9.1

DEPARTMENT OF
PLANNING AND DEVELOPMENT

CITY OF SACRAMENTO
CALIFORNIA

1231 I STREET
SACRAMENTO, CA

ADMINISTRATION
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June 4, 1992

City Council
Sacramento, California

Honorable Members in Session:

SUBJECT: **RATIFICATION OF CITY OF SACRAMENTO LANDFILL BALEFILL OPERATION(YA-06) NEGATIVE DECLARATION AND APPROVING THE BALEFILL OPERATION AT THE CITY OF SACRAMENTO LANDFILL (YA-06).**

LOCATION AND COUNCIL DISTRICT

District 3

SUMMARY

It is proposed that the City Landfill method of operation be changed to a balefill operation. The City Landfill and the proposed balefill operation are located at the 28th and A Streets. This report recommends approval of the balefill operation at the City of Sacramento Landfill located at 28th and A Streets. This report also recommends ratification of the Negative Declaration for the balefill operation.

COMMITTEE/COMMISSION ACTION

None.

APPROVED
BY THE CITY COUNCIL
JUN 04 1992
OFFICE OF THE
CITY CLERK

STAFF RECOMMENDATION

It is recommended that the City Council, by resolution:

1. Ratify the Negative Declaration; and

2. Approve the balefill operation at the City Landfill;

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BACKGROUND

It is proposed that the City Landfill method of operation be changed to a balefill operation. The City Landfill and the proposed balefill operation are located at the 28th and A Streets. The baler

will be housed in a 30,000 square foot building. The proposed method of operation involves compressing bales of solid waste to a density between 1,350 and 1,500 pounds per cubic yard. The baling facility is necessary to extend the potential life span of the City landfill and to reduce the amount of cover material used.

In accordance with the State Guidelines for implementation of the California Environmental Quality Act 1970, an initial study was performed dated **April 1, 1992** . As a result of this study, the Environmental Coordinator has determined that the proposed project will not have a significant adverse impact on the environment and a Negative Declaration was prepared (Attachment A).

A Notice of Availability for public review and comment of the Negative Declaration was published in a local newspaper on **April 8, 1992** . The appropriate length of time has elapsed for comments regarding the Negative Declaration. Comments were received from the California Integrated Waste Management Board. These comments and the responses to these comments are addressed below.

COMMENT SECTION I-General Comments

The Comments received from the CIWMB indicated that the Negative Declaration prepared for the balefill operation does not provide information that substantiates the following statements that are contained within the Negative Declaration.

COMMENT: "Recently it was recognized that methane gas, in excess of what is allowed under the California Code of Regulations was migrating from the landfill. This situation is in the process of being rectified and is not anticipated to be significantly impacted by the proposed balefill operation."

RESPONSE: Keith Johnson of the City of Sacramento, Department of Public Works, Solid Waste Division has indicated that the County of Sacramento, Environmental Management Department, Environmental Health Division has confirmed (See attached Exhibit A) that as the Local Enforcement Agency (LEA), they inspected the City landfill on January 28, 1992. The LEA found that "new gas collection wells installed along the easterly property boundary have effectively controlled the migration of methane gas from the landfill.". The LEA has concluded that the landfill is in compliance with all of the LEA's regulations.

COMMENT: "It is anticipated that the proposed permit revision ..... will substantially reduce the amount of cover material required....."

RESPONSE: The City Department of Public Works, Solid Waste Division has run computations regarding the cover soil savings associated with balefill operation. These computations were included in the Amendment to the Report of Disposal Site Information (RDSI) which the City of Sacramento, Department of Public

Works, Solid Waste Division submitted to the County of Sacramento Environmental Health Department. This document has also been reviewed, by Mike Kuhn of the California Integrated Waste Management Board (CIWMB). The computation included in the Report of Disposal Site Information (RDSI) (See attached Exhibit B) indicates that the amount of cover soil could be reduced in the range of 14.7% to 19.7%. The City of Sacramento, Public Works Department, Solid Waste Division, considers a 15% reduction to be a conservative estimate (Pers. Comm. Keith Johnson, 5-8-92).

COMMENT: ".....long-term leachate generation in the expansion area will be reduced."

RESPONSE: The research conducted for preparation of the Negative Declaration for the proposed balefill operation included reviewing numerous periodicals (See Attachment C), and contacting the National Solid Waste Management Association (NSWMA). The above referenced statement is based upon conversations with Jack Legler of the NSWMA and an article entitled "Different Strokes For All Kinds of Folks"(See Attachment C) found in the September 1989 issue of Waste Age (Pg. 72).

COMMENT: "The proposed change to a balefill operation will extend the life span of the landfill."

RESPONSE: Included in the RDSI Amendment is a figure that illustrates the landfill expansion area life span estimation. This estimate is contingent upon a change in the method of operation to a balefill operation (See attached Exhibit D). As of January 1992, the landfill had a remaining capacity of 600,000 cubic yards. With the implementation of the balefill it was estimated that the remaining life span for the landfill is 2.25 years based on a daily tonnage of 600.

COMMENT: "The Bales.... are less prone to producing excessive odor and are less prone to attracting flies and other vectors."

RESPONSE: The research conducted for preparation of the Negative Declaration for the proposed balefill operation included reviewing numerous periodicals and contacting the National Solid Waste Management Association (NSWMA). The above referenced statement is based upon conversations with Jack Legler of the NSWMA and an article entitled "Different Strokes For All Kinds of Folks" (See Exhibit C)found in the September 1989 issue of Waste Age (Pg. 72).

COMMENT SECTION II-Temporary Structure to Accommodate Baler

COMMENT: Although the subject document does not identify the location of the temporary structure which accommodates the baler, Board staff have been led to believe the structure is located on a portion of old fill area within the permitted boundaries

of the landfill. Prior to adoption of the ND, the following questions should be answered regarding this issue:

COMMENT: Where is the temporary structure to accommodate the baler located, if not on-site?

RESPONSE: The location of the temporary baling facility was indicated in the RDSI Amendment and is located on a portion of the old fill area on the north central portion of the landfill (See the Attached Exhibit E). The baling facility will be located inside the existing fenced compound area used for repairing and storing landfill equipment.

COMMENT: Has an environmental review of the structure been conducted? (If so, please submit a copy for Board records as soon as possible.)

RESPONSE: The project description for the subject Negative Declaration includes the baler structure.

COMMENT: If an environmental review of the structure and it's contents has not been conducted, when will it be?

RESPONSE: See previous response.

COMMENT: Is there some reason why the subject Negative Declaration is not intended to meet the environmental review requirements for the baler structure?

RESPONSE: The City intends for the subject Negative Declaration to meet the environmental review requirements for the baler structure.

COMMENT SECTION III-Facility Review Branch Staff Recommendations

COMMENT: If the existing structure is temporary, where will the permanent structure be located and how, if at all, will it differ from the temporary one?

RESPONSE: The baler structure is intended to temporarily provide shelter for the baler machinery until such time as the landfill closes.

COMMENT: What measures have been/will be implemented to prevent hazards from the accumulation of explosive levels of landfill gas within the structure?

RESPONSE: The baler structure is only enclosed on three sides. The structure is designed with four 13,210 cubic feet per minute ventilation fans in the roof that assist in the exchange of air within the facility. The baler structure foundation is a concrete slab foundation that will not allow for gas accumulation underneath.

These design measures are intended to prevent hazards from the accumulation of explosive levels of landfill gas within the structure.

COMMENT: How will the structure be protected from potential impacts of subsidence of fill upon which it is standing?

RESPONSE: The baler facility site was evaluated by Marr-Shaffer Structural Engineers. Based upon geotechnical analysis of borings taken at the landfill, it was established that the baler foundation would be laid on a mixture of concrete and asphalt, rubble, metal, glass and soil. These materials will protect the structure from subsidence.

COMMENT SECTION IV-Additional Information

COMMENT: In addition to responding to these questions, please provide the following information regarding the baling operation:

COMMENT: Site layout map (showing the location and site of the baling operation in relation to the existing landfill.)

RESPONSE: The bale facility will lie inside the existing fenced compound area used for repairing and storing the landfill equipment. A small portion of the bale facility will also rest on a corner of the parking area used for refuse collection vehicle parking(See Exhibit E - site plan).

COMMENT: Detailed description of the baling operation to include type of equipment used, hours of operation, procedures used for prevention of dust and odors, leachate collection systems, employee health and safety provisions designed into the operation , and fire control provisions.

RESPONSE: TYPE OF EQUIPMENT

The baling building is a 30,000 square foot structure. The tipping floor area is approximately 25,000 square feet and has sufficient capacity to handle the anticipated stockpiling of material during the day. The building has the capacity to handle 600 tons of waste piled 6 feet high on the tipping floor. Normal facility operation will be able to bale all the refuse unloaded on the tipping floor each day. The baler machinery will consist of one 300 horsepower baler which will be used to compact the refuse accepted at the facility. If a mechanical breakdown occurs, refuse would be diverted to the balefill's emergency dumping area for conventional landfilling.

HOURS OF OPERATION

It is anticipated that the baling will occur in two shifts Monday through Friday: one shift will be from 5 a.m. to 1 p.m. and one shift will be from 1 p.m. to 9 p.m.. Landfilling of the bales is anticipated to occur Monday through Friday 6 a.m. to 9 p.m.. On Saturday baling and landfilling will occur from 5:30 a.m. to 2 p.m..

PROCEDURES USED FOR DUST, ODOR, AND VECTOR PREVENTION

Accumulation of odors at the bale facility will be prevented by the use of four roof mounted ventilation fans and by the physical layout of the structure which is open on the eastern side. Routine cleaning practices will prevent the buildup of odors, dust and vectors. If excessive dust is experienced, a light water spray will be applied to materials during unloading and processing. However, dry clean up methods will typically be used in the building.

LEACHATE COLLECTION SYSTEMS

It is anticipated that the garbage that will be baled will be deposited into a pit containing a conveyor belt. The conveyor belt will operate automatically to feed the baler. The baler will have a drain that is served directly by the sanitary sewer (Pers. Comm., Reginald Young, 3-17-92). Furthermore, there will be a gutter system around the baler to divert any liquid that is emitted from the baler during compaction. From the baler, all bales will be deposited into the portion of the landfill that has a clay liner, and that is served by a leachate collection system.

The landfill expansion area has a leachate collection system and clay lined berms that surround the landfill to prevent lateral migration. The leachate collection system consists of a clay liner, a drain blanket, collection pipes, and pumps. The liner extends three feet above the historical highest level of groundwater. A groundwater dewatering system is beneath the liner to prevent uplift pressures due to high groundwater. The leachate is discharged to the regional sanitary wastewater system. Remaining areas of the landfill which have already been filled to capacity do not have a groundwater dewatering system. However, standards required by the landfill permit ban the acceptance of sludge and liquid wastes at the landfill, and require application of daily cover to inhibit infiltration, and gradation of the interim slopes of the landfill to promote runoff. All refuse that will be baled with the implementation of the proposed balefill operation will be placed in the expansion area of the landfill site.

