REPORT BY THE

AUDITOR GENERAL

OF CALIFORNIA

THE CITY OF LOS ANGELES' COMPLIANCE WITH A FEDERAL COURT ORDER TO UPGRADE ITS HYPERION SEWAGE TREATMENT PLANT

P-746 **MAY 1988**

REPORT BY THE

OFFICE OF THE AUDITOR GENERAL

P-746

THE CITY OF LOS ANGELES' COMPLIANCE WITH A FEDERAL COURT ORDER TO UPGRADE ITS HYPERION SEWAGE TREATMENT PLANT

MAY 1988

Telephone:
(916) 445-0255

STATE OF CALIFORNIA
Office of the Auditor General
660 J STREET, SUITE 300
SACRAMENTO, CA 95814

Thomas W. Hayes
Auditor General

May 25, 1988 P-746

Honorable Bruce Bronzan, Chairman
Members, Joint Legislative
Audit Committee
State Capitol, Room 448
Sacramento, California 95814

Dear Mr. Chairman and Members:

The Office of the Auditor General presents its report concerning the City of Los Angeles' $1.1 billion construction program to improve the city's Hyperion Sewage Treatment Plant. The report concludes that the city has spent $77 million more than it originally estimated and has taken 38.5 months longer than it originally scheduled to construct its new sludge processing plant, the Hyperion Energy Recovery System. The report also points out that the city has generally complied with a 1987 amended consent decree by stopping its discharge of sewage sludge into the ocean by December 31, 1987, and by meeting other decree requirements.

Respectfully submitted,

THOMAS W. HAYES
Auditor General

TABLE OF CONTENTS

SUMMARY

RESULTS IN BRIEF

The City of Los Angeles (city) is in the midst of a $1.1 billion construction program to improve the city's Hyperion Sewage Treatment Plant (Hyperion Plant). The city has already spent $356 million of this on the construction of its new sludge processing plant, the Hyperion Energy Recovery System (HERS). The remaining approximately $800 million will be spent on other improvements at the Hyperion Plant that will enable the city to provide secondary treatment to all of the city's sewage by 1998, as required by a federal court order. During our review of this program, we found the following specific conditions:

- The HERS has cost $77 million more than the original construction bids and will take 38.5 months longer to complete than the city's consultant originally estimated;

- The city, the State Water Resources Control Board (state board), and the United States Environmental Protection Agency (EPA) participated in a five-year study of various sludge management alternatives before deciding to use the HERS to process the city's sludge;

- The city has generally complied with a 1987 amended consent decree by stopping its discharge of sewage sludge into the ocean by December 31, 1987, and by meeting other decree requirements. However, it has violated the amended consent decree by not reporting accidental discharges of insufficiently treated sewage into the Pacific Ocean; and

- The city has established a master schedule for providing required secondary treatment of all municipal sewage by December 31, 1998, and it is proceeding with projects to meet that requirement.

BACKGROUND

The Federal Water Pollution Control Act requires the city to provide secondary treatment to all of its sewage before piping it into the ocean. In addition, this act prohibits the city from discharging sewage sludge into the ocean. Because the city failed to comply with these provisions, the United States Department of Justice filed a lawsuit against the city. To avoid litigation, the city entered into a consent decree with the federal court in June 1980, which was eventually amended to require that the city stop discharging sewage sludge into the ocean by December 31, 1987. The amended consent decree also required the city to have its new sludge processing plant, the HERS, operational by 1989 and to provide full secondary treatment to all of the city's sewage by 1998.

PRINCIPAL FINDINGS

The Hyperion Energy Recovery System Is Costing More and Is Taking Longer To Complete Than Originally Estimated

Between 1981 and 1983, the city estimated that the HERS would cost $222 million to build, and between 1983 and 1986, the city received construction bids totaling $158 million. However, in March 1988, the city released a report stating that the cost of the HERS had reached about $235 million by December 19, 1987, for construction costs alone. In addition, the city has spent an estimated $121 million for city employees who have worked on the HERS, design and construction management consultants, and startup equipment and supplies to complete the HERS. Similarly, in 1981, the city's consultant projected that the HERS would be fully operational by July 1985; however, the city did not have the HERS fully operational by July 1985. It is currently working toward meeting the 1989 deadline imposed by the current consent decree.

During the construction of the HERS, the city has issued change orders that have increased the project's cost by $77 million and that have extended the date by 38.5 months that the HERS will be fully operational. A number of the change orders were needed to correct deficiencies in the original design of the HERS. In addition, a number of the change orders have been issued to correct problems that the city could not have reasonably anticipated because of the innovative and, therefore, unproven nature of the HERS technologies.

The City of Los Angeles Studied Numerous Alternatives Before Selecting the Hyperion Energy Recovery System

Starting in 1974, the city, in cooperation with other wastewater treatment agencies, the state board, and the EPA, conducted a five-year, $3.5 million study to evaluate the feasible approaches to sludge management for the city and other local governments participating in the study. After considering all possible approaches, the study group identified six alternatives that it subsequently evaluated in depth. These included transporting the sludge out of Los Angeles County for treatment, composting and recycling the sludge, dehydrating and incinerating the sludge, and continuing the city's practice of disposing of the sludge into the ocean. Of the six alternatives, the study group recommended a sludge dehydration and incineration method using the Carver-Greenfield process. At the time, the city considered this the most desirable alternative because it was less costly and more energy efficient than other sludge disposal methods. Moreover, the city would be able to recover energy during this process and convert the energy to electricity.

The City of Los Angeles Has Generally Complied With the 1987 Amended Consent Decree

The city first entered into a consent decree in 1980 because it had violated terms of its National Pollutant Discharge Elimination System permit issued under the Federal Water Pollution Control Act by continuing to dispose of its sewage sludge into the ocean past a 1978 deadline. The consent decree, which was amended in 1987, required that the city discontinue its practice of dumping sewage sludge into the ocean. The city ceased dumping its sludge into the ocean before the December 31, 1987 deadline. It now disposes of its sludge by processing it in the HERS facility, by dumping it in landfills, and by contracting with a private company that composts or recycles it. In addition, the city is in the process of contracting with a second company to compost or recycle the city's sludge.

The city has also complied with other stipulations of the amended consent decree. For example, the city provides the court with required reports on the city's compliance with the consent decree; it meets water quality standards for the treated wastewater that it discharges into the ocean; and it has provided a new training program for the plant's operators. However, the city violated the amended consent decree on at least five occasions in 1987 by not reporting accidental discharges of insufficiently treated sewage. The Los Angeles Regional Water Quality Control Board has referred these violations to the California attorney general, who has begun litigation against the city.

The City of Los Angeles Is Proceeding With Its Plans To Provide Full Secondary Treatment to All City Sewage by 1998

The Federal Water Pollution Control Act requires the city to provide full secondary treatment to all city sewage. The amended

consent decree requires that the city accomplish this by 1998. In accordance with its master plan, the city has initiated construction projects at the Hyperion Plant. The city estimates that this expansion of the Hyperion Plant, which began on December 1, 1987, will cost approximately $800 million. According to the United States Environmental Protection Agency, as long as the city meets key future milestones, it should be able to meet the 1998 deadline despite the delays that it has experienced. In 1998, when all of the improvements to the plant are scheduled to be complete, the city will be able to provide full secondary treatment to all of the city's sewage.

AGENCY COMMENTS

The City of Los Angeles and the State Water Resources Control Board concur with our conclusions.

