Contracts for Disposal/Reuse	$4,368	$312
Alternative No.2 - Prima Deshecha Composting Facility	$7,405	$3,349
Alternative No.3 - Phased Digestion at JBLTP	$5,381	$1,325
Alternative No.4 - Current Operation with Contract for Reuse with EnerTech	$6,304	$2,248

Table 15.4 Fiscal Impact On El Toro Water District

Operation Scenario	Annual Operating Budget ($/Year)	Increase Over Current Annual Operating Budget ($/Year)
Current[1]	$114,043	-
Alternative No.1 - Current Operation Private Contracts for Disposal/Reuse	$122,806	$8,763
Alternative No.2 - Prima Deshecha Composting Facility	$208,219	$94,176
Alternative No.3 - Phased Digestion at JBLTP	$151,305	$37,262
Alternative No.4 - Current Operation with Contract for Reuse with EnerTech	$177,250	$63,207

Table 15.5 Fiscal Impact On City Of Laguna Beach

Operation Scenario	Annual Operating Budget ($/Year)	Increase Over Current Annual Operating Budget ($/Year)
Current[1]	$96,641	-
Alternative No.1 - Current Operation Private Contracts for Disposal/Reuse	$104,068	$7,426
Alternative No.2 - Prima Deshecha Composting Facility	$176,447	$79,806
Alternative No.3 - Phased Digestion at JBLTP	$128,217	$31,576
Alternative No.4 - Current Operation with Contract for Reuse with EnerTech	$150,203	$53,562

Notes:

1. Based on Fiscal Year '05/'06 Budget for Task 21-B Biosolids Hauling and Disposal

Table 15.6 Fiscal Impact On Moulton Niguel Water District

Operation Scenario	Annual Operating Budget ($/Year)	Increase Over Current Annual Operating Budget ($/Year)
Current[1]	$578,490	-
Alternative No.1 - Current Operation Private Contracts for Disposal/Reuse	$622,943	$44,453
Alternative No.2 - Prima Deshecha Composting Facility	$1,056,204	$477,714
Alternative No.3 - Phased Digestion at JBLTP	$767,503	$189,012
Alternative No.4 - Current Operation with Contract for Reuse with EnerTech	$899,110	$320,620

Table 15.7 Fiscal Impact On City Of San Juan Capistrano

Operation Scenario	Annual Operating Budget ($/Year)	Increase Over Current Annual Operating Budget ($/Year)
Current[1]	$129,620	-
Alternative No.1 - Current Operation Private Contracts for Disposal/Reuse	$139,581	$9,960
Alternative No.2 - Prima Deshecha Composting Facility	$236,660	$107,040
Alternative No.3 - Phased Digestion at JBLTP	$171,972	$42,351
Alternative No.4 - Current Operation with Contract for Reuse with EnerTech	$201,461	$71,840

Table 15.8 Fiscal Impact On Santa Margarita Water District

Operation Scenario	Annual Operating Budget ($/Year)	Increase Over Current Annual Operating Budget ($/Year)
Current[1]	$123,546	-
Alternative No.1 - Current Operation Private Contracts for Disposal/Reuse	$133,040	$9,494
Alternative No.2 - Prima Deshecha Composting Facility	$225,570	$102,024
Alternative No.3 - Phased Digestion at JBLTP	$163,913	$40,367
Alternative No.4 - Current Operation with Contract for Reuse with EnerTech	$192,020	$68,474

Notes:

1. Based on Fiscal Year '05/'06 Budget for Task 21-B Biosolids Hauling and Disposal

Table 15.9 Fiscal Impact On South Coast Water District

Operation Scenario	Annual Operating Budget ($/Year)	Increase Over Current Annual Operating Budget ($/Year)
Current[1]	$175,541	-
Alternative No.1 - Current Operation Private Contracts for Disposal/Reuse	$189,031	$13,489
Alternative No.2 - Prima Deshecha Composting Facility	$320,502	$144,961
Alternative No.3 - Phased Digestion at JBLTP	$232,897	$57,355
Alternative No.4 - Current Operation with Contract for Reuse with EnerTech	$272,833	$97,291

Notes:

1. Based on Fiscal Year '05/'06 Budget for Task 21-B Biosolids Hauling and Disposal

SUMMARY

Biosolids Management Goals

The following goals for the SOCWA biosolids management program were identified through a series of workshops:

- The program should maintain multiple, economical options. At least three options are to be identified for each treatment facility.
- The program should maximize SOCWA control. Options should include both reuse and disposal within the County.
- The selected program should not increase impacts to the neighbors surrounding the three treatment plants.
- The program should adhere to environmentally sound practices.
- The beneficial reuse of biosolids is important; however, this goal does not outweigh the need for a program that strives for long term economic responsibility.
- The Biosolids Management Strategic Plan needs to remain flexible and should be updated every two years to reflect the rapidly changing biosolids market.

Existing Biosolids Handling at SOCWA

- The current annual average of biosolids production is 77.1 wet tons per day; the projected ultimate biosolids production is 88.7 wet tons per day. The biosolids hauling from the three SOCWA treatment facilities with solids handling capability can be simplified as a total of 3 to 3-1/2 truck loads each day.
- The centrifuge dewatering process at all three plants yields biosolids cake that ranges between 23% to 28% solids concentration.
- The Regional Treatment Plant and Plant 3A produce Class B biosolids as defined by Federal regulations. The biosolids from the J. B. Latham Treatment Plant can not meet this classification due to insufficient digester detention time.
- Neither the J. B. Latham Treatment Plant nor the Regional Treatment Plant has the capability to store more than one day's production of dewatered biosolids cake. Plant 3A has the capability of storing 2 to 3 days of dewatered biosolids cake in outside bins. However, this represents a potential odor concern.

- The hauling of biosolids to the County of Orange Prima Deshecha Landfill has been an element of SOCWA's (and its predecessors') biosolids management for over 20 years. This remains the most cost effective approach to biosolids management.

- The ability to haul large amounts of biosolids to the Prima Deshecha Landfill on a regular basis is limited by potential wet weather conditions and a 10:1 refuse to biosolids criterion.

- The recent annual average of hauling to the Prima Deshecha Landfill has been 12 wet tons per day. None of the alternatives developed in this strategic plan include hauling to the landfill at an average rate higher than 12 tons per day.

Biosolids Regulations

The review of the current state of biosolids regulations indicated the following:

- The trend toward the effective ban of land application of biosolids at the county level is expected to continue in the State of California.

- There are no current regulations in the State of Arizona that prohibit the land application of biosolids. However, it is assumed that local political forces will begin lobbying for the implementation of some form of biosolids restriction within the next 5 to 10 years.

Regional Biosolids Management Programs

Wastewater utilities in Southern California have adopted widely varying approaches to biosolids management. Key points from a survey of regional programs is as follows:

- There are no existing programs that appear to offer any partnering opportunities for SOCWA. However, SOCWA has entered into discussions with the Inland Empire Utilities Agency (IEUA) and the Orange County Sanitation District (OCSD) regarding potential participation in a conceptual regional solids handling facility in the Prado Basin.

- SOCWA will continue to work in conjunction with OCSD to identify and develop projects such as the proposed Prima Deshecha Compost Facility that provide biosolids handling solutions on a County wide basis.

- The Santa Margarita Water District is evaluating options for biosolids management at its Chiquita Water Reclamation Facility.

Private Disposal and Reuse Options

A survey of private disposal options for SOCWA yielded the following:

- Fourteen companies were identified as potential handlers of biosolids. These firms dispose of biosolids through land application, landfilling and composting. A survey of the firms was conducted to determine site locations, capacities, longevity of the disposal options and other information.

- The number of private biosolids disposal firms has gone up slightly since the 2002 SOCWA Biosolids Strategic Plan Update.

- The current range of land application costs (including hauling) ranges from $40 to $55/wet ton.

- The current average contracted cost for composting (including hauling) is approximately $55/wet ton.

- SOCWA has a 10 year contract with Synagro for 25 wet tons per day of guaranteed capacity at the South Kern Industrial Complex (SKIC) Compost Facility. This site is currently under construction and is expected to begin operation in late 2006.

- Another type of opportunity may be created by firms such as EnerTech that utilize a specialized type of handling to generate a biosolids product for reuse. EnerTech is developing a facility in Rialto that is expected to have a 675 wet ton per day capacity.