Ground water quality is monitored by the County of Sacramento Environmental Health Division, the California Integrated Waste Management Board and the

Regional Water Quality Control Board. The site is graded as per the specifications of the California Integrated Waste Management Board requirements to deter percolation through the wastes and to minimize leachate. Furthermore, balefilling results in less moisture to be deposited in to the landfill which results in less leachate than other methods of landfilling (Pers. Comm. 3-23-92 with Jack Legler, National Solid Waste Management Association).

EMPLOYEE HEALTH AND SAFETY PROVISIONS

All employees will be issued proper clothing, shoes, masks and other safety gear. Periodic safety meetings will be held with employees operating the baler and supervisors to reinforce good safety practices and procedures and to develop feedback for improving safety conditions.

If a load of refuse suspected of being hazardous spilled at the facility, workers shall be kept away from the spill and the City of Sacramento Hazardous Material Response Team shall be called to the scene to evaluate and/or assist in spill containment and clean-up.

FIRE CONTROL PROVISIONS

Some loads of refuse that arrive at the landfill may be smoldering and/or smokey. These loads are called "hot loads". "Hot loads" of refuse will be diverted to the landfill and smothered with cover soil or flooded with water if they are noticed before being dumped on the tipping floor. In the event of a fire on the tipping floor, the building's overhead sprinklers will be turned on. Water used to quench the fire will be channelled to the two drainage inlets located at the end of the facility. Water collected by these inlets will be treated at Sacramento Regional Wastewater Treatment Plant (SRWTP).

Fire extinguishers will be mounted on building supports at four locations within the facility. These fire extinguishers will be used for small fires and for equipment fires.

All waste material deposited on the tipping floor will be cleaned out daily. Therefore, the only fire danger from "hot loads" would occur during the day when there could be refuse standing on the tipping floor. Standard maintenance procedures will ensure that there is not waste standing on the tipping floor over night.

COMMENT: Waste removal frequency.

RESPONSE: Several hours each day shall be spent cleaning the baling facility and performing some routine maintenance. The facility will be swept once each day. Once a

week, the conveyor pit will be cleaned. No litter or putrescible waste will be allowed to accumulate anywhere within the baler facility for more than one work day.

COMMENT: Method and frequency of baling facility equipment cleaning.

RESPONSE: See previous response.

COMMENT: Recyclable materials recovery program.

RESPONSE: Information pertaining to the recyclable materials recovery program is provided in the RDSI Amendment was submitted to the CIWMB. Two City employees will be involved with the diversion of recyclable materials. This will be accomplished by diverting refuse with a high percentage of recyclable materials to a separate location in the baling structure for sorting and diversion of recyclables.

COMMENT: Screening procedures to be implemented for identifying and segregating hazardous liquid and other incompatible wastes.

RESPONSE: The City landfill has a hazardous waste screening program presently in place, The baler facility and structure shall be posted with signs prohibiting unacceptable wastes, hazardous wastes, or liquid wastes. Personnel will be trained to identify hazardous or suspicious material. Any hazardous material found will be removed from the tipping floor.

Waste oil, latex paint and lead acid batteries screened from the tipping floor of the baling facility would be temporarily stored for recycling at the next City Hazardous Waste Collection Event. Liquid oil based paints, corrosives, flammable liquids and oxidizers will be stored individually, properly packaged, and transferred to a qualified contractor for treatment, storage or disposal. No hazardous material would be stored on site for more than 90 days.

COMMENT SECTION V-Risk of Upset

COMMENT: Item 10 of the Initial Study identifies no "risk of an explosion of the release of hazardous substances in the event of an accident or upset conditions". As the Negative Declaration indicates, household hazardous wastes are sometimes inadvertently disposed of at solid waste landfills. Implementation of a balefill operation which will compress bales of solid waste to a density of more that 1350 pounds per cubic yard would appear to increase the risk of explosion or release of hazardous substances. The Negative Declaration should describe mitigation, in place or proposed, to prevent or limit the disposal of hazardous wastes or proposed, to prevent or limit the disposal of hazardous wastes at the landfill and

to prevent the inherent risk of their disposal.

RESPONSE: Three-tenths of one percent of the municipal solid waste stream is household hazardous waste. The City of Sacramento Public Works Department, Solid Waste Division has 12 events annually to reduce the amount of hazardous wastes that are deposited into the waste stream. It is anticipated that the baler will not result in an increased risk of explosion. The waste that is baled is still spongy and the household hazardous waste that will be baled is not anticipated to be compressed to such a degree that explosions will occur. However, the baler does have a metal hood to protect baler operators and landfill personnel from the unlikely event of an explosion or projection of resilient waste materials occurring as a result of bale compaction (Pers. Comm. Keith Johnson, 5-8-92).

Also, see previous discussion regarding screening of household hazardous waste.

COMMENT SECTION VI-Daily Cover

COMMENT: The subject document includes the following statements: 1)"This method of filling will reduce the amount of cover used because cover material will only be used on the top surface." and 2)"An alternative method of cover is being explored which would be used to cover the horizontal surface of the solid waste with a 6 inch cover soil and to cover the vertical face of each bale with a tight fitting plastic wrap.". Per a May 1, 1992 conversation with Hilary Perry of the City of Sacramento, Board staff verified: 1)The subject document is intended only to evaluate the potential impacts of the balefill operation and not use of plastic wrap for vertical cover; and 2) The City is aware of the Boards policy on the evaluation of the use of alternative cover.

COMMENT: This serves as a reminder that prior to implementation of the balefill operation as described in the subject Negative Declaration, one of the following must occur: 1) The facility operator must obtain approval from the Board to conduct an alternative cover demonstration, or; 2) The facility operator must identify a method for covering the vertical face of the balefilled portions of the landfill which meets the requirements of the State Minimum Standards for Solid Waste Handling and Disposal.

RESPONSE: Comment noted. The RDSI Amendment that has been submitted to the CIWMB identified plastic wrap as an alternative method of cover for the vertical face of the bales. In addition, under 14CCR17688, volume reduction activities are permitted in conjunction with site operation (Keith Johnson, May 1992).

COMMENT SECTION VI-Notice of Public Hearing for Negative Declarations

COMMENT: Recently enacted legislation requires the lead agency for a project to: "notify any

public agency which comments on a negative declaration of the public hearing or hearings, if any, on the project for which the Negative Declaration was prepared"[Public Resources Code Section 21092.5(b)]. Please be certain to advise Board staff of any public hearing held to adopt the subject document.

RESPONSE: The City of Sacramento, Environmental Services Division, will contact Donnaye Palmer, from whom the CIWMB comments were received, when the Balefill Negative Declaration is scheduled on the City Council Agenda.

COMMENT SECTION VII-Mitigation Monitoring Implementation Schedule(MMIS)

COMMENT: It is staff's opinion, upon review of the subject Negative Declaration, that the Negative Declaration and/or responses to these comments identifies mitigation measures pertinent to the proposed project. Whenever an environmental review document identifies mitigation measures, preparation of an MMIS is required (Public Resources Code Section 21081.6). This serves as a reminder to be certain to forward a copy of an MMIS for the proposed project to staff for their review prior to adoption of the Negative Declaration.

RESPONSE: The Environmental Services Manager has determined, based upon the Initial Study prepared for the proposed balefill operation that mitigation measures are not required to mitigate any significant impacts. The proposed project as defined contains statements and precautionary measures that will mitigate any significant impacts resulting from the implementation of the balefill operation. Since the Negative Declaration does not contain mitigation measures it is not required that a Reporting Plan be adopted.

FINANCIAL DATA

There are no costs associated with the actions recommended in this report. Adequate funds for the proposed project construction are available in the FY 1991-92 Capital Improvement Program YB21. A ten year lease has been placed with Fiscal Funding Company Inc. for $1,421,000.

POLICY CONSIDERATIONS

None.

MBE/WBE EFFORTS

No goods or services are proposed to be purchased with this item.

Respectfully submitted,

Dianne Guzman, AICP
Director
Planning and Development Department

John E. Medina
Director
Public Works Department

RECOMMENDATION APPROVED:

Walter J. Slipe
City Manager

FOR COUNCIL MEETING DATE: June 4, 1992

Contact Person: Keith Johnson, Senior Engineer, 264-7181.

RESOLUTION NO. 92-386

ADOPTED BY THE SACRAMENTO CITY COUNCIL

ON DATE OF _____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SACRAMENTO RATIFYING THE NEGATIVE DECLARATION FOR THE CHANGE OF THE METHOD OF OPERATION AT THE CITY LANDFILL TO A BALEFILL OPERATION TO BE LOCATED IN THE CENTRAL CITY COMMUNITY PLAN AREA, AND APPROVING THE BALEFILL OPERATION AT THE CITY OF SACRAMENTO LANDFILL (YA06)

WHEREAS, the City of Sacramento has determined the need to revise the 28th Street Landfill's operating permit (hereinafter called the "Project"), and

WHEREAS, the City of Sacramento has conducted an initial study to determine if the Project may have a significant effect on the environment, and

WHEREAS, the Initial Study concludes that there is no substantial evidence that the Project, or any of its aspects, may cause a significant effect on the environment and a Negative Declaration is therefore appropriate, and

WHEREAS, the City Council finds and certifies that the Negative Declaration was prepared, publicized, circulated and reviewed in accordance with and constitutes an adequate, accurate, objective and complete Negative Declaration in accordance with the requirements of the California Environmental Quality Act (CEQA) and State CEQA Guidelines and the City of Sacramento CEQA Procedures.

WHEREAS, the City Council certifies that the Negative Declaration has been presented to it and the City Council has reviewed it and considered the information contained therein prior to acting on the proposed project.

WHEREAS, the Initial Study concluded that the Project involves no potential for any adverse effect, either individually or cumulatively on wildlife resources and

NOW, THEREFORE BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SACRAMENTO THAT:

1. The City Council hereby approves the 28th Street Landfill's operation permit revision Negative Declaration, finding on the basis of the Initial Study and comments received that there is no substantial evidence that the Project may have a significant effect on the environment.

2. The City Council hereby approves the revision of the 28th Street Landfill's operation permit to include balefill.

FOR CITY CLERK USE ONLY

RESOLUTION NO.: _____

DATE ADOPTED: _____

3. The City Council hereby finds that there is no evidence before them that the Revision of the 28th Street Landfill's operation permit to balefill, located in Sacramento County, will have any potential for adverse effect on wildlife resources.

_____
MAYOR

ATTEST:

_____
CITY CLERK

YA06

FOR CITY CLERK USE ONLY

RESOLUTION NO.: _____

DATE ADOPTED: _____

ATTACHMENT A

DEPARTMENT OF
PLANNING AND DEVELOPMENT

CITY OF SACRAMENTO
CALIFORNIA

1231 I STREET
ROOM 200
SACRAMENTO, CA
95814-2998

BUILDING INSPECTIONS
916-449-5716

PLANNING
916-449-5604

NEGATIVE DECLARATION

The Environmental Services Manager of the City of Sacramento, California, a municipal corporation, does prepare, make, declare, and publish this Negative Declaration for the following described project:

The City of Sacramento, Department of Planning and Development, Environmental Services Division has reviewed the proposed project and has determined that the project as proposed will not have a significant effect on the environment. This conclusion is based on information contained in the attached Initial Study.