INTRODUCTION

The Federal Water Pollution Control Act, as amended in 1972, generally prohibited the discharge of sewage sludge into the Pacific Ocean, except in accordance with a permit. The City of Los Angeles (city) obtained a National Pollutant Discharge Elimination System (NPDES) permit allowing it to discharge sludge into the ocean, but only until 1978. Because the city failed to comply with this deadline, it violated the provisions of the NPDES permit and, consequently, the federal act. The United States Department of Justice, at the request of the United States Environmental Protection Agency (EPA), filed a lawsuit against the city on August 12, 1977, and to avoid extensive litigation, the city entered into a consent decree on June 20, 1980, with the United States Department of Justice, the EPA, and the State Water Resources Control Board (state board).

The original consent decree of 1980 required the city to stop discharging sludge into the ocean by July 1, 1985. On August 27, 1985, the court modified the consent decree and extended that deadline to February 15, 1986. Because the city did not meet this deadline, the court again amended the consent decree on February 19, 1987, requiring the city to stop discharging sludge into the ocean by December 31, 1987, and to begin operating the Hyperion Energy Recovery System (HERS) by June 30, 1989. Table 1 presents a chronology of consent decree deadlines.

TABLE 1

CONSENT DECREE DEADLINES

	Effective Date	Deadline to Stop Discharging Sludge	HERS Operational Deadline
Original Consent Decree	6/20/80	7/01/85	
Modified Consent Decree	8/27/85	2/15/86	2/15/86
Amended Consent Decree	2/19/87	12/31/87	6/30/89

Funding for Expansion of the Hyperion Wastewater Treatment Plant

The state board is responsible for protecting and enhancing the quality of all waters of the State. Under its water quality program, the state board administers both state and federal programs for awarding grants to local governments to construct wastewater treatment facilities. The federal government awards grants through the EPA that pay from 55 to 75 percent of the construction costs for wastewater treatment facilities and up to 85 percent for facilities designated as innovative or alternative technologies. The State awards grants through previous bond issues that provide at least 12.5 percent of project funding. The EPA and the state board are both participating in the funding of improvements to the city's Hyperion Wastewater Treatment Plant (Hyperion Plant).

To stop discharging sludge into the ocean by the end of 1987 and to provide secondary treatment to all city sewage by 1998 as required by the consent decree, the city decided to construct over $1.1 billion in improvements to the Hyperion Plant. The city will spend approximately $800 million of the $1.1 billion on improvements that will enable the city to provide secondary treatment to all of the city's sewage by 1998. The city has already spent an additional $356 million on the city's new sludge processing plant, the HERS, which is located on the grounds of the Hyperion Plant. The State has funded about $25.2 million of the cost to plan, design, and construct the HERS.

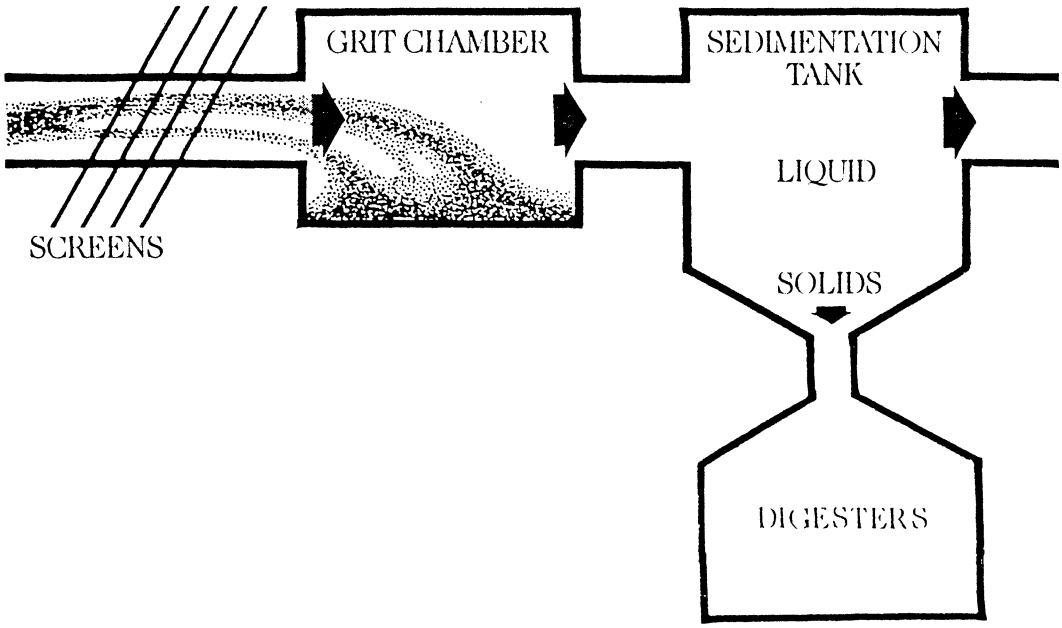
Sewage Treatment Methods

The basic function of a wastewater treatment plant is to accelerate the natural processes by which water purifies itself. In this report, we will refer to two basic methods for treating wastewater: primary and secondary treatment. During primary treatment, wastewater, or sewage, flows through a screen used to remove large floating objects, such as sticks and rags. Some plants use a grinder in conjunction with the screens to shred heavy solid material, which is removed later in a settling tank. After screening, the sewage flows into a grit chamber where small stones, grit, sand, and cinders settle to the bottom. The materials that are removed from the sewage are usually taken to a landfill. The sewage is then treated in a sedimentation tank to remove the solids that sink to the bottom and form a mass called sludge. To complete the primary treatment process,

the sludge is removed from the sedimentation tank before the remaining wastewater, the effluent, is further treated or discharged into rivers, streams, or the ocean. The sludge is usually hauled to a landfill. Illustration 1 shows the primary treatment process.

ILLUSTRATION 1

PRIMARY TREATMENT PROCESS
FOR SEWAGE SLUDGE



Source: A 1982 brochure entitled "The Hyperion Energy Recovery System, A Major Resource Recovery Project for Los Angeles."

After primary treatment, sewage is further purified through secondary treatment. Secondary treatment uses the bacteria present in sewage and either trickling filters or the activated sludge process to remove up to 90 percent of the organic matter in sewage. A trickling filter consists of a bed of stones three-to-ten feet deep through which sewage passes. Bacteria that have accumulated on the stones consume most of the organic matter in the sewage as the sewage flows through the stones. The cleaner water trickles out through pipes in the bottom of the filter for further treatment.

The activated sludge process also relies on bacteria that exist in sludge to consume unwanted organic matter in the sewage. This process accelerates the work of the bacteria by bringing air and sludge heavily laden with bacteria into close contact within the sewage. Sewage that has been through the primary treatment stage is pumped into an aeration tank containing sludge and allowed to remain for several hours while the bacteria break down the organic matter in the sewage. The sewage then flows to another sedimentation tank where the sludge is removed. A portion of the activated sludge that is produced during secondary treatment is used again by returning it to an aeration tank and mixing it with new sewage.

History of the Hyperion Plant

The Hyperion Plant began operating in the early 1950s. It processes almost 400 million gallons of sewage per day and is operated by the city's Bureau of Sanitation. This facility provides primary treatment to all of the sewage that flows to the Hyperion Plant and then provides secondary treatment to about 30 percent of its sewage. After primary or secondary treatment, the processed sewage water is discharged into the Pacific Ocean five miles offshore from the Hyperion Plant. Until recently, the city also disposed of some of its sewage sludge in the same manner. The sludge that was not discharged into the ocean was trucked to landfills. To provide an alternative to discharging its sludge into the ocean, the city is building a new sludge processing plant, the HERS.