- The rate of inflation for private contract costs from 2002 to 2005 appeared to be approximately 10% to 25% for that period.

- There is a greater reliance on handling and disposal of biosolids by private companies within the State of Arizona.

- There appear to be fewer future options available for procuring contracts without a guaranteed delivery amount.

- The experience of Synagro with the SKIC Composting Facility and EnerTech with the reuse facility in Rialto point to challenges faced by private firms in developing new handling facilities. The longer development time and political vulnerability may impact reliability of new contracts that SOCWA negotiates with private firms.

Biosolids Treatment, Disposal and Reuse Options

Ten advanced treatment technologies were reviewed for possible implementation at SOCWA's treatment plants (with the exception of composting which was considered at the proposed Prima Deshecha site). The conclusions of this review are summarized below:

- Advanced digestion, composting and heat drying are the treatment options that appear most viable for SOCWA.

- Pasteurization was identified as a technology that might merit further consideration if the costs of currently favored options significantly increase.

- Chemical treatment, vermiculture, pyrolysis, incineration and glassification were determined to be infeasible based on such factors as space requirements.

Biosolids Alternative Treatment Summary

Advanced digestion, composting and heat drying have been the subject of previous studies for SOCWA. The findings of the previous studies are summarized in Chapter 8. A comprehensive cost matrix was developed based on the past work. Additional findings are as follows:

- Advanced Digestion - Two phase, temperature phased digestion offers potential at the J. B. Latham and Regional Treatment Plants to produce Class A biosolids without a significant potential for odor complaints. This process requires too much space to be implemented at Plant 3A. However, thermo-philic digestion may be feasible at Plant 3A.

- Heat Drying - Heat drying is feasible for both the J. B. Latham and Regional Treatment Plants. There is not sufficient space to implement heat drying at Plant 3A.

Market for Biosolids Products

The following key points were identified in this analysis regarding the marketing of biosolids based compost:

- The proposed Prima Deshecha Compost Facility would generate less than 5 percent of the compost produced by other Southern California operators.

- A 2003 study suggested that SOCWA should focus its marketing effort on local communities, CalTrans and horticultural users. This study also indicated that that there is sufficient demand in Orange County to market all of the

compost produced at the proposed Prima Deshecha Compost Facility.

- It appears that the current demand for compost in Orange County is being met by the existing compost producers in the region. Therefore, unless new markets are developed by SOCWA it must compete with existing compost producers for customers.

- Due to the relatively low volume of compost to be produced at SOCWA's proposed composting facility it is not likely that SOCWA can compete in the large retail bagged compost market. It is assumed that SOCWA would market its compost in bulk form to local markets. Currently local compost needs are most likely being met by greenwaste composters that operate in the region.

- The most important aspect of a successful biosolids composting operation is marketing the product. A third-party operator would be responsible for the marketing and would likely have existing outlets for the product.

The market for dried pellets may also be limited. The experience of the new City of Corona heat drying system and the proposed Encina Wastewater Authority drying facility will provide a future reference as to the relative ease of disposing/marketing the dried product.

Biosolids Management Scenarios

Four biosolids management scenarios were identified for SOCWA. These four scenarios are as described below:

- Each management scenario involves the commitment of 25 wet tons per day to be shipped to the Synagro SKIC Compost Facility for the next ten years as set forth by contract with Synagro.

- Each management scenario involves the disposal of up to 12 wet tons per day of biosolids at the Prima Deshecha Landfill.

- Biosolids Management Scenario No.1 is basically an extension of the existing operation with the inclusion of the 25 wet tons per day commitment to the Synagro SKIC facility. There will be no change in the facility treatment schemes. The agency will continue to contract with private companies for the disposal of biosolids through land application, composting (other than SKIC) or landfilling (other than Prima Deshecha).

- Biosolids Management Scenario No.2 involves the construction and

operation of the Prima Deshecha Compost Facility.

- Biosolids Management Scenario No.3 is the same as Scenario No.1; the difference is the implementation of phased digestion at the J. B. Latham Treatment Plant to produce Class A type biosolids at that facility. Disposal will continue to be through the procurement of private contracts.