An Environmental Impact Report is not required pursuant to the Environmental Quality Act of 1970 (Division 13 of the Public Resources Code of the State of California).

This environmental review process and Negative Declaration filing is pursuant to Title 14, Division 6, Chapter 3, Article 6, Section 15070 of the California Administrative Code and pursuant to the Sacramento Local Environmental Regulations (Resolution 78-171) adopted by the City of Sacramento and pursuant to Sacramento City Code, Chapter 63.

A copy of this document may be reviewed/obtained at the City of Sacramento, Department of Planning and Development, Environmental Services Division, 1231 I Street, 3rd Floor, Sacramento, California 95814.

Environmental Services Manager of the
City of Sacramento, California,
a municipal corporation

By: _____

YAOO
attachment
rev. 1/90
form 7

CITY OF SACRAMENTO

INITIAL STUDY

This Initial Study has been required and prepared by the Department of Planning and Development Environmental Services Division, 1231 I Street, Room 301, Sacramento, CA 95814, (916) 449-2037, pursuan to CEQA Guidelines, Section 15063 (August 1, 1983).

File No. and/or Project Name: YOLO LANDFILL PERMIT REVISION FOR BALEFIL
Project Location: 2880 S A ST OPERATIO
Applicant - Name: CITY OF SACRAMENTO, SOLID WASTE DIVISI
Address: 921 10TH ST SUITE 500
SACRAMENTO CA 95814

ENVIRONMENTAL IMPACTS

		YES/MAYBE/NO
1.	**Earth**. Will the proposal result in:	
	a. Unstable earth conditions or in changes in geologic substructures?	NO
	b. Disruptions, displacements, compaction or overcovering of the soil?	NO
	c. Change in topography or ground surface relief features?	NO
	d. The destruction, covering or modification of any unique geologic or physical features?	NO
	e. Any increase in wind or water erosion of soils, either on or off the site?	NO
	f. Changes in deposition or erosion of beach sands, or changes in siltation deposition or erosion which may modify the channel of a river, stream, inlet or lake?	NO
	g. Exposure of people or property to geologic hazards such as earthquakes, ground failure, or similar hazards?	NO
2.	**Air**. Will the proposal result in:	
	a. Substantial air emissions or deterioration of ambient air quality?	NO
	b. The creation of objectionable odors?	NO
	c. Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?	NO
3.	**Water**. Will the proposal result in:	
	a. Changes in currents, or the course of direction movements, in either marine or fresh waters?	NO
	b. Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?	NO
	c. Alterations to the course of flow of flood waters?	NO
	d. Change in the amount of surface water in any water body?	NO
	e. Discharge into surface waters, or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?	NO
	f. Alteration of the direction or rate of flow of ground waters?	NO
	g. Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?	NO
	h. Substantial reduction in the amount of water otherwise available for public water supplies?	NO
	i. Exposure of people or property to water related hazards such as flooding?	NO

YES/MAYBE/NO

4. **Plant Life**. Will the proposal result in:
   a. Change in the diversity of species, or number of any species of plants? NO
   b. Reduction of the numbers of any unique, rare or endangered species of plants? NO
   c. Introduction of new species of plants into an area, or in a barrier to the normal replenishment of existing species? NO
   d. Reduction in acreage of any agricultural crop? NO

5. **Animal Life**. Will the proposal result in:
   a. Change in the diversity of species, or number of any species of animals? NO
   b. Reduction of the numbers of any unique, rare or endangered species of animals? NO
   c. Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals? NO
   d. Deterioration of existing fish or wildlife habitat? NO

6. **Noise**. Will the proposal result in:
   a. Increases in existing noise levels? NO
   b. Exposure of people to severe noise levels? NO

7. **Light and Glare**. Will the proposal produce new light or glare? NO

8. **Land Use**. Will the proposal result in a substantial alteration of the present or planned land use of an area? NO

9. **Natural Resources**. Will the proposal result in:
   a. Increase in the rate of use of any natural resources: NO
   b. Substantial depletion of any nonrenewable natural resource? NO

10. **Risk of Upset**. Does the proposal involve:
   a. A risk of an explosion or the release of hazardous substances (including but not limited to, oil, pesticides, chemicals or radiation) in the event of an accident or upset conditions? NO
   b. Possible interference with an emergency response plan or an emergency evacuation plan? NO

11. **Population**. Will the proprosal alter the location, distribution, density, or growth rate of the human population of an area? NO

12. **Housing**. Will the proposal affect existing housing, or create a demand for additional housing? NO

13. **Transportation/Circulation**. Will the proposal result in:
   a. Generation of substantial additional vehicular movement? NO
   b. Effects on existing parking facilities, or demand for new parking? NO
   c. Substantial impact upon existing transportation systems? NO
   d. Alterations to present patterns of circulation or movement of people and/or goods? NO
   e. Alterations to waterborne, rail or air traffic? NO
   f. Increase in traffic hazards to motor vehicles, bicyclists or pedestrians? NO

YES/MAYBE/NO

14. **Public Services**. Will the proposal have an effect upon, or result in need for new or altered governmental services in any of the following areas:
   a. Fire protection? NO
   b. Police protection? NO
   c. Schools? NO
   d. Parks or other recreational facilities? NO
   e. Maintenance of public facilities, including roads? NO
   f. Other governmental services? NO

15. **Energy**. Will the proposal result in:
   a. Use of substantial amounts of fuel or energy? NO
   b. Substantial increase in demand upon existing sources of energy or require the development of new sources of energy? NO

16. **Utilities**. Will the proposal result in a need for a new system, or substantial alterations to the following utilities:
   a. Power or natural gas? NO
   b. Communications systems? NO
   c. Water? NO
   d. Sewer or septic tanks? NO
   e. Storm water drainage? NO
   f. Solid waste and disposal? NO

17. **Human Health**. Will the proposal result in:
   a. Creation of any health hazard or potential health hazard (excluding mental health)? NO
   b. Exposure of people to potential health hazards? NO

18. **Aesthetics**. Will the proposal result in the obstruction of any scenic vista or view open to the public, or will the proposal result in the creation of an aesthetically offensive site open to public view? NO

19. **Recreation**. Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities? NO

20. **Cultural Resources**.
   a. Will the proposal result in the alteration or destruction of a prehistoric or historic archaeological site? NO
   b. Will the proposal result in adverse physical or aesthetic effects to a prehistoric or historic building, structure or object? NO
   c. Does the proposal have the potential to cause a physical change which would affect unique ethnic cultural values? NO
   d. Will the proposal restrict existing religious or sacred uses within the potential impact area? NO

21. **Mandatory Findings of Significance**.
   a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory? NO
   b. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.) NO

YES/MAYBE/NO

c. Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.) NO

d. Does the project have environment effects which will cause substantial adverse effects on human beings, either directly or indirectly? NO

MITIGATION MEASURES

____ The applicant has agreed to revise the project to incorporate the mitigation measures contained in Attachment A, Discussion of Intial Study.

__X__ A discussion of the project's impacts is contained in Attachment A, Discussion of Initial Study. No Mitigation is required for this project.

REFERENCES

__X__ City of Sacramento General Plan Update EIR, 1988
__X__ City of Sacramento Zoning Ordinance
____ North Natomas Community Plan EIR
____ South Natomas Community Plan EIR & SEIR
____ Airport-Meadowview Community Plan EIR
____ North Sacramento Community Plan EIR
____ South Sacramento Community Plan EIR
____ Pocket Community Plan Update
____ Downtown Redevelopment Plan Update and EIR, 1985
__X__ Central City Community Plan EIR
____ ITE Trip Generation Manual, Fifth Edition
____ South Coast Air Quality Maintenance District "Air Quality Handbook for Preparing EIR's"
____ Land Use Planning Policy Within the 100 Year Flood Plain in the City and County of Sacramento EIR
____ Urbemis - 3
____ Emfac 7 PC
____ CALINE 4
____ Traffic Study _____
____ Noise Study _____
____ Preliminary Site Assessment: _____
__X__ Other: EVALUATION OF SOLID WASTE BALING AND BOILERLESS, E.P.A. 198[illegible] AMERICAN CITY AND COUNTY, MAY 1989; WASTE AGE, SEPT. 1989; SOLID WASTE & POWER, VOL. IV, NO. 4, AUGUST 1990.

DETERMINATION

On the basis of this initial evaluation:

__X__ I find the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

____ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described in this Initial Study have been added to the project. A NEGATIVE DECLARATION WITH MITIGATION MEASURES WILL BE PREPARED.

____ I find the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

DATE: 4/1/92 SIGNATURE: [signature]

ATTACHMENT A

City of Sacramento Landfill Permit Revision for Compliance To Allow a Balefill Operation

CIP-YA06

Project Description

The City of Sacramento Landfill located at 28th and A Street is in the northwest portion of the County, and is within the Central City Community Plan Area. The landfill site encompasses 113 acres. The Landfill is bounded on the south and east by Business 80 Freeway, on the north by the American River, and on the west by the site that was previously used for disposal of City municipal solid waste, and is presently used for composting operations. Both the Community Plan and the General Plan designate the site for a solid waste disposal facility and future open space/park.

The City Landfill consists of the original 78 acre unlined landfill unit, and a clay lined 35 acre expansion unit constructed in 1985. The total capacity of the facility is approximately 5,175,000 cubic yards. The City landfill is comprised of a Class III sanitary landfill, an inactive vegetal waste processing plant, and a composting operation. The wastes received at the City landfill are of Group 3 and Group 4 classification. This includes: household garbage, garden refuse, vegetal rubbish, office wastes, construction and demolition wastes and restaurant wastes. Hazardous wastes, liquid wastes, and sludge are not accepted at this site, and scavenging and open burning are prohibited. Currently the 28th Street landfill is operated under Solid Waste Facilities permit number 34AA0018. The California Integrated Waste Management Board granted this permit.

An application has been made by the City of Sacramento Public Works Department, Solid Waste Division to revise the landfill permit to change the method of operation from an area fill operation to a balefill operation. This will extend the potential life span of the City landfill. Implementing the baling operation will involve the construction of a temporary 30,000 square foot structure to accommodate the baler. This proposed method of operation involves compressing bales of solid waste to a density between 1,350 and 1,500 pounds per cubic yard. Bales will be delivered to the expansion site using trucks with four wheel drive and floatation-type tires. The bales can be stacked with the use of a forklift to conserve space, are less prone to producing excessive odor, and are less prone to attracting flies and other vectors. Balefill operations do require landfill compactors and dozers. This method of filling will reduce the amount of cover used because cover material will only be used on the top surface. Six inches of cover material would be placed on the horizontal surfaces that are active during the day and in the evening. An alternative method of cover is being explored which would be used to cover the horizontal surface of the solid waste with a 6 inch cover soil and to cover the vertical face of each bale with a tight fitting plastic wrap that would serve as a barrier to both air and vectors.