The HERS

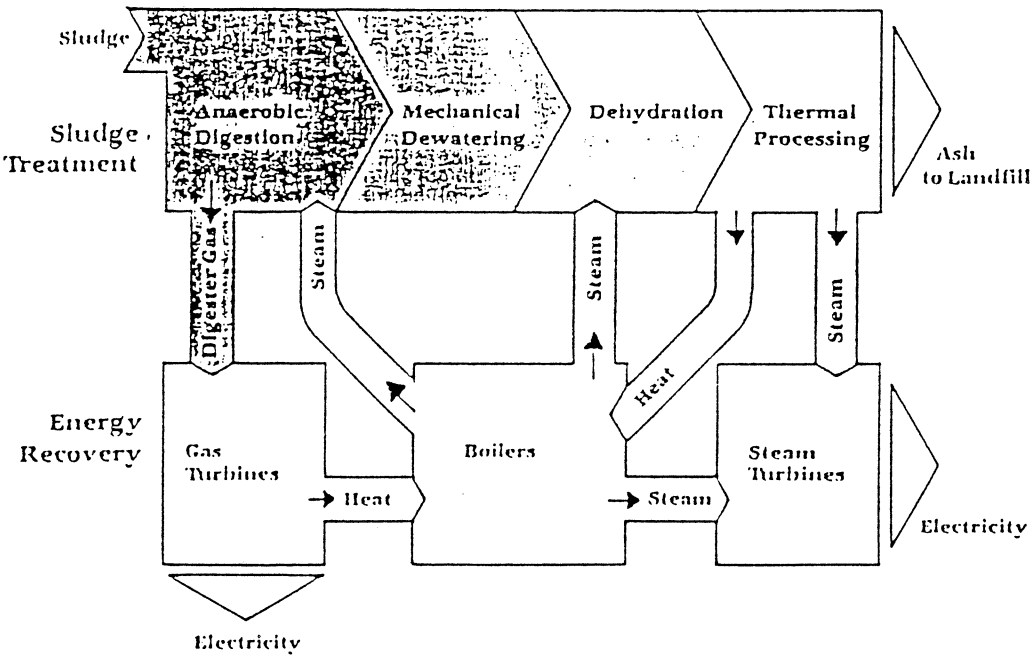
The HERS is a process that dewaters, dehydrates, and then incinerates the Hyperion Plant's sewage sludge while converting to electricity the energy recovered during the process. The HERS process consists of six basic components: sludge thickening, anaerobic digestion of the sludge, sludge dewatering using centrifuges, sludge dehydration, sludge combustion, and energy recovery. To prepare the sludge for the subsequent steps in the HERS process, the sludge is first thickened. Then the sludge is sent to the anaerobic digesters, which reduce the population of disease-causing microorganisms that

exist in raw sludge. Anaerobic digestion also reduces other noxious characteristics of raw sludge, such as its foul odor. A by-product of the digestion process is methane gas, which the city converts to electricity in the HERS' energy recovery facility. The sludge is then transported to the centrifuges where enough moisture is extracted from the sludge to create a slurry that is about 80 percent liquid. The next step is sludge dehydration, which is accomplished by the Carver-Greenfield process, a patented thermal process using a four-stage dehydration system for sludge drying. This process is designed to extract moisture from the slurry to create a dry powder that contains only one percent liquids. After the dehydration step, the sludge, which we will refer to as sludge powder, is transported to the combustion facility where it is burned as a fuel.

The energy produced during the combustion of the powder and the digestion process is converted to electrical energy and is used to supply the Hyperion Plant's energy needs. The HERS is designed to produce more electrical energy than is needed to operate the plant, and the city plans to sell the surplus electrical energy to the Los Angeles Department of Water and Power. Burning the sludge powder also produces an ash, which can be hauled to a landfill. Because the HERS uses the Carver-Greenfield process and other state-of-the-art technologies for processing sewage, the EPA has designated specific components of the HERS as innovative technologies. Illustration 2 shows the HERS process.

ILLUSTRATION 2

THE HERS PROCESS
FOR TREATING SEWAGE SLUDGE



Source: A 1982 brochure entitled "The Hyperion Energy Recovery System, A Major Resource Recovery Project for Los Angeles."

The HERS is located on the same property as the Hyperion Plant, which is near the Los Angeles International Airport. The city's Bureau of Engineering supervises the Hyperion Construction Division, which is responsible for building the HERS. The EPA monitors the city's construction of the HERS and has contracted with the United States Army Corps of Engineers to provide construction review services.

SCOPE AND METHODOLOGY

The purpose of this audit was to obtain information on the city's selection of the various technologies included in the HERS and on the operational problems that the city has experienced with the HERS. We also evaluated the city's construction of the HERS and the city's compliance with the amended consent decree.

During our audit we obtained information regarding the steps that the city followed in selecting the technology used in the HERS, including the options for sludge management that the city considered in its Los Angeles/Orange County Metropolitan Area study. We also reviewed the history of the city's long-range planning for sludge management. In addition, we obtained information regarding the operational problems that the city has experienced during the startup phase of the new HERS plant.

To evaluate the city's management of consultant and construction contracts, we reviewed the contracts of two major consultants in the HERS project and determined whether the city had complied with applicable federal, state, and city construction regulations regarding proper advertising, bidding, selecting, and monitoring of each contract. To determine whether the HERS staff properly selected construction consultants and contractors, we tested a sample of each and verified their compliance with federal, state, and city guidelines for advertising, bidding, and awarding of contracts.

In addition, we reviewed the stipulations of a sample of contracts with HERS consultants to verify that the consultants promptly provided the city with all agreed-upon services.

We also reviewed other phases of HERS' construction management, including the city's review of shop drawings, inspection of completed phases of construction, approval of construction change orders, and controls over contract payments. Specifically, we reviewed all of the HERS construction procedures for each of the above activities, and we reviewed pertinent federal and state guidelines governing public construction projects. To determine whether the city properly reviewed, approved, and inspected the equipment specified in the contract, we reviewed a number of shop drawings of various pieces of HERS equipment. Also, we evaluated the city's fiscal controls over payments to contractors and consultants and examined a sample of construction payments for proper review and authorization. We found no weaknesses in the city's selection and management of consultant and construction contracts, review of shop drawings, inspection of completed phases of construction, approval of change orders, or controls over payments to contractors and consultants.

Our review also included an examination of the city's compliance with the terms of the consent decree with the court, state, and federal government. We verified instances when the city had met stipulations of the decree and determined what the city has done to meet upcoming deadlines of the consent decree. Finally, we documented

the city's plans for providing full secondary treatment of all city sewage by 1998, and we determined the steps taken by the city to assure the feasibility of its master schedule for making improvements to the Hyperion Plant.

CHAPTER I

THE HYPERION ENERGY RECOVERY SYSTEM IS COSTING MORE AND IS TAKING LONGER TO COMPLETE THAN ORIGINALLY ESTIMATED

Between 1981 and 1983, the City of Los Angeles (city) estimated that the Hyperion Energy Recovery System (HERS) would cost $222 million to construct, and between 1983 and 1986, the city received construction bids totaling $158 million. However, in March 1988, the city released a report stating that the cost of the HERS had reached about $235 million by December 19, 1987, for construction costs alone. Similarly, in October 1981, the city's consultant, Metcalf and Eddy Engineers, projected that the HERS would be fully operational by July 1985; however, the city did not have the HERS fully operational by July 1985. It is now working toward meeting the June 30, 1989 deadline imposed by the current consent decree. During the construction phase of the HERS, the city has issued change orders that have increased the cost to construct the HERS by $77 million and that have extended by 38.5 months the date that the HERS will be fully operational. Although many of these change orders were needed to correct deficiencies in the original design of the HERS, a number of the change orders have been issued to correct problems that the city could not have reasonably anticipated because of the innovative and, therefore, unproven nature of the HERS technologies.