- Biosolids Management Scenario No.4 is also similar to Scenario No.1 as no change in the treatment scheme is proposed. This alternative considers contracting with a private firm for the specialized reuse of biosolids. The example of the proposed EnerTech facility in Rialto is used in this scenario.

- Heat drying has not been incorporated into any of the current management scenarios due to the high cost of that approach. However, heat drying remains as a potential back-up option at either the J. B. Latham or Regional Treatment Plants.

- The proposed disposal rate of each of the four alternatives is presented in Table 16.1.

Cost Analysis

Table 16.2 presents the estimated annual costs for the four biosolids management scenarios to produce Class B biosolids.

Sensitivity Analysis

A cost sensitivity analysis indicated the following issues:

- Inflation of the SKIC costs impacts each management scenario the same.

- The price of land application must grow to over $70 tpd before Alternatives 2 and 4 would become more economically equitable.

- The unit cost for the Prima Deshecha Compost facility was evaluated over a range from $80 per ton to $110 per ton. It is unlikely over this range that the Management Scenario No.2 would ever be the most economic approach.

Table 16.1 SOCWA Biosolids Management Scenarios

	Average Daily Disposal Rate (Wet Tons Per Day)				
Management Scenario	**Private Contractor (Land Application)**	**Prima Deschecha Compost Facility**	**Synagro SKIC Compost Facility**	**Private Contractor (Reuse)**	**Prima Deshecha Landfill**
No.1	51.7		25		12
No.2		55	25		8.7
No.3[1]	51.7		25		12
No.4			25	51.7	12

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Table 16.2 Biosolids Management Scenario Annual Costs

Alternative	Reuse/Disposal Elements			Annual Biosolids Management Cost
No. 1	Prima Deshecha Landfill	SYNAGRO South Kern	Class B Land Spreading	$1,491,000
No. 2	Prima Deshecha Landfill	SYNAGRO South Kern	Prima Deschecha Compost Facility	$2,528,000
No. 3	Prima Deshecha Landfill	SYNAGRO South Kern	JBL Phased Digestion/Class B Spreading	$1,837,000
No. 4	Prima Deshecha Landfill	SYNAGRO South Kern	EnerTech	$2,152,000

A review of the management scenarios according to non-cost factors indicated the following:

- Management Scenario No.1 on contracts for land application makes this option the most vulnerable to regulatory and political impacts.
- Management Scenario No.2 is almost entirely focused on composting (the SKIC contract and the Prima Deshecha Compost Facility. That makes this alternative the most sensitive to fluctuations in the reuse (compost) market.

- All of the management scenarios are vulnerable to the reliance on outside contractors. Management Scenario No.4 was found to be slightly more disadvantageous due to the reliance on the EnerTech's contracts for reuse of the energy and residuals generated at that facility.

- Diversity of biosolids disposal methods was identified as a goal for SOCWA's management program.

Evaluation and Implementation of the Prima Deshecha Compost Facility

A series of issues must be resolved as part of the implementation of the Prima Deshecha Landfill:

- Selection of a final location for the compost facility at the Prima Deshecha Landfill.

- Geotechnical evaluation to identify foundation requirements and estimated costs for the new facility.

- Development of agency agreement between OCSD and SOCWA to determine responsibility, ownership capacity and cost sharing.

- Negotiation of lease agreement with the County of Orange to determine site fee.

- Investigation with the County of Orange and negotiation with the private company CR&R (and potential other firms) to secure the source of bulking material and amendments for the compost facility.

- Definition of the appropriate compost technologies that would be allowed in a bid.

- Identification of the procurement procedure for a facility operator.

- Development of the CEQA documentation and facility permitting.

- Determination of the approach that SOCWA should take to the local marketing of compost based biosolids.

A series of preliminary implementation projects were identified to resolve the above listed issues:

- Alternative siting assessment

- Geotechnical site assessment

- CEQA development

- Permitting assistance

- Development of 30% design documents for bidding (if a design-

build form of bidding is to be utilized).

It is estimated that this phase of the project will last two years. The preliminary phase would culminate in the opening of bids for facility construction. An additional two to three years is expected from the bid to facility start-up.