This proposed project will involve submittal of a Solid Waste Facilities Permit application to the County of Sacramento Environmental Management Department and to the California Integrated Waste Management Board. Both of these agencies must approve the application to revise the

landfill's operating permit. It is anticipated by the City of Sacramento, Department of Public Works, Solid Waste Division, that the method of cover associated with the balefill operation would be superior to the present method of cover being used at the landfill. However, the CIWMB must approve this alternative method of cover. The Solid Waste Division has applied for the appropriate permits for this alternative method of cover.

Case Study

An in-depth balefill operation study was conducted for the U.S. Environmental Protection Agency(EPA) and has been reviewed in order to ascertain the potential impacts associated with balefill operation. This study, authorized by the EPA, involved a 19 month investigation of the operational, economic, and environmental aspects of baling solid waste, transporting bales and disposal to an off-site landfill in St. Paul, Minnesota. This was a two phase project. Phase 1 involved a 5 day field study of normal working conditions. The objectives for this phase were to evaluate the following: The physical layout and mechanical components, the plant operation, the nature of incoming waste, the baling operation(including rate, method and an analysis of the bales and the liquid squeezed from the solid waste during baling), the activities associated with the baling plant, the environmental impact of the baling system and the cost associated with construction, maintenance and operation. Phase 2 included organizing the results of specific monitoring activities both at the landfill and at a test cell.

The St. Paul baling plant was located 2 blocks south of the Mississippi River, and 12 miles from the landfill. The results of the study were as follows:

- Small amounts of liquids squeezed from the waste may collect below the baler.
- Surface water problems were not significant.
- It was recommended that, because there was not a direct sewage collection system at the baling facility, a pan to collect slurry and liquid squeezed from the baler should be designed and installed below the baling chamber, the gathering ram, and the compacting ram.
- Higher long term temperature levels were recorded to be associated with balefill due to the density of the bales.
- "The concentrations of various constituents found in the St. Paul bale test cell leachate were generally less than or in the low end of the range of concentrations for leachate from normal and shredded waste landfills. However, the short period of leachate monitoring may not represent long-term trends."

Due to differing meteorologic conditions and physical geographic constraints, the effects of baling at the Sacramento Landfill are anticipated to be different than the effects of baling in St. Paul, Minnesota. The solid waste stream of the City of Sacramento is less saturated and wet than the solid waste stream of St. Paul, Minnesota. Furthermore, the City of Sacramento balefill operation will be directly served by the sanitary sewer system and the Sacramento landfill where the bales will be landfilled has a clay liner. The baling operation and landfill in St. Paul did not have these features. The following assessment of the proposed balefill operation is based upon the previously discussed study, solid waste periodical articles pertaining to balefill operations in Cumberland County North Carolina, the cities of Lubbock Texas and Lawrenceburg Tennessee,

and information derived from conversations with Keith Johnson (City of Sacramento, Department of Public Works, Solid Waste Division), with Reginald Young(City of Sacramento, Department of Public Works, Acting Director), with Jack Legler(National Solid Waste Management Association), and representatives from the California Integrated Waste Management Board, and the Regional Water Quality Control Board. The above articles are available for review at the City of Sacramento, Planning and Development Department, Environemntal Services Division.

ENVIRONMENTAL EFFECTS

1. Earth

The subject site is designated by the General Plan to be used for a solid waste treatment facility. The subsurface soil conditions have been evaluated numerous times, and the evaluations of soil conditions have been consistent. The base soil in the landfill vicinity consists of deposits of the Victor Formation and alluvial deposits. Granite sands, silts and clays with interspersed gravel deposits dominate this soil type that is predominate along the Sacramento and American Rivers.

The landfill is totally surrounded by levees or berms. Most of the older section of the site has been filled to about the height of the surrounding berms and levees and is covered with an interim layer of soil. All soil that is used as cover at the landfill site is obtained from excavation for construction projects. Currently, the landfill top is approximately 20 to 30 feet above the original grade of the landfill site. For the presently used landfill site, the final grading plan has been developed. The final plan includes specifics regarding grading contours that will provide for 3 percent minimum slopes as required by the California Integrated Waste Management Board. This design is anticipated to direct runoff to surface discharge, to eliminate arbitrary runoff, and to minimize haphazard settlement impacts. The landfill closure plan includes the specification that the landfill will be capped by two feet of compacted soil, covered by one foot of compacted soil with low permeability and topped with one foot of topsoil. The primary concerns pertaining to landfill activity are leachate and settlement. The balefill operation is anticipated to minimize leachate generation. Settlement occurs through three processes: settlement due to construction and development, settlement induced by seismic activity, and settlement due to decomposition of fill materials. The majority of the naturally geologic deposits on the landfill site have been removed and replaced with fill. Since balefill contain less moisture and are more stable than area fills, leachate and settlement will be reduced. The proposed permit revision is expected to have a less than significant impact upon settlement and upon geological features.

2. Air

Odor and Methane gas are elements of air quality associated with landfill use. Performance standards are addressed in the California Code of Regulations, Chapter 3, Section 17682 and 17683. Recently it was recognized that methane gas, in excess of what is allowed under the California Code of Regulations, was migrating from the landfill. However, the City of Sacramento Solid Waste Division is taking action to correct violations of Title 14, California Code of Regulations, Sections 17705 and 17783. This situation is in the process of being rectified and is not anticipated to be significantly impacted by the proposed balefill operation.

It is anticipated that the proposed permit revision with change to a balefill operation will substantially reduce the amount of cover material required to maintain State minimum standards and, in turn, will reduce the number of vehicle trips associated with delivery of dirt to the landfill. A reduction in the number of vehicle trips associated with the landfill will result in an incremental reduction of pollutants that degrade air quality. The proposed permit revision is not anticipated to result in a significant impact to air quality.

3. Water

The City of Sacramento waste stream has less liquids than the waste streams of cities that have more rainfall than Sacramento. The standard practice at the City Landfill is that trucks empty the garbage in a garbage pit that has a sump in the bottom that collects liquid. This liquid is disposed of directly into the sanitary sewer system that feeds into the Regional Water Treatment Plant(Pers. Comm., Keith Johnson, 3-2-92). It is anticipated that the garbage that will be baled will be deposited into the pit that is presently used and will be transferred to the baler via a conveyor belt. The baler will have a drain that is served directly by the sanitary sewer(Pers. Comm., Reginald Young, 3-17-92). Furthermore, there will be a gutter system around the baler to divert any liquid that is emitted from the baler during compaction. From the baler all bales will be deposited into the portion of the landfill that has a clay liner, and that is served by a leachate collection system. Furthermore, bales contain less moisture than original waste. Therefore, long-term leachate generation in the expansion area will be reduced. The proposed balefill operation is anticipated to result in an incremental addition of wastewater contributed into the sewer system, however, the collection system is not anticipated to be significantly impacted by this addition.

Flooding

The City of Sacramento Landfill is bordered by the American River. According to the EIR for the General Plan Update, there were no flooding problems at the project site during the February 1986 floods. The proposed project is located in an area of the City defined by the most recent Flood Insurance Rate Map, published by the Federal Emergency Management Agency(FEMA) as Flood Zone X. This zone is designated by the National Flood Insurance Program as an area of 500-year flood, as an area of 100 year flood with average depths of less than 1 foot, or as an area protected by levees from 100 year flood. The height of the landfill resulting from years of landfilling and the height of the surrounding levees are factors which result in protection of the landfill site from 100 year floods. Implementation of the project will not expose people and/or property to the risk of injury or damage in the event of 100 year or lesser flood.

Storm Water/Surface Water

Storm drainage from the project site flows either into the American River or the City of Sacramento combined sanitary wastewater and stormwater system. The combined flows are treated at the 35th Avenue Treatment Plant and discharged into the Sacramento River. During the rainy season the capacity of this plant is sometimes exceeded and untreated sewage and storm runoff is discharged directly to the Sacramento River. To relieve this situation some stormwater drainage at the landfill is collected separately and discharged directly to the American River.

According to the storm sewer plans on file at the City of Sacramento Department of Public Works, there are no storm sewers on the project site west of the 20th Street railroad tracks. The eastern portion of the site drains southward from two storm drain lines to a 33 inch storm drain on 28th Street. A 15 inch drain collects runoff along 16th Street and transports it in a combined sanitary and storm sewer along 18th Street to the south. The surface runoff is transported to the City treatment plant.

According to the revised Landfill Closure plan that was approved June 18, 1991, a lined surface channel system will be installed at landfill closure to replace the current drain system and some surface water runoff will still go into the combined system. Channels will be designed for the 100 year, 24 hour storm. After closure, all surface runoff which has not been in contact with refuse will be discharged directly into the American River. According to the closure plan, all facilities will be inspected annually and maintained in compliance with Regional Water Quality Control Board regulations.

All landfill activity is monitored and regulated by the California Integrated Waste Management Board and the Regional Water Quality Board. The site is graded as per the specifications of the California Integrated Waste Management Board requirements to deter runoff. Compliance with regulations set forth by these governing bodies will ensure that the activities associated with the proposed balefill operation will not result in a significant impact to storm drainage at the City landfill.

Groundwater

The hydrology of the landfill site is influenced by the proximity of the site to the American River. The groundwater at the landfill has a tendency to reverse its flow direction seasonally. During times of low river flow the ground water tends to flow toward the American River; during times of high river water levels , the opposite is true. The groundwater conditions at the landfill have been repeatedly evaluated and regularly monitored since 1972 when monitoring wells were installed around the perimeter of the existing disposal operation(Closure Plan Final Report, 1986). Groundwater quality has been degraded by the existing landfill operations. However, since 1986 a long term ground and surface water monitoring program and a ground water and surface water assessment program was established to adequately address water quality at the landfill.

Leachate is defined as water percolating through the refuse potentially containing dissolved refuse compounds. The landfill expansion area has a leachate collection system and clay lined berms that surround the landfill to prevent lateral migration. This system consists of a clay liner, a drain blanket, collection pipes, and pumps. The liner extends three feet above the historical highest level of groundwater. A groundwater dewatering system is beneath the liner to prevent uplift pressures. The leachate is discharged to the regional sanitary wastewater system. All remaining areas of the landfill do not have a groundwater dewatering system. However, standards required by the landfill permit ban the acceptance of sludge and liquid wastes at the landfill, and require application of daily cover to inhibit infiltration, and gradation of the interim slopes of the landfill to promote runoff. All refuse that will be baled with the implementation of the proposed balefill operation will be placed in the expansion area of the

landfill site.