The HERS Is Costing More Than the City Originally Estimated

On March 2, 1988, the city released a report that identified all of the costs associated with the HERS construction as of December 19, 1987. Two types of costs are included in this report: construction costs and nonconstruction costs. Construction costs are the funds paid to contractors to build the HERS and procure the equipment necessary to operate the HERS. Nonconstruction costs comprise the costs to plan and design the HERS; the cost of labor provided by city employees for engineering, inspection, and other services; and the cost of other direct charges, which include nonlabor items such as travel, janitorial services, and telephone services. Nonconstruction costs also include the cost of construction and design consultants.

In 1981, 1982, and 1983, the city prepared its estimates of the cost to construct the HERS.[1] The city's estimate of $222 million to build the HERS included construction costs only. Bids received for the construction of the HERS totaled $158 million, $64 million less than the cost estimated by city engineers. The city attributed this difference to the depressed state of the construction industry at the time that the bids were received. During construction,

---

[1]The estimate for one of the construction segments, paving and landscaping around the HERS buildings, was prepared in 1986.

the city issued change orders totaling $77 million. This brought the total construction costs of the HERS to $235 million as of December 19, 1987.

During the planning, design, and construction of the HERS, the city spent an additional $121 million for construction and design consultants, city employee labor, and other direct charges. Part of this $121 million was also for startup equipment and supplies. Startup equipment and supplies include replacement parts that have a short useful life and may be unique to the HERS and, therefore, difficult to obtain quickly. A shortage of these parts, such as pumps, motors, valves, meters and bearings, could prevent the HERS from operating. Another portion of the $121 million was for modifications such as changes in pipe fittings, pipe elbows, and valves, which the city made to the HERS process as a whole and could not be identified with one specific contract. As of December 19, 1987, the construction and non-construction costs totaled $356 million.

Deficiencies in the Original Design of the HERS Have Caused the HERS To Take Longer To Complete Than Originally Estimated

In October 1981, the city's consultant, Metcalf and Eddy, projected that the city could have the HERS operating by July 1985. Although the city did not have the HERS fully operational by July 1985, it is now working toward the 1989 deadline imposed by the current consent decree.

By December 19, 1987, the city had issued $77 million in change orders during the construction of the HERS. These change orders have added 38.5 months to the original schedule. Some of the change orders were needed to correct design deficiencies. According to a September 1987 report by the United States Environmental Protection Agency (EPA), some of the operational problems that the city has experienced with the HERS may have been the result of deficiencies in the original design of the HERS. However, according to the report, the EPA acknowledges that the city had insufficient time to design the HERS. In addition, the EPA recognizes that the city has issued numerous change orders for the HERS, in part, because the city did not have enough time to review the quality of the design drawings.

The director of the city's Wastewater Program Management Division also stated that the time in which the city attempted to design the HERS was extraordinarily short. He pointed out that the consent decree allowed the city two years to design the HERS, but two years is a short period of time to design even a traditional sewage treatment plant, much less a plant as mechanically complex as the HERS. According to the director of the city's Wastewater Program Management Division, the city lacked enough time during the design process to have someone uninvolved in preparing the design drawings check the quality of each of the drawings, yet an independent check of each of the design drawings is normal in any design process. According to the director, because of shortcomings in the design process, the city has had to redesign portions of the HERS during the construction phase of the project, thus delaying the startup of the HERS.

Problems With the HERS
Sludge-Dehydration Process

The city has been able to operate the sludge thickening, anaerobic digestion, and centrifuge components of the HERS at their design capacities. However, during February 1988, the city was only able to operate the energy-recovery component of the HERS at about 50 percent of its design capacity because full operation of this component is dependent on full operation of the sludge-combustion component, which the city is still testing. The city began testing the sludge-dehydration component in April 1986 by running water through the process, but it has not yet been able to operate this component at 100 percent of its capacity. In December 1987 and March 1988, the city completed test runs of the sludge-combustion component, and based on these tests, the city is modifying the sludge-combustion component and plans to test this component again in April 1988.

Of the six components of the HERS, the sludge-dehydration component has caused the city the most problems. To dehydrate the sludge, the city uses the Carver-Greenfield evaporation process, a mechanically complex process that uses numerous pieces of equipment such as heat exchangers, pumps, oil distillers, storage vessels, and conveyor belts. Although the construction of the sludge-dehydration component is 99 percent complete, the city has been unable to run the sludge-drying component for more than a few days at a time without having to shut down the facility for repair, cleaning, or modification. The shutdowns have been necessary because the city has

experienced operational problems or failures with selected pieces of equipment. For example, 22 of the HERS sludge feed pumps have suffered premature erosion of certain parts of the pumps because the city's sludge is more abrasive than the city originally anticipated. The city has recently replaced these pumps at a cost of about $354,000. According to Mr. Charles Greenfield, one of the creators of the Carver-Greenfield process, the amount of pump failure that the city has experienced at the HERS is "way out of line" with anything that has been experienced at any other facility using the Carver-Greenfield process. The abrasiveness of the city's sludge has also resulted in premature wear of portions of the HERS piping, which has had to be replaced at a cost of $5,500.

Another problem that the city has had to face is the plugging of the HERS' heat exchangers. The sludge-dehydration component of the HERS consists of 24 spiral heat exchangers, which are there to improve the thermal efficiency of the sludge-dehydration process. However, these spiral heat exchangers are being plugged with hairs and other fibers that are present in the sewage sludge. Each time the spiral heat exchangers plug up, the city has to clean out the plugged heat exchangers with high pressure water. This involves removing equipment insulation, disconnecting system piping, opening up the heat exchangers, and re-installing the equipment and piping after the heat exchangers have been unplugged, a process which takes a minimum of eight hours for each exchanger. The city may ultimately have to replace the existing spiral heat exchangers or modify the HERS process

to eliminate the repeated plugging problem. As of January 20, 1988, the city was awaiting the recommendation of a group of city and consultant engineers who have been assigned to study this problem and recommend a solution.

The city has encountered numerous other problems with the HERS. For example, the sludge does not always flow through the system's piping and equipment as the designers intended. This is especially a problem in the dehydration process before much water has been extracted from the sludge, and it leads to plugging of the pipes, valves, and other pieces of equipment. Also, the city has experienced problems with conveying the dried sludge throughout the process. This has led to the discovery of sludge particles in stages of the dehydration system where sludge particles do not belong.

The EPA is concerned about the many difficulties that the city has encountered with the HERS sludge-dehydration component. The EPA, which is responsible for federal funding of projects that use innovative technologies, has halted funding of future projects that use the Carver-Greenfield process to dehydrate sewage sludge until existing Carver-Greenfield facilities have demonstrated that they can yield full-scale, sustained, cost-effective performance.

The HERS Is an Unproven Process for the Treatment of Sewage Sludge

Part of the reason that the city is having problems starting up the HERS is that the HERS is an innovative process, and, as the EPA concluded in a September 1987 report on the Carver-Greenfield sludge-drying technology, startup problems are likely in an innovative process. A number of the change orders that the city has issued during the construction of the HERS have been issued to correct problems that could not have been anticipated because of the innovative and, therefore, unproven nature of the HERS technologies. The EPA considers a process innovative if it is a new process that has not been fully proven but is promising based on results from research and demonstration projects. By designating selected projects as innovative and supporting the departure from standard engineering and design practices, the EPA hopes to encourage the design and construction of more efficient wastewater treatment projects. To encourage innovation, federal law and EPA regulations provide incentives to municipalities that incorporate innovative technologies into their sewage treatment facilities. For example, the EPA will provide increased grant funding to new sewage treatment projects that the EPA has deemed state of the art. The EPA also may pay 100 percent of the cost of any grant-funded project that is innovative but does not operate as it was intended to, thus encouraging municipalities to take risks.