Defining the Management Plan

The SOCWA Biosolids Management Plan is not based on the recommendation of a single alternative as described in the previous chapters. The Plan is based on a flexible approach as dictated by the goals set forth in Chapter 2. Figure 14.1 presents the decision path for implementing the Plan. There are currently two courses of action:

- Procure New Private Contracts.
- Procure New Private Contracts and Investigate Prima Deshecha Compost Facility.

The goal of the current negotiation for new private disposal contracts is to provide coverage through 2008 - 2009. Longer contracts will be negotiated if beneficial terms can be obtained.

The expected duration of both the Prima Deshecha Compost Facility development process and the new private disposals contracts indicates that SOCWA should review the Biosolids Strategic Plan again in late 2007 - early 2008. The decisions to be made at this juncture in time are identified in Figure 14.1. The key points will be the final decision to proceed with the Prima Deshecha Compost Facility and the type/duration of new private disposal contracts to procure. A decision not to build the Prima Deshecha Compost Facility will lead to continued reliance on private disposal contracts. A no-go decision would also lead to a crucial update of the Biosolids Strategic Plan in late 2009 - early 2010.

The intervening four years between now and the proposed '09/'10 Biosolids Strategic Plan Update will provide new information that will be helpful in determining a long term plan. This anticipated information includes the following:

- Trend in biosolids land applications limitations - particularly with respect to the political/regulatory climate in the State of Arizona.
- Inflation in private disposal contracts due to both regulatory and consumer price index effects.
- The effectiveness of heat drying operations at the Encina Waste-water Agency and the City of Corona.
- The conceptual development of biosolids management plans for

the Santa Margarita Water District Chiquita Water Reclamation Facility.

- The development of new and the evolution of existing solids handling technology.

- The identification of new partnering and contracting opportunities.

RECOMMENDATIONS

- Investigate and negotiate successor contracts to the current contracts with Synagro and Waste Markets. These new contracts should have durations ranging from 2 to 5 years depending on the terms available.

- Develop an agreement with the Orange County Sanitation District (OCSD) regarding the development of the Prima Deshecha Compost Facility. This agreement should be based on limiting SOCWA's participation in the facility to an average 25 wet tons per day. The agreement should also provide the language to allow either party to withdraw during the preliminary development phase of the project.

- Begin final site selection analysis and geotechnical evaluation for Prima Deshecha Compost Facility with an emphasis on site that will minimize geotechnical costs.

- Continue to work with the County of Orange IWMD through the site selection process for the Prima Deshecha Compost Facility. Develop terms of a lease agreement in order to identify potential site fees.

- Proceed with discussions with IWMD and CR&R to develop an agreement for amendments and bulking materials for the Prima Deshecha Compost Facility.

- Procure the services of a consultant to work on environmental analysis and permit preparation for the Prima Deshecha Compost Facility.

- Work with City of San Juan Capistrano staff in the development of the CEQA process. Identify methods of mitigating potential impacts on neighbors adjacent to the Prima Deshecha site. Develop plan for integrating compost facility into the site closure plan.

- Identify the delivery mechanism (e.g. design/build/operate) for the Prima Deshecha Compost Facility. Procure a consultant to prepare bidding documents for the project.

- Evaluate the OCSD biosolids based compost local marketing program. Determine whether this program is applicable to the South County regardless of whether or not the Prima Deshecha Compost Facility is implemented. Develop a plan for a similar marketing program or identify possibility of extending OCSD program to the South County.

- Continue dialogue with the Santa Margarita Water District regarding long term solids management plans at the Chiquita Water Reclamation Facility. Participate in any analysis of a potential regional facility at that location.

- Continue to pursue possible participation in a potential solids handling facility in the Prado Basin.

- Monitor the progress of the heat drying systems at the City of Corona and the Encina Wastewater Authority with emphasis on the marketing programs for the drying product.

- Continue to evaluate evolving technologies for the treatment and reuse of biosolids.

- Remain open to new proposals for contracting biosolids reuse/disposal similar to the current EnerTech proposal. Investigate and inform the SOCWA Engineering Committee and Board.

- Follow the decision path identified in Figure 14.1 for either the implementation or non-implementation of the Prima Deshecha Compost Facility.

- Prepare an update to the SOCWA Biosolids Management Strategic Plan in mid- to late 2007 and, at minimum, every two years thereafter.