Ground water quality is monitored by the County of Sacramento, Environmental Health Division, the California Integrated Waste Management Board and the Regional Water Quality Control Board. The site is graded as per the specifications of the California Integrated Waste Management Board requirements to deter percolation through the wastes and to minimize leachate. Furthermore, balefilling results in less moisture to be deposited in to the landfill which results in less percolation than other methods of landfilling(Pers. Comm. 3-23-92 with Jack Legler, National Solid Waste Management Association).

4/5 Plant and Animal Life

The proposed project is located in an urban habitat. Due to the fact that this site has been a landfill site for over 30 years, it is not anticipated that the proposed project will have a significant impact upon plant or animal life.

6. Noise

The proposed balefill operation will not change the use of the site. The landfill will continue to operate as such until capacity is reached. Due to the proximity of the landfill site to Business 80 Freeway, the site is in an area that is identified in the SGPU as exceeding the 60 dB Ldn (SGPU EIR, EXHIBIT AA-47). Landfill use is not considered to be a sensitive noise receptor. The actual baling will occur inside the baling structure and is not anticipated to result in a excessive amount of noise. It is not anticipated that changing the method of operation at the landfill to a balefill operation will result in a significant noise impact.

7. Light and Glare

Standard landfill operation requires the use of lighting for safety. The proposed project will not affect or be impacted by existing lighting. Some of the balefill operations will take place during parts of the day when it will be necessary to use artificial lighting. The impact of this lighting on adjacent parcels is expected to be minimal since the balefilling of the expansion area will occur below the top of the containment berms. Landfill use is not a use normally associated with excessive light and glare impacts. The proposed change to the landfill permit is not anticipated to result in a significant light and glare impact.

8. Land Use

The proposed permit revision is in compliance with land use designations for this site. The proposed change to a balefill operation will extend the life span of the landfill. The Central City Community Plan and the General Plan designate the site as a solid waste disposal facility. The City Council adopted a resolution in August of 1964 which identifies the landfill site as "Solid Waste, Open Space, Park". Once the landfill has reached capacity adopted City plans designate the landfill to be used as a future regional park area.

At closure, the landfill will receive a final cover which is designed and constructed to function

with minimum maintenance and consists, at a minimum, of a two foot thick foundation layer overlain by a one foot thick clay liner and a one foot thick vegetative soil layer. This final cover has been approved by the California Integrated Waste Management Board pursuant to Subsections 2510(b) and (c) of Subchapter 15 of the California Code of Regulations. The site will be revegetated with flora and may possibly be developed with bicycle and hiking trails, and picnic areas. The post closure maintenance period will be required to extend as long as the wastes pose a threat to water quality. The proposed balefill operation is, therefore, consistent with the General Plan and the Community Plan designations for the site and will be operated in conjunction with an approved permit from the California Integrated Waste Management Board. The proposed balefill operation is not anticipated to have a significant impact upon land use.

9. Natural Resources

The proposed permit to change the method of operation at the landfill to a balefill operation is not anticipated to significantly accelerate the use of natural resources or deplete non-renewable resources. Therefore, it is concluded that the potential natural resource impacts are less-than-significant.

10. Risk of Upset

The City landfill is operated under the Solid Waste Facilities Permit No. 34-AA-0018 with the California Integrated Waste Management Board. The practices of the landfill are under the jurisdiction of the California Integrated Waste Management Board, The Regional Water Quality Control Board and the City of Sacramento Public Works Department. These practices are subject to performance standards. The landfill has a hazardous waste screening program which was prepared and submitted to the Regional Water Quality Control Board on June 28, 1989. The conditions of various permits pertaining to hazardous materials are divided into conditions that apply to both the original landfill site and to the expansion site. For both of these sites hazardous wastes and liquids are prohibited. In order to further reduce the impact of any possible hazardous waste, a minimum of 6 inches of compacted soil cover is applied daily on the surface of the fill. For the expansion site only, a compacted clay liner and a leachate collection system have been installed.

Performance standards require additional reporting and monitoring of potential hazardous materials associated with landfill use. Methane gas is a primary hazardous material concern. Methane gas is anticipated to remain at relatively high levels over the next 10 years, but will decrease over time. Performance standards serve as protective measures to mitigate the potential seepage of toxic or flammable materials. Other gases produced during the refuse decomposition may be corrosive and have strong odors. The proposed balefill operation could lessen the potential impacts associated with solid waste decomposition because the bales are tightly compacted. Methane production requires moisture and an absence of oxygen. With baling there is less of both of these components, and so, while the same amount of methane will be produced the production rate is lower and over a longer period of time. There is a landfill gas collection system and perimeter control systems presently in place at the landfill and at closure the system will be enhanced and continued to be implemented. Based upon information provided in the Water Section of this document(See Section 3), the proposed project is anticipated to result in

a less than significant risk of upset.

11/12. Population/Housing

The proposed landfill permit revision will not alter the location, density, distribution or growth rate of the human population or generate any additional demand for housing. The proposed project will have a less-than-significant impact population and housing.

13. Transportation/Circulation

The access road to the landfill is a northerly extension of 28th Street. Public use of 28th Street does not extend north of the Southern Pacific Railroad tracks between A and B Streets. Traffic resulting from proposed change to the method of operation at the landfill to a balefill operation is not anticipated to generate any substantial impacts.

Haul vehicle traffic is spread fairly uniformly over the day which accounts for the lack of traffic congestion. The proposed permit revision with change to a balefill operation will lead to a decreased number of trips in the future, due to the reduced need for cover material deposited at the landfill site. The existing land use designation was evaluated as part of the SGPU EIR and change to a balefill operation is not expected to create a traffic impact on the access routes serving the landfill, primarily 28th, E Street and Business Route Interstate 80. It is not anticipated that this proposal will have a significant impact upon transportation.

14. Public Services

The proposed balefill operation will not affect or result in additional or altered public services. This proposal will not lead to an impact upon fire protection, police protection, schools, recreational facilities or other governmental services. The proposed revision to the landfill permit is not anticipated to result in a significant environmental impact upon public services.

15. Energy

The proposed balefill operation will not result in an increased use of substantial amounts of fuel or energy and will therefore, have a less-than-significant impact upon energy sources.

16. Utilities

The proposed landfill permit revision will not result in a need for new or altered power, natural gas, water, sewer, or stormwater drainage. The proposed project is not anticipated to substantially alter Sacramento's solid waste disposal. The proposal is considered to have a less-than-significant impact upon utilities.

17. Human Health

The landfill permit is issued under the authority of the California Integrated Waste Management Board. This permit includes performance standards that will prevent any health hazards. These

performance standards addressed in the California Code of Regulations, Chapter 3, Sections 17682 and 17683 require additional reporting and monitoring of vector populations, odors, litter, and fires at the landfill. It is anticipated that fewer vector problems will occur as a result of balefilling. In order to avoid leachate formation, sludge and liquid wastes are banned from the landfill site and daily covering of waste with soil and grading of the interim slopes at the landfill have assisted in limiting infiltration and promoting surface runoff. To reduce the potential for leaching to occur, the expanded portion of the landfill site was required to have a clay liner and a leachate collection system. As part of the balefill operation, all baling will occur inside of the baling structure. This structure will be served by a drain that flows directly into the sanitary sewer system. The measures discussed above are designed to protect groundwater and surface water quality.

Presently the City landfill site is in violation of Title 14, California Code of Regulations, Sections 17705 and 17783 because methane gas is migrating off the landfill site at over 5 percent by volume. This violation is presently undergoing correction to obtain compliance with the code requirements. The City intends to install additional gas collection wells or use other means to reduce all boundary probe readings to 5% or less. The landfill gas collection and control shall undergo alterations, as well. The City of Sacramento Public Works Department, Solid Waste Division is continuing to work toward rectifying this situation.

The proposed balefill operation is not anticipated to result in the creation of health hazards or expose people to potential health hazards. All operations at the City landfill are subject to review by and must be permitted by the California Integrated Waste Management Board. Due to the standards enforced by the CIWMB and the Regional Water Quality Board, a less-than-significant human health impact is anticipated to result from the proposed balefill operation.

18. Aesthetics

The landfill site has been used for waste disposal for many years and is designated for this purpose in both the SGPU and the Central City Community Plan. Once the landfill site has reached capacity, the site will be the future location of a regional park. Obstruction of a scenic view and creation of an aesthetically offensive site is not anticipated to occur as a result of the proposed balefill operation, therefore, a less-than-significant aesthetic impact is expected.

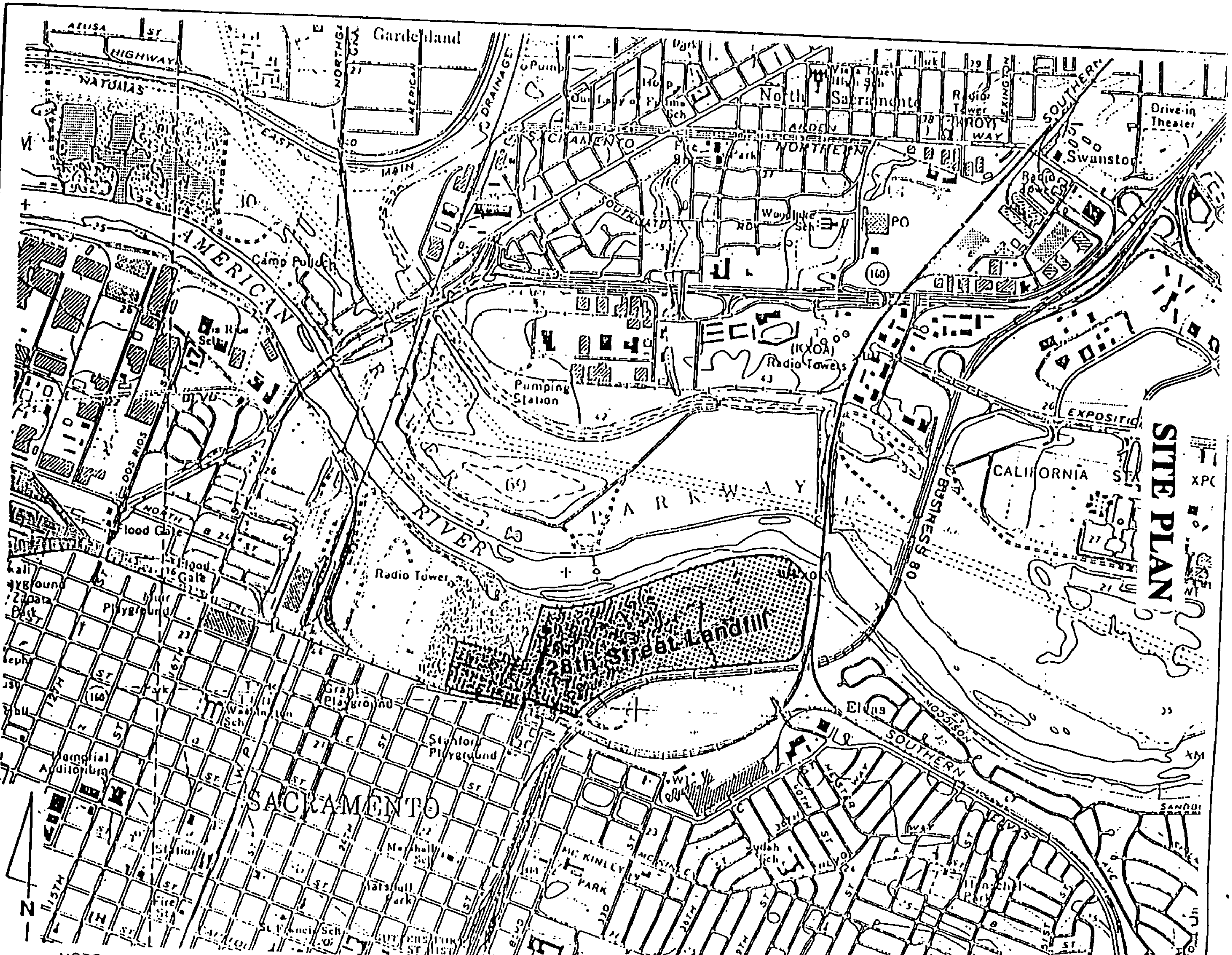
19. Recreation

The proposed permit revision will not result in an impact upon the quality or quantity of existing recreational facilities. As previously mentioned in this environmental document, once the landfill site has reached capacity the planned land use of the site will be as a recreational facility. A less than significant impact upon recreational facilities is anticipated to occur as a result of the proposed balefill operation.