The EPA funded portions of the HERS project as innovative. Two important factors that the EPA considers in determining whether a project is innovative are the project's cost and the project's energy requirements. To be considered innovative, a new sewage treatment project must be either less costly than the comparable traditional treatment process or more energy efficient than the comparable traditional treatment process. In funding portions of the HERS as innovative, the EPA recognized that the HERS is more energy efficient than conventional facilities in handling sewage sludge. The EPA also recognized that the HERS included technologies that were not yet proven for the processing of sewage sludge.

Although over 60 industrial plants, such as rendering and food processing plants, are using the Carver-Greenfield process to extract water from a slurry, the HERS is the first facility in the United States to use the Carver-Greenfield process for drying sewage sludge. Two cities in Japan are using the Carver-Greenfield process to dry their cities' sewage sludge, but these cities are processing much less sludge than the City of Los Angeles is attempting to process. Before the city decided to use the Carver-Greenfield process as part of its plan to dispose of the city's sludge, one of the city's design consultants conferred with the operators of selected Carver-Greenfield plants in this country and with the operators of one of the Japanese plants about any problems that these operators had experienced in their Carver-Greenfield facilities. Operators of some of these plants had experienced problems similar to those that the City of Los Angeles is

experiencing. However, the city, the EPA, and the State Water Resources Control Board felt that problems with the HERS' Carver-Greenfield process could be minimized and that the process had a high potential for success.

The City Has Operated the HERS at a Portion of Its Design Capacity

Although the city has experienced problems and delays with the HERS, it has been able to partially operate the HERS. During October and November 1987, the city was experiencing mechanical difficulties with the HERS sludge-drying component and was able to evaporate only limited amounts of wet sludge using the Carver-Greenfield component. As a result of these difficulties, during October and November 1987, the city completed several modifications to this component. This allowed the city to feed wet sludge to the sludge-drying component on November 25, 1987, for the first time since October 28, 1987. The city continued to feed sludge to the sludge-drying component through December 1987 and January 1988. During this time, the city increased significantly the amount of sludge that it was able to dry in the HERS sludge-drying component. The city continued to operate the component until January 31, 1988, although, because of mechanical difficulties, it was unable to operate the component every day during this time.

During the 68 days between November 25, 1987, and January 31, 1988, the city was able to dehydrate sludge in the sludge-drying component 53 of those 68 days, or 78 percent of the

days. On the 53 days that it was able to dehydrate sludge, the city operated the sludge-drying component at an average of 6.4 percent of its design capacity. In addition, on one of the 53 days, the city operated the component at up to 35 percent of its design capacity. On February 1, 1988, the city stopped feeding sludge to the sludge-drying component to allow time for the city to make needed process modifications and component repairs. In March 1988, the city completed these modifications and repairs and once again began feeding sludge to the sludge-drying component. However, on March 23, 1988, after running the sludge-drying component intermittently for five days, the city discovered a deep groove on the inside of the component's centrifuge, which required that the city stop processing sludge through that centrifuge. As of March 25, 1988, the city had not decided whether to suspend the operation of the rest of the sludge-drying component until the damaged centrifuge could be replaced. The city's goal in its next test run of the sludge-drying component is to operate the component at a minimum of 30 percent of the system's design capacity.

CONCLUSION

The HERS is costing more and is taking longer to complete than originally estimated. The city originally estimated that the HERS would cost $222 million to build, and the city received construction bids totaling $158 million to build the HERS. However, in March 1988, the city released a report stating that the cost to construct the HERS had reached about

$235 million by December 19, 1987. Similarly, in October 1981, the city's consultants, Metcalf and Eddy Engineers, projected that the HERS would be fully operational by July 1985; however, the city failed to meet that date. The city is currently working toward meeting the 1989 operational deadline imposed by the current consent decree. During the construction of the HERS, the city has issued change orders that have increased the cost to construct the HERS by $77 million and that have extended by 38.5 months the date that the HERS will be fully operational. A number of the change orders were needed to correct deficiencies in the original design of the HERS. However, a number of the change orders have been issued to correct problems that the city could not have reasonably anticipated because of the innovative and, therefore, unproven nature of the HERS technologies.

CHAPTER II

THE CITY OF LOS ANGELES STUDIED NUMEROUS ALTERNATIVES BEFORE SELECTING THE HYPERION ENERGY RECOVERY SYSTEM

The city, in cooperation with other wastewater treatment agencies, the State Water Resources Control Board (state board), and the EPA, conducted a five-year, $3.5 million study to evaluate feasible approaches to sludge management and to select a sludge-management plan. The study group, known as the Los Angeles/Orange County Metropolitan Area (LA/OMA) evaluated alternative systems for sludge management. After selecting six alternatives for in-depth study, the LA/OMA selected a thermal-processing alternative that involved the dehydrating and eventual burning of the city's sludge. On October 23, 1980, the Los Angeles City Council accepted this alternative, which uses the Carver-Greenfield process, because at the time it was believed less costly and more energy efficient than conventional methods of sludge management. Moreover, the city would be able to convert to electricity the energy produced during the process.

The Formation of the LA/OMA

The Federal Water Pollution Control Act, as amended in 1972, generally prohibited the discharge of sewage sludge into the Pacific Ocean, except in accordance with a permit. The city obtained a National Pollutant Discharge Elimination System (NPDES) permit allowing it to discharge sludge into the ocean, but only until 1978. To comply

with this act and the NPDES permit, the city, the Los Angeles County Sanitation District, and the Orange County Sanitation District entered into a Joint Powers Agreement with the state board and the EPA in October 1974. These agencies formed a regional management program for wastewater solids for the Los Angeles/Orange County Metropolitan Area, known as the LA/OMA. The LA/OMA conducted a five-year $3.5 million study. The LA/OMA's goal was to develop a long-term plan for reuse and disposal of the sludge resulting from industrial and municipal wastewater treatment in the Los Angeles/Orange County Metropolitan Area in an environmentally, economically, and socially acceptable manner.

In accordance with the Joint Powers Agreement, a five-member policy board, comprising representatives of the city, the sanitation districts of Los Angeles and Orange counties, the state board, and the EPA, was established to guide and direct the LA/OMA. A project manager was assigned the responsibility for conducting the work. Other personnel employed by the LA/OMA included three engineers, an environmental scientist, two persons assigned to coordinate public participation, and support personnel. In addition, consultants were hired to evaluate various alternatives for sludge management.

Sludge-Management Alternatives

After considering the feasible approaches to disposing of the sewage sludge, the LA/OMA identified 18 candidate systems for preliminary analysis. Each of the 18 systems was designed to recover, reclaim, or recycle at least one of the potential resources contained in sewage sludge, such as energy or nutrients. According to the LA/OMA, each of the 18 systems considered was also "technically feasible, compatible with existing treatment facilities, reasonably cost-effective and devoid of excessive adverse environmental effects."

The LA/OMA analyzed the 18 systems, using both quantitative and qualitative criteria. The quantitative attributes examined were capital costs, operations and maintenance costs, land acquisition costs, energy use, and air emissions. The qualitative attributes examined were environmental concerns, implementation feasibility, public health impacts, reliability, flexibility, land availability, land use effects, social impacts, and political constraints. The LA/OMA chose some of the elements from the 18 candidate systems and created six sludge management alternatives, which it evaluated in depth. These alternatives included (1) transporting the sludge out of Los Angeles/Orange County Metropolitan Area for treatments such as solar drying, disposing in landfills, and recycling; (2) composting and recycling the sludge in the Los Angeles area; (3) thermal processing, including drying and burning the sludge while recovering energy from the process; (4) disposing of the sludge into the ocean at deepwater

locations; (5) processing primary and secondary sludge separately; and (6) continuing present practices. From these six alternatives, the LA/OMA formulated 12 specific sludge-management projects. At the conclusion of the LA/OMA's analysis and evaluation of the 12 projects, LA/OMA determined that the project using the thermal-processing alternative was the most feasible for sludge management for the city.