20. Cultural Resources

The subject site is not located in the Primary Impact area for cultural resources as defined by

the SGPU EIR. The proposed permit revision is expected to result in a less-than-significant impact to cultural resources.



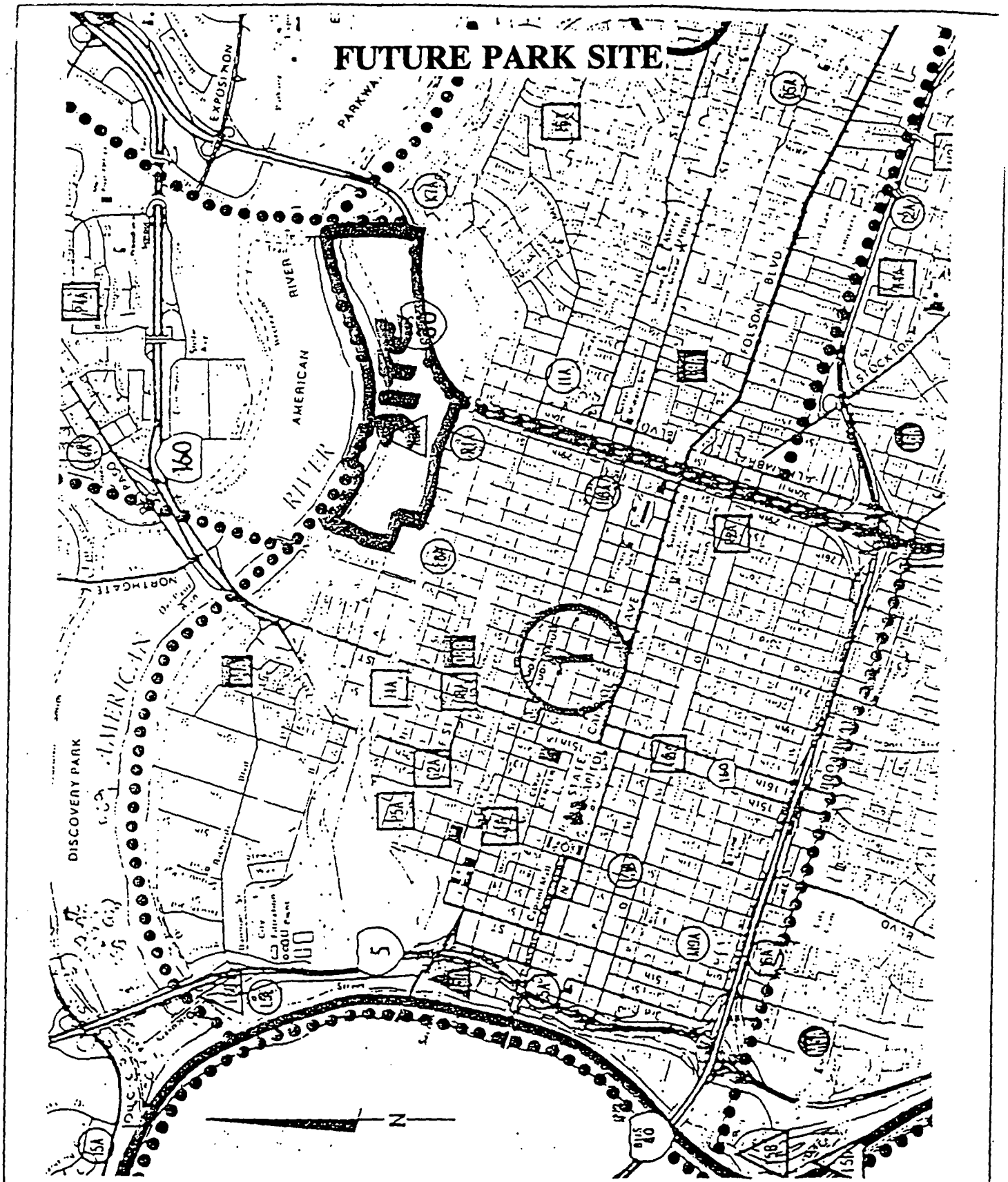
NOTE: This Map is a portion of the Sacramento East 7.5 minute topographic quadrangle map, U.S. Geological Survey, 1967.

Harding Lawson Associates
Engineering and Environmental Services

Site Location Map
Feasibility Study for
Sutter's Landing Park Development
Sacramento, California

FIGURE 1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CSN	18551,003.02		8/90	



Not to Scale

Harding Lawson Associates
Engineering and
Environmental Services

Park Planning Area 1 Boundaries
Feasibility Study for
Sutter's Landing Park Development
Sacramento, California

FIGURE
2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DA
CSN	18551.003.02		8/90	

#1

EXHIBIT A

COUNTY OF SACRAMENTO

ENVIRONMENTAL MANAGEMENT DEPARTMENT

NORMAN D. COVELL, DIRECTOR

ENVIRONMENTAL HEALTH DIVISION
Kenneth C. Stuart, Chief

February 3, 1992

Mr. Keith Johnson
Senior Engineer
City of Sacramento
Solid Waste Division
921 10th Street, Suite 500
Sacramento, CA 95814-2715

SUBJECT: COMPLIANCE INSPECTION FOR THE SACRAMENTO CITY LANDFILL

Dear Mr. Johnson:

This letter is to confirm that this office, as the Local Enforcement Agency (LEA), inspected the City landfill on January 28, 1992. Our inspection found that new gas collection wells installed along the easterly property boundary have effectively controlled the migration of methane gas from the landfill. The landfill is now in compliance with all regulations enforced by this office.

The permit revision to allow a bale fill operation on this landfill is nearing completion and should be submitted to the California Waste Management Board for their concurrence about February 5, 1992.

If there are any questions regarding this matter, please contact me at 386-6115.

Sincerely,

Robert Berger
Senior Environmental Health Specialist

RB:co
013192

cc: K. Knight
P. Maher
S. Happersberger CIWMB

Attachment: Inspection report of January 28, 1992

618RB-166.92

8475 Jackson Road, Suite 240 • Sacramento, CA 95826 • (916) 386-6108

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
COMPUTATION SHEET

DATE	CALC. BY	SHEET ____ OF ____
DATE	CHK. BY	PROJ. NO.
SUBJECT		

COVER SOIL SAVINGS

NORMAL RAMP TYPE LANDFILL WILL USE 20-25% COVER SOIL TO REFUSE

BALEFILL OPERATION - 6" OF SOIL FOR EACH 15' LIFT

$6''/180'' = .033 \rightarrow 3.3\%$

SOME COVER SOIL WILL BE LOST IN THE GAPS BETWEEN THE BALES. ASSUME ≈ 2% LOSS

20% CONVENTIONAL LANDFILLING
- 5.3% BALEFILL
14.7% LOWEST SAVINGS

25%
- 5.3%
19.7% HIGHEST SAVINGS

USE 15% SAVINGS AS CONSERVATIVE ESTIMATE

EXHIBIT C

September 1989

Waste Age

Environmentalists of Maine,
Hauler Sawyer, Senator Mitchell

Balers Are Big — A Special Report

Introducing A New Series:
Focus On The Waste Generators

DIFFERENT STROKES FOR ALL KINDS OF FOLKS

Baling of waste—for landfilling, long-haul shipment, and recycling—is hotter than hot. Plus: Baler buying trends.

A couple of hours south of Buddy Holly's hometown of Lubbock, a small hill is rising out of the west Texas desert in Big Spring. Unlike a peak created by volcanic eruptions, an engineer can tell you this peak will rise 50 feet from its original base when finished — and it will be L-shaped.

Also, unlike a peak that's pushed up by tectonic plates or built of cooled volcanic lava, this hill will consist of baled solid waste and virgin dirt.

This new addition to the topography of Big Spring, population 22,000, is the top of a balefill, begun on the city's existing landfill four years ago. Even in the wide open spaces of the West, cost is a factor in solid waste disposal: it's one reason why Big Spring and many other municipalities are turning to baling to conserve landfill volume and, therefore, extend landfill life.

Haulers and transfer station operators are beginning to handle more baled solid waste, too, as municipalities without landfills densify their solid waste to shop it as economically as possible.

Advantages of balefills

In a typical balefill operation, solid waste collected by a community is taken to a public or private transfer station, where recyclables may be recovered. The nonrecyclable fraction is then compacted into bales generally about 5 feet by 4 feet by 4 feet.

If baling doesn't occur at the fill site, the bales are loaded onto truck trailers (or rail cars) and transported there. The bales are off-loaded and stacked in rows three to five bales high, usually below grade (although an above-grade design, such as that in Big Spring, is feasible). The waste is then top-covered, with no roller compaction required.