The city subsequently adopted this project for several reasons. Specifically, this process is more cost effective than other methods of sludge disposal because energy is recovered during the process and converted to electricity. Also, this process reduces, by an approximate factor of ten, the volume of material that must be transported to a landfill. Finally, the city already had the land on which to construct this treatment project whereas some of the other projects would have required that the city obtain additional land. The Los Angeles City Council accepted the project using thermal processing on October 23, 1980, and EPA Region IX approved it on December 5, 1980.

CONCLUSION

In response to the 1972 amendments to the Federal Water Pollution Control Act, which set a deadline for stopping the discharge of sewage sludge into the ocean, the City of Los Angeles, in cooperation with other wastewater treatment agencies, the State Water Resources Control Board, and the United States Environmental Protection Agency, conducted a

five-year, $3.5 million study to evaluate feasible approaches to sludge management and to select a sludge-management plan. The Los Angeles/Orange County Metropolitan Area Project evaluated numerous alternative systems for sludge management and selected a thermal processing alternative, which the Los Angeles City Council accepted on October 23, 1980.

CHAPTER III

THE CITY OF LOS ANGELES HAS GENERALLY COMPLIED WITH THE 1987 AMENDED CONSENT DECREE

The city has generally complied with the stipulations of the amended consent decree. The amended consent decree, dated February 19, 1987, required that the city stop discharging sewage sludge into the Pacific Ocean by December 31, 1987. The city discontinued discharging sludge into the ocean at Santa Monica Bay on November 2, 1987. The city has also complied with other stipulations of the amended consent decree. For example, the city submits the required reports to the court, and it has completed systems for operator training and maintenance management for the Hyperion Plant. It also meets the interim requirements for the quality of treated wastewater that it legally discharges from the Hyperion Plant into the ocean. However, the city has violated the amended consent decree by not reporting accidental discharges of insufficiently treated sewage into Santa Monica Bay on at least five occasions in 1987. Consequently, the Los Angeles Regional Water Quality Control Board (regional board), which monitors water quality for the federal government, referred the violations to the California attorney general, who has filed a civil suit against the city. The attorney general and the city are currently attempting to negotiate a settlement to the suit.

The City Has Stopped Dumping Sludge Into the Ocean

The 1987 amended consent decree required that the city stop discharging sludge into the ocean by December 31, 1987. The city met this deadline when it stopped discharging sludge into Santa Monica Bay on November 2, 1987. The regional board has confirmed that the city has stopped its disposal of sewage sludge into the ocean and now uses three alternative methods of sludge disposal. Specifically, the city has begun the testing and startup phase of its HERS plant and, during January 1988, has dried approximately 7 percent of its sludge in the plant. However, because the HERS plant is not yet operating at full capacity, the city has also developed supplemental sludge disposal methods. The city has disposed of most of its sludge through contracts with four trucking firms that haul the sludge to landfills. In January 1988, the four trucking firms hauled approximately 84 percent of the city's sludge to two landfills in the Los Angeles area.

In addition, the city has contracted with one company and is in the process of contracting with a second to develop innovative methods of sludge disposal. The city contracted with Chemfix Technologies, Inc., to haul sludge to a site at the Los Angeles airport, where the sludge is mixed with cement-like compounds that render the sludge inert and usable as the top layer of sanitary

landfills. In January 1988, Chemfix hauled approximately 9 percent of the city's sludge from the Hyperion Plant. The city is also in the process of contracting with H. Clay Kellogg, Inc., to haul sewage sludge to a site in the San Joaquin Valley, where the firm will compost sludge for future use as a fertilizer. According to one of the HERS' plant managers, the city anticipates that these two firms will eventually be capable of using up to 25 percent of the sludge produced at the Hyperion Plant.

In 1987, to assist its offsite disposal of sludge, the city made two improvements at the Hyperion Plant. In late 1987, the city began a project to quadruple the plant's capacity for loading partially dried sludge aboard trucks that transport it to landfills for disposal. The truck-loading facility, which cost an estimated $5 million to expand, allows the city to dispose of all of the sludge from the Hyperion Plant by trucking it to landfills, if necessary. For emergencies, the city also prepared a sludge storage site at the Hyperion Plant, which is capable of holding up to four days' sludge from the plant. These improvements, combined with the two innovative disposal methods used by Chemfix Technologies, Inc., and H. Clay Kellogg, Inc., will also provide a contingency for sludge disposal on weekends or during wet weather when landfills may be closed, or during emergencies, such as mechanical breakdowns that preclude the drying of sludge in the HERS.

The City Has Complied With Other Consent Decree Stipulations

Four times annually, the city reports as required to the United States District Court for the Central District of California, the specific steps that it has taken to comply with the requirements of the amended consent decree. The EPA evaluates each of these quarterly reports.

In its last two quarterly evaluations of the city's efforts to comply with the provisions of the amended consent decree, the EPA concluded that, with the exception of a series of sewage spills in 1987, the city has fully complied with the provisions of the amended consent decree.

For example, before the city completely stopped discharging sludge into the ocean, the amended consent decree required that the city meet monthly minimum amounts for hauling sludge to landfills. The treatment plant produces approximately 1,200 tons of sewage sludge per day (36,000 tons per month). The decree required that the city haul at least 2,000 tons per month, beginning February 19, 1987, and at least 5,000 tons per month, beginning August 19, 1987. The EPA confirmed that the city met the minimum monthly requirements of the decree. In one month, April 1987, the city reported that it hauled as much as 11,000 tons of sludge from the Hyperion Plant.

The city has also complied with all reporting requirements of the amended consent decree. Specifically, the city has provided the court with semiannual progress reports and quarterly updates detailing its compliance with the requirements of the decree. These reports also outline the status of future sewage projects, such as the expansion of the city's sewer system, which will enable the city to provide secondary treatment to all city sewage, and the status of a stormwater control project, which will reduce the amount of pollutants carried by stormwaters from the Hyperion Plant's service area into Santa Monica Bay. The city's reports also disclose that it met interim requirements regulating the discharge of treated wastewater from the Hyperion Plant into the ocean. These interim requirements regulate wastewater quality until the expansion of the city's secondary treatment facilities is complete.

In addition to reporting requirements, the amended consent decree required the city to complete and implement, by December 31, 1986, a system for the preventive maintenance of all facilities at the Hyperion Plant. The city complied with this stipulation by implementing a system for maintenance management on December 15, 1986; the EPA corroborated this.

The consent decree also set staffing and training requirements for operators, engineers, maintenance staff, and administrative and laboratory staff at the Hyperion Plant. It stipulated that the city hire and train, by July 1, 1987, a minimum number of personnel in selected job categories. The city reported to the court as of

June 1, 1987, that it had hired more than the minimum number of staff in each of these job categories.

The amended consent decree further stipulated that the city submit to the court by October 19, 1987, the draft of a training program for operators at the Hyperion Plant. In response, on October 9, 1987, the city submitted for the state board's review, a draft outline of a personnel-training program. The EPA corroborated this in a February 1988 evaluation of the city's compliance with consent decree requirements. The city hired a training consultant to develop a training program for all city personnel at wastewater treatment facilities owned by the city and for other Bureau of Sanitation personnel. The city anticipates that the training of all personnel will require three years to complete and will represent a total training system for all of the city's sanitation staff.

Another stipulation of the consent decree mandates that the city complete a draft environmental impact report, within 18 months of the beginning date of the decree, addressing the hauling and offsite disposing of all sewage sludge produced at the Hyperion Plant. In November 1987, the city was in the process of awarding a contract to Engineering Science, Inc., to complete the report by August 19, 1988, the court-mandated deadline.

Finally, the city complied with the consent decree by delivering to the United States Department of the Treasury a check for $625,000 on March 12, 1987, as payment for failing to comply with previous consent decree requirements.

The Report of a Fire
at the HERS Facility

The 1987 amended consent decree and its predecessor, the 1985 modified consent decree, both require that the city report to the court any occurrence that will have an impact on the city's ability to meet the consent decree deadlines. In compliance with this, the city reported a smoldering fire that had been discovered on February 2, 1987, in the sludge dehydration component of the HERS. The city informed the state board of the fire the day after it was first discovered. According to the EPA engineer who was responsible for overseeing the city's compliance with the consent decree, the city acted responsibly in reporting this fire to the EPA. Also, the morning after the fire was discovered, the city reported the fire to the city fire department. The city engineers have speculated that the cause of the fire was a combination of the carryover of hot smoldering dust into the overhead vapor lines, combined with air leakage into the overhead vapor system. The city estimates that it will have spent approximately $2.6 million of its own funds in change orders to clean up and repair the damage caused by the fire and to modify the HERS piping to prevent a recurrence of similar problems. Although the fire has not yet had an impact on the city's ability to meet any of the consent decree

deadlines, the city is unclear whether this fire will delay its efforts to get the HERS fully operational by June 30, 1989, as required by the amended consent decree.

Violations of the Federal
Water Pollution Control Act

The amended consent decree requires that the city continue to comply with the provisions of the Federal Water Pollution Control Act and the National Pollutant Discharge Elimination System (NPDES) permit, which prohibit the city from discharging into the ocean wastewater that contains excessive levels of pollutants. The regional board and the EPA issued the NPDES permit jointly to the city in 1975. The permit requires the city to notify the regional board by telephone of any spills of city wastewater or of any diversions of insufficiently treated wastewater as soon as the city is aware of them. The city must also send to the regional board written confirmation of any spills or diversions within five days. The city has violated its NPDES permit on at least five occasions since the amended consent decree of 1987 went into effect.

For example, on May 25, 1987, the city diverted approximately 2.7 million gallons of unchlorinated effluent from its five-mile to its one-mile pipe. The one-mile pipe from the Hyperion Plant into Santa Monica Bay is used only for emergency overflows of sewage into the bay, and all such diversions must be chlorinated before being discharged into the ocean. The city reported that a power failure made

the diversion at the Hyperion pumping facility necessary. However, the city reported to the regional board that, because it was not aware of the diversion until June 16, 1987, the city did not report the diversion to the regional board until June 17, 1987. The city maintains that the diversion occurred without its knowledge because of inaccurate gauges used to measure diversions and because of poor access to the underground tank where diversions could be observed. Further, the city believes that the diversion had a minimal effect on the quality of the water in Santa Monica Bay.

Also, on June 6, 1987, the city discharged over 1.6 million gallons of raw, untreated sewage from its Venice pumping facility into the Esplanade Canal, which flows into Santa Monica Bay near Marina del Rey. The city reported that the sewage spill was due to a power failure at the pumping station caused by an electrical storm. City officials chlorinated the spill. However, the quantity was incorrectly reported to county officials. As a result, officials at the county department of health did not post nearby beaches with signs warning beachgoers that swimming in the water posed a health risk. The city incorrectly reported the magnitude of the spill because a city employee underestimated its volume. Consequently, the county did not post the beaches with warnings about possible health dangers resulting from the sewage spill.

To prevent these kinds of sewage diversions in the future, the city has completed improvements at its Hyperion and Venice pumping facilities. The city has improved the access to its one-mile pipe and has improved its control equipment for the one-mile pipe. It has also installed backup power sources at the Hyperion pumping facility. The regional board has confirmed that the city made these improvements. Also, the city has installed an additional backup generator at the Venice pumping facility to supply pumping power in emergencies. After a public hearing in July 1987 regarding these sewage spills and diversions, the regional board referred the matter to the California attorney general, who filed a civil suit against the city in October 1987. The city and the attorney general are attempting to negotiate a settlement to the civil suit.

CONCLUSION

The City of Los Angeles has generally complied with the stipulations of the amended consent decree. The consent decree required that the city cease discharging sewage sludge into the Pacific Ocean by December 31, 1987. The city stopped discharging sludge into the ocean on November 2, 1987, and has complied with other requirements of the consent decree, including submitting all required reports to the court and providing the court with additional compliance data. However, the Los Angeles Regional Water Quality Control Board found that the city has violated the amended consent decree by not

reporting accidental discharges of insufficiently treated sewage into the ocean. The California attorney general has therefore filed a civil suit against the city.

CHAPTER IV

THE CITY OF LOS ANGELES IS PROCEEDING WITH ITS PLANS TO PROVIDE FULL SECONDARY TREATMENT TO ALL CITY SEWAGE BY 1998

The Federal Pollution Control Act requires the city to provide secondary treatment to all city sewage. The amended consent decree of 1987 requires that the city accomplish this by December 31, 1998. The city currently provides secondary treatment to only a portion of its sewage. To meet the consent decree's deadline, the city has established a master schedule for expanding the Hyperion Plant to provide full secondary treatment of all city sewage by 1998. Expansion of the Hyperion Plant began December 1, 1987, and the city estimates that the expansion to accommodate the full secondary treatment of sewage will cost approximately $800 million. To assist the city, the state and federal governments granted $59.3 million to the city in 1986 and 1987 for the construction of new facilities that will enable the city to provide secondary treatment to all of its sewage.[2]

---

[2]The new facilities that the $59.3 million will help fund are not secondary treatment facilities in the strict sense of the term "secondary treatment," but are among the projects that the city has included in its "Hyperion Full Secondary" construction program.

The City's Secondary
Treatment of Sewage

The Federal Water Pollution Control Act established a July 1, 1988 deadline for providing full secondary treatment to all of the city's sewage. In 1978, the city applied for a waiver to the Federal Water Pollution Control Act that would have permitted it to continue its practice of not providing secondary treatment to all of its municipal sewage. The EPA tentatively granted the waiver in 1981 but subsequently denied it in March 1986. Because the city was not complying with the provisions of the act, the federal district court ordered the city to take steps to achieve compliance, and in February 1987, the city entered into an amended consent decree wherein the city agreed to provide secondary treatment to all city sewage by December 31, 1998. The city has established a master plan for the design and construction of facilities that will provide full secondary treatment of all city sewage by that date. The amended consent decree specified that date as the deadline by which the city should be able to reasonably meet federal standards for sewage treatment. Expansion of secondary treatment facilities at the Hyperion Plant began December 1, 1987.

To prepare its estimates of the time required to meet these standards, the city hired a scheduling consultant experienced in the construction of sanitation facilities. According to the city's scheduling consultant, the 1998 deadline resulted from negotiations between all parties involved in the consent decree. The city's

estimates were based on the consultant's engineering projections of future sewage flows, the additional sanitation equipment needed to process those flows, and the time necessary to construct additional facilities. The city's estimate of the time required to construct additional facilities was based on the scheduling consultant's historical information for similar construction activities in Milwaukee and San Francisco. The city's consultant concluded that a 12-year schedule for completion of the project was feasible, based on its construction experience. Another consultant, hired by the EPA to evaluate the city's plan for achieving secondary treatment of all the city's sewage, concluded that "the city's scheduled delivery of this project is suitably ambitious and reflects the difficulty of working in a very constrained site and the difficulty of maintaining necessary treatment during construction and upgrade."