Proponents of balefills point to advantages of the process:

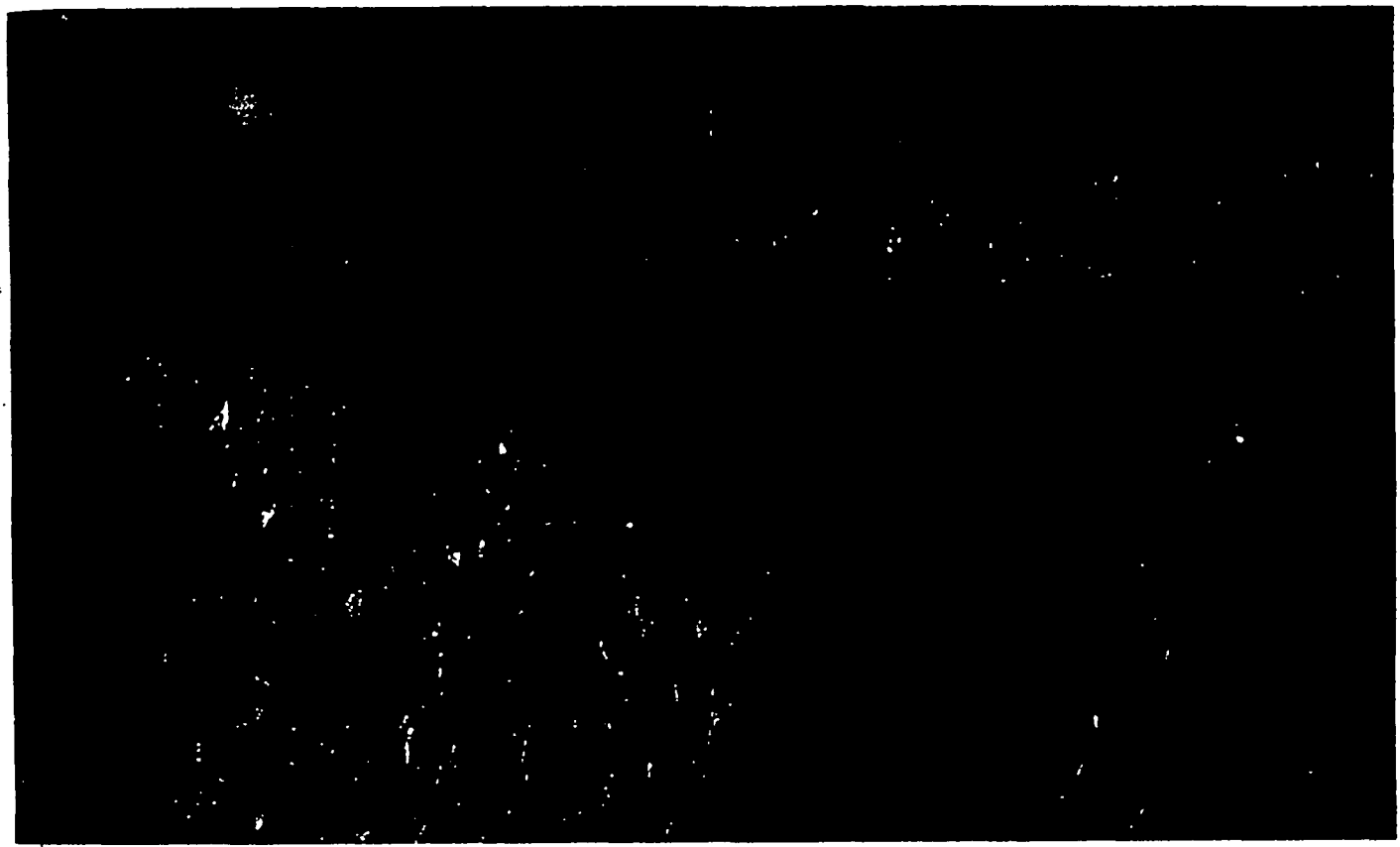
- reduced leachate because of the bale density;
- reduced amount of loose waste to blow off the fill site;
- reduced odor; and
- depending on whom you ask, a real advantage in fill density over roller-compacted loose waste.

A good package for shipping

While there is still some contention over whether a real volume advantage is gained by stacking bales in a balefill vs. loose filling and compaction in an open sanitary landfill, there is little doubt that compacting waste for shipment has real benefits. One of those is the use of flatbed trucks for the trucking of bales, a move that can allow the transport of larger waste volumes (compared with shipment of waste in trailers with sides of steel or even aluminum).

That has led to the development of ancillary businesses that may handle only parts of the balefill process, such as baling, or baling-and-transporting, or operating dedicated

By DAN GOLDBERG
Goldberg is an Ohio-based writer.



balefills (facilities that accept only baled waste).

As land-poor communities are forced to ship more waste longer distances, the popularity of baling solid waste is likely to grow, regardless of whether it's being shipped to a dedicated balefill. Baling operations on the East Coast are sending waste to Ohio, Michigan, Kentucky, western Pennsylvania, even as far as Indiana.

Big Spring's choice: no options

To understand the economics of shipping solid waste those distances, it may help to start by looking at a situation in which the nearest landfill alternative is 20 miles away. That takes us back to Big Spring.

"This facility has proved to be extremely cost-effective for the city and its citizens," says Tom DeCell, Big Spring's director of public works, of the city's balefill. The balefill, located within city limits on an existing city landfill, was the first permitted in Texas, beginning operation in November, 1985.

When DeCell started working for the public works department in 1982, the 183-acre landfill had been operating since 1970. Estimates on the remaining capacity of the site ranged from seven years down to 18 months. Whichever, plans had to be made for the future.

First, the siting of a new landfill was investigated. DeCell said the city was stuck with one site 20 miles northeast of the city. Geological conditions in the immediate area dictated this. "Everything south, north and west of us is a lot of salt flats, with high-chloride water," he says.

In addition to the environmental constraints, new landfill technology (protective liners and leachate collection) would be required to get a new facility permitted. This would have presented city planners with high construction costs and a tight timetable — even if the permitting process went smoothly.

A second option was to truck the city's solid waste to the nearest permitted landfill — in Midland, about 20 miles to the southwest. However, the economics of sending 28 truckloads each week to Midland, at a cost of $1.05 per mile — before the tipping fee was assessed — was prohibitive for Big Spring.

So the decision was made to go with the balefill plan, based in part on visits to a number of existing balefill sites.

A balefill in operation

Waste collected by the city's Emco sideloaders, and in roll-off containers, is delivered to a tipping floor in a building at the city's original landfill. There the burden is transported by conveyor into a 100-hp, single-ram Logemann baler.

Finished bales are then stacked, four high, on the fill site. They are covered with a six-inch layer of virgin dirt. A multipurpose Caterpillar integrated toolcarrier handles the waste, and the bales, at both ends of the baling process.

With its above-ground location and relatively small cover layer, DeCell says the balefill also represents a "potential strip mine for a waste-to-energy operation," which he feels will eventually become cost-effective for the area. Another advantage is the desert environment, which gives

the landfill a "negative transevaporation rate." That means that evaporation rate is greater than the amount of rainfall, allowing the city to get a state permit without requiring a liner to handle leachate problems.

Big Spring's switch to balefilling has proven cost-effective, says DeCell. The site requires a staff of only six, including three heavy-equipment operators. Aside from regular preventive maintenance, the staff has encountered no serious equipment problems. This year, city workers refurbished the baler's wear plates by themselves, probably the biggest regular maintenance task in a baling operation.

"The key to keeping this operation going is dedicated preventive maintenance," says DeCell. What changes would he make, given a chance to construct the facility again? Most would be related to easier cleaning, better drainage, and isolation of control areas. A dust collector might be another improvement, especially to reduce the amount of dried organic particles in the air, such as leaves and grass.

Some of these changes might well be made in the future, as the public works staff should have time to work on the system. Estimates show the useful life of the city's landfill has been extended some 37 years by the shift to a balefill.

Shipping out: Bergen County

Many municipalities are not as lucky as Big Spring: They no longer have a landfill in their backyard, so there is no advantage to be gained by baling waste — there is no landfill life to extend.

But still some cities are baling waste — to gain long-term transportation savings.

Even a baler alone can be a significant investment for a small community. Often, that cost can be shared by combining solid-waste service areas. The 70 municipalities in Bergen County, N.J., for example, are part of one of the state-mandated solid-waste management districts. Under the district plan, the county bales these communities' waste and ships it out by truck; soon, it will begin using railhaul, too.

"Dollars," is the simple explanation offered by Sal Crupi, of the Bergen County Utility Authority, for the county's decision to bale the waste.

"Baled waste we ship out at $75/ton, and loose waste we ship at $105/ton," says Crupi, the county's director of solid waste management. Judging from the BCUA facility's capacity, low-cost shipment appears to be the best option: as of this spring, the county was taking in 2,200 tpd of solid waste from the municipalities, and the transfer station has a throughput capacity of 3,000 tpd.

To handle that amount of solid waste, the county has

An investment in a baler is becoming more important to those in solid waste management. Ever-higher volumes of refuse and recyclables are being processed in these machines—which means more roofs in the solid waste business, and more pieces of rubber-tired mobile equipment (lower right).

four Mosley balers, each capable of processing 50 tph. Two shifts of workers, up to 50 in an average day, handle the waste stream processing inside the plant. Crupi notes the county's solid-waste management plan also includes a comprehensive recycling program.

Baled waste is shipped by transportation contractors Mitchell Environmental and Laidlaw Transportation to sites in Ohio and Michigan. With the enormous output from the Bergen County operation, many landfill outlets must be available; 16 have been secured for the county's waste stream.

Bergen to begin railhauling bales

Rail transportation will begin this year from a Conrail spur already on Bergen County's North Arlington landfill site. The track brings rail cars right into the baling facility, with enough room available for 20 cars. The cars are to be loaded continuously, with each holding roughly 100 tons — the equivalent of four to five average truckloads of baled waste.

At the end of the day, 20 cars — filled with 2,000 tons of waste — can be pulled out at once. New cars can be brought in and quickly prepared for the next shift of loading.

To the railroad, transporting solid waste represents a po-

tentially lucrative bulk material. Some rail hauling has been done in the past, such as via Burlington Northern's runs out of Omaha in the late Seventies. Because higher tip fees have recently improved cost margins for shipping solid waste, large rail carriers such as Burlington Northern, Conrail, CSX and Union Pacific have all investigated the possibility of hauling solid waste in the past few years. Some have even bid against trucking firms on recent contracts. See the accompanying story for more details.

Baling out small communities

What about smaller communities that do not generate the large waste volumes of a densely populated area such as Bergen County — but still face the problem of no landfill space? Some may not even have enough money in their solid-waste management budget to purchase a baler.

In that case, solid-waste managers may turn to private contractors to handle part or all of the baling process. Waste may be taken by city trucks or a private hauler to a contractor for baling. While this may be only a short-term solution until other plans are made, it may be the most cost-effective way to get a community's waste stream to a landfill — a waste stream that won't wait until the planning process is finished.

If a community does bale its own waste, bales may still be handled by a hauler that has contracted for space and provides a service, taking baled waste from permitted transfer stations to permitted landfills. The customer is billed for the haul plus the tip fee, says GSCS vice president Jack Lynch. "Interest has been growing in the service," says Lynch, who adds — "We expect to expand."

At present, GSCS hauls waste from 15 transfer stations, all of them privately operated, in New York, New Jersey, Pennsylvania, and Maryland. GSCS takes on the task of locating space for the baled waste, which means the firm must constantly locate new balefill outlets. Baled waste is shipped to landfills in Ohio, Indiana, Illinois, and Kentucky, and GSCS recently sought a permitted site in West Virginia.