Expansion of the City's Secondary
Sewage Treatment Facility

The full secondary project consists of 16 construction components, encompassing site grading and construction of retaining walls, expansion of present HERS facilities, and expansion of the Hyperion secondary sewage treatment facilities. The city must complete the site grading and construction of retaining walls before it can begin construction on the other two phases. This first phase, currently underway, requires the removal of over a million cubic yards of sand from the site and the construction of two large retaining walls against the eastern hillside that borders the plant. In its February

1988 compliance evaluation for the consent decree, the EPA concluded that the start of the site-grading project has been delayed. However, the EPA and the city maintain that the impact of the delay on the entire secondary expansion project is minimal. According to the EPA, the city is making satisfactory progress toward constructing improvements that will enable the city to provide secondary treatment to all of the city's sewage by 1998.

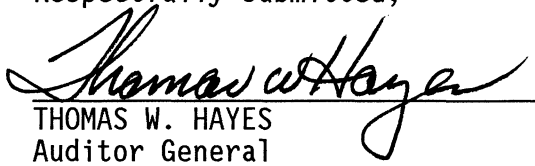
According to the director of the city's Wastewater Program Management Division, the expansion of the present Hyperion facilities will include construction of facilities that will provide secondary treatment for up to 450 million gallons of sewage per day, about 335 million gallons more per day than the current secondary treatment capacity at the Hyperion Plant. The director also pointed out that the facilities will be designed and constructed to allow the city to expand the facilities even further, if necessary, to a capacity of 550 million gallons per day. The city projects that all units will be operating by February 1998. City engineers estimate that the total cost of the improvements to the Hyperion Plant, including the HERS, which will enable the city to provide secondary treatment to all of the city's sewage, will be approximately $800 million. To assist with this, in 1986 and 1987, the state and federal governments granted $59.3 million for the construction of new facilities that will enable the city to provide secondary treatment to all of its sewage.

CONCLUSION

The City of Los Angeles has established a master plan for expanding sewage treatment facilities at the Hyperion Wastewater Treatment Plant that will allow it to provide full secondary treatment to all city sewage. The expansion is in response to a court order that requires that the city provide full secondary treatment to all city sewage by December 31, 1998. The city is proceeding with construction of the initial projects in the expansion of treatment facilities and estimates that the expansion will cost approximately $800 million to complete.

We conducted this review under the authority vested in the Auditor General by Section 10500 et seq. of the California Government Code and according to generally accepted governmental auditing standards. We limited our review to those areas specified in the audit scope section of this report.

Respectfully submitted,



THOMAS W. HAYES
Auditor General

Date: May 23, 1988

Staff: Robert E. Christophel, Audit Manager
Steven Hendrickson
Emily Burstein
Paul Carrigan
James D. Lynch, Jr.
Diana L. Oretsky

State of California

SACRAMENTO

JANANNE SHARPLESS
Secretary of
Environmental Affairs

May 16, 1988

Mr. Thomas W. Hayes
Auditor General
Office of the Auditor General
660 J Street, Suite 300
Sacramento, CA 95814

Dear Mr. Hayes:

Thank you for transmitting to me a copy of your draft report entitled "A Review of the City of Los Angeles' Compliance with a Federal Court Order." The draft report was reviewed by the staff of the State Water Resources Control Board. In general, the report is a fair representation regarding the City of Los Angeles' construction program for the Hyperion Wastewater Treatment Plant. The most recent information available to the State Board indicates that the $1.1 billion figure for the Hyperion construction program is accurate. (The city will spend $356 million of this on the construction of its new sludge processing plant, the Hyperion Energy Recovery System (HERS). The remaining approximately $800 million will be spent on other improvements at the Hyperion Plant that will enable the city to provide secondary treatment to all of the city's sewage by 1998, as required by a federal court order.) However, figures taken from the Revenue Program transmitted to the State Board by the City of Los Angeles in mid-1987 indicate that the expected cost for the HERS project is $147 million and the construction cost to install full secondary treatment at the Hyperion facility is $946 million.

In addition, the report is accurate in that neither the State nor the federal government has made a grant to the City of Los Angeles for construction of the secondary treatment system at Hyperion.* However, the City has still not completed its design for the full secondary treatment works. Grants have been given to the

---

* The Office of the Auditor General's Comment:
On page 43 of the report, we have added a footnote that more fully explains how the city will use monies granted to it by the federal and state governments.

1102 Q STREET, SACRAMENTO, CALIFORNIA 95814 (916) 322-5840

City for construction of headworks ($32.6 million); primary facilities ($18.5 million); and the HERS project ($200 million).

Once again, thank you for the opportunity to review your report.

Sincerely,

Jananne Sharpless
Secretary of Environmental Affairs

cc: Mr. Robert Ghirelli
Executive Officer
Los Angeles Regional Water Quality Control Board
107 South Broadway, Room 4027
Los Angeles, CA 90012

CITY OF LOS ANGELES
CALIFORNIA

TOM BRADLEY
MAYOR

DEPARTMENT OF
PUBLIC WORKS
BUREAU OF
ENGINEERING
ROBERT S. HORII
CITY ENGINEER

ROOM 800, CITY HALL
LOS ANGELES, CA 90012

MAY 13 1988

Thomas W. Hayes, Auditor General
State of California
Office of the Auditor General
660 J Street, Suite 300
Sacramento, California 95814

Dear Mr. Hayes:

The City of Los Angeles appreciates the opportunity to review and comment on your report entitled "A Review of the City of Los Angeles' Compliance With a Federal Court Order."

As you note in your report, the City is under court order by way of an amended consent decree to achieve and maintain compliance with the Clean Water Act and the California Ocean Plan. The City is doing exactly that by improving the quality of the effluent from the Hyperion Treatment Plant to well below required standards, while embarking on a $1.5 billion construction program to upgrade the plant and provide secondary treatment to all of the city's sewage flows.

In the interim, the city is committed to providing the best effluent quality possible with its existing facilities. To that end, changes have been made in the operation of the Hyperion Plant that have it performing at its best level ever, despite the fact that it is treating the highest loadings in its history.

Ocean disposal of sludge was ceased in November of 1987, ahead of the date agreed upon in the amended consent decree. This, together with the improved effluent quality, has begun to make an impact on bettering the quality of the environment in Santa Monica Bay.

A master schedule has been adopted, and resources committed, to ensure that all facilities will be in place and treating all of the City's sewage flows to the required secondary treatment levels by December 31, 1998.

Without trying to minimize the seriousness of the inadvertant discharge of improperly treated sewage into the Pacific Ocean, the quantity that has been either diverted or overflowed represents less than one hundredth of one percent of the flows properly treated in the Hyperion system last year. The effluent which is now being discharged by the City into the Pacific Ocean is the cleanest ocean discharge by any major agency in California.

The City has taken these significant steps toward our goal of meeting the requirements of the Clean Water Act, the California Ocean Plan, the amended consent decree and of improving Santa Monica Bay. Our committment to these goals is firm.

I would again like to thank you for the opportunity to review and comment on this report. I would also like to compliment your staff on the thorough and professional review which they gave this massive, complex program and to express my appreciation for the spirit of cooperation which existed during the conduct of the audit.

Sincerely,

ROBERT S. HORII
City Engineer

RSH:

cc: Members of the Legislature
Office of the Governor
Office of the Lieutenant Governor
State Controller
Legislative Analyst
Assembly Office of Research
Senate Office of Research
Assembly Majority/Minority Consultants
Senate Majority/Minority Consultants
Capitol Press Corps