Roughly 30 truckloads per day are now being handled by GSCS. Transfer station operators load trailers with approximately 23 tons of baled waste; the bales range in size and weight from 5 x 4 x 4 (in feet) and 3,300 pounds, to 5 x 3 x 2 (weight 1,700 pounds). There are no particular bale specifications required for the GSCS service, says Lynch. "We're just looking for 23 tons on a truck, from a permitted transfer station," he says.

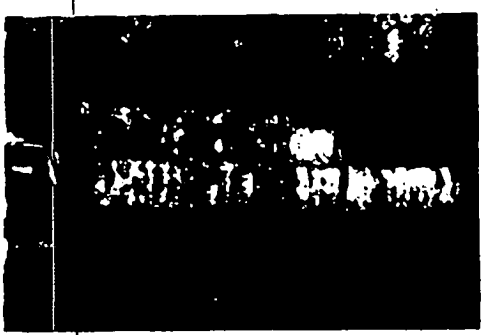
Lynch adds that some of the landfills that accept the bales also accept unbaled waste from other haulers, which may be compacted on site. As solid-waste baling increases, more landfill operators may have to deal with two different types of loads — the tightly packed, wire-tied bales and compacted, loose waste intended to be spread and compacted. Operators may segregate the two kinds of deliveries.

If the volume of baled waste still represents a small percentage of their intake, operators may break the bales and process them along with loose waste.

A competitor for balers

For many solid-waste professionals, the real advantage of baling is the transportation cost advantage, not what happens at the landfill. But the wire-tied bale may not be the last word in compaction for long-haul shipment.

A competitor has emerged for baling for long-haul shipment and for balefilling. The Portland, Ore., area (see accompanying railhaul story) will use a slightly different kind of compacting equipment from Amfab, a Portland-based company.



Compact bales can be transported short distances (as here, from a Kentucky baler to a nearby balefill) or over highways to distant landfills. Those traveling on highways are tarped.

This new compacting technology creates a dense "slug" of waste that is continuously loaded into a vehicle for transport and then spread out and compacted after it's deposited at the landfill. This technology's advantage is in transportation density: a slug that measures 37 x 7 x 7 (in feet) could be packed into a trailer as a 25- to 28-ton payload. That yields as much as a 30% higher payload density than a conventional bale. What's more, the process offers a higher throughput capacity — up to 150 tph, compared with 50 to 70 tph for many large balers.

Another advantage offered by the slug-producing technology is that it can be shipped to an incinerator as an alternative to a landfill. This is not a practical option for baled waste.

It's worth noting that Amfab was recently purchased by Amhoist, best known in the solid waste industry as a manufacturer and marketer of baling equipment.

Is baling for everyone?

"Discussing the benefits of balefills is a kind of mixed bag," says one solid waste professional, "kind of like arguing politics or religion with somebody."

Detractors point out that balefills are not necessarily a panacea for landfill disposal needs. While landfill compactors still can't compete with balers' output density, (2,000 to 2,500 pounds per cubic yard, on average), some studies show that once the soil overburden is added to the equation, the open landfill's density may approach that of a balefill.

Another debated point is the overall stability of balefills. Landfill proponents point out that balefills can still develop holes — as decomposition rates may vary from load to load — whereas continually compacting in an open landfill results in even packing.

Disagreements are likely to continue in this arena, because of a lack of comparative research on the two landfill technologies. Although a considerable body of definitive research on waste in open sanitary landfills exists, there is a lack of similar independent research on baled waste and balefills, and no well-known comparative studies on the two processes.

"EPA really dropped the ball on research" concerning landfill technology, says Robert Ham, professor of civil and environmental engineering at University of Wisconsin-Madison. Ham notes that Europeans are carrying out most research in this area. Some small-scale studies on leachate production were carried out at several universities in the past, but because of the scope and the short time span of these studies, results could hardly be called conclusive, says Ham.

In addition, relatively little research has been published comparing methane production from compacted and baled waste. As Gary Musselwhite, sales manager for Amhoist Corporation's Harris Group, points out: Common sense says "methane production takes water and air, and there's going to be less of both in a balefill." However, overall, in the absence of EPA funds, no independent institutions have stepped forward to fund comparative studies into gas or leachate production and compaction rates.

Research results comparing baling and compaction densities may be outdated and also can be suspect. Often, moisture content is not included as a parameter when density measurements are discussed, says Ham. Other critics point out that landfill compactor densities may be improved by repeated passes with the equipment — even though this additional processing may not be feasible or cost-effective for a landfill operator.

However, balefills are "going in like mad," says Ham, "and we should be able to compile long-term data from them." Manufacturing engineers and independent researchers agree that for now, prospective users of balers and balefills should look to current operators for accurate field data. "At this point, you have to go to the end-user," says Musselwhite.

Starting from scratch in Tennessee

One of North America's newest balefills is in Lawrenceburg, Tenn. This "greenfield" facility, a joint project of the city and Lawrence County, is the state's first permitted balefill.

Lawrenceburg's balefill began operation in February.

1988, on a new, 40-acre site at the outskirts of town. As with most waste-handling facilities these days, though, the process to get it running took almost three years.

In 1985, the county's 30-year-old landfill was topping out. The county wanted to get a new landfill site permitted by the state, but in the meantime it was forced to ship waste 63 miles to temporary landfill space in Morgan County, Ala. — at more than three times the old tip fee. It cost the city and county governments $400,000 per year (20,000 tpy, at $20/ton) to export their waste during the three years it took to develop the balefill.

A city/county solid waste commission studied the problem, examining landfill and incineration options. Both had drawbacks; the most significant one with landfills being NIMBY resistance from neighbors of proposed sites.

After visiting some baling operations, the committee determined a balefill would be the best option. Baling seemed a cost-effective way to circumvent citizen worries about birds, rodents, and other pests attracted by landfills, as well as odor and loose waste blown off site by wind. The commission estimated a balefill could be operated for $8/ton.

The facility wins rave reviews

Lawrenceburg's balefill has been a success story from the beginning. The actual waste stream of 90 to 100 tons per day is processed on the balefill site, in a 1,000-square-foot building that houses scales and baling equipment, a tipping floor, and storage space for recyclables the county now collects. A Harris HRB-8 baler, which can handle up to 20 tons per hour, was purchased to bale the nonrecyclable waste. A flatbed truck with a modified bed then transports bales the short distance to the balefill face, where a forklift stacks the bales and a front-end loader applies covering layers. The city and county governments spent a total of

Is There A Future In Bale-By-Rail For Refuse?

Can railroads compete for solid waste volume with trucking firms that have dominated hauling for so long?

Obviously, rail shipments offer a great capacity advantage over truck hauling. However, there may not be rail spurs close to the desired endpoints. That means an additional truck haul after off-loading baled waste, and in many cases, a haul from the baler site to load onto the train.

Compare that to trucking the waste: You won't find many landfills — balefill or open sanitary — that don't have a road leading right up to the tip area.

One way railroad haulers can get around this problem is by using "intermodal" technology — containers that can be off-loaded from a rail car directly onto a semi rig. Intermodal units are also used to move cargo between rail cars and ships.

However, intermodal technology creates a need for specialized off-loading terminals to handle the containers, and the terminals and the units themselves would add considerable equipment cost to the waste disposal equation.

A case in point

One example of how construction costs might have affected bids for a transport contract was the recent bid situation in Portland, Ore. While the economy of scale of a rail transport operation might seem obvious, rail companies in fact bid much higher than the trucking company that won the bid — Jack Gray Transport.

In Portland, an RFP was put out for transporting waste over 20 years. Over the life of the contract, an estimated 16.9 million tons of solid waste would have to be moved.

The Portland RFP called for the transportation firm to build loading facilities at three transfer stations owned by the three-county Metropolitan Service District (known as Metro), plus an off-load facility at the landfill.

But loading facilities would have to be planned to accommodate a growing waste stream, points out Dave Luneke, former engineering manager for Oregon Waste Systems, Inc. Oregon Waste is the Waste Management, Inc., unit that is the district's landfill contractor. Only 40% of the waste in the contract will be generated in the first 10 years of the contract life, Luneke says.

With 60% of the waste (and, most likely, the revenue) being generated in Year 11 and after, large corporate entities might have a problem winning such a bid. "With a big rail company like Union Pacific, that might have to answer to a lot of stockholders, it's my guess they're looking at a much shorter ROI payback period," says Luneke.

Costs too high?

It is possible, then, that the capital cost of rail facilities is too high right now for hauling relatively certain amounts of waste in many situations.

Note that the Portland Metro bid award may not be relevant to situations such as the conversion of abandoned coal mines, which are in most cases already served by existing track, into landfills.

However, the new-facility cost factor and the need of publicly held corporations for quick returns on investment could limit rail companies' entry into solid waste hauling to large cities and high-population-density areas — such as northern New Jersey.

Even in such an area as Bergen County, N.J. (noted in the main story), a railhaul plan must be augmented by trucks. Says Sal Crupi of the Bergen County Utilities Authority: "By rail, I can only get out 2,000 tons a day. We're still going to need trucks."

Assuming it operates at capacity, Bergen's transfer facility would still have another 1,000 tpd to ship. Eventually, Conrail may be able to schedule more cars for daily pick-ups at the BCUA facility.

What's more, for Crupi and the BCUA as well as others, trucks still will offer flexibility in scheduling, especially in overflow periods such as post-holiday weeks.

— D.G.

$650,000 on the operation.

Interestingly, because this was the first balefill permitted in Tennessee, the Lawrence County group convinced state officials to allow them to use a clay liner, rather than the polyethylene liners states require of most landfills. The commission presented evidence that the greater density of baled waste would slow migration of water through the fill.

Considering the commission had estimated liner installation in an open sanitary landfill at $30,000 to $70,000 per acre, the savings (at the low end of the estimates) are around $1 million.

Balefill employees still save residual liquids squeezed from the waste, and residue cleaned from the baler, for analysis at an independent lab. Note that baler manufacturers recommend liners and collection systems for most balefill installations.

Ken Knott, former chairman of the Lawrenceburg/Lawrence County Solid Waste Commission who headed the balefill research process, said many people who doubted the success of the operation have been convinced after seeing it in operation. "I honestly think I could put a balefill in any part of Lawrence County, where we couldn't put a landfill before," says Knott.

To balefill, or not to balefill

One key in a decision to develop a balefill at this point will probably be the experience of current users. Deciding how those users' solid waste needs match up with those of your community, as well as comparing existing waste management assets, should be a good guideline.

As Harris's Musselwhite points out, each community's needs are going to be different. "There's never going to be any one process for every municipality," he says. The growing acceptance of balers and balefills simply presents new options for solving solid waste management problems. ■

(Trends in baler buying: see pages 82-83)

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Options for Modern Solid Waste Planning

Today there are numerous choices for managers seeking to reduce their communities' dependence on landfills. Despite many new approaches, land disposal will remain the primary method of solid waste management in the 1990s.

By Larry T. Schaper

Municipal solid waste management has undergone tremendous change over the past 30 years. The 1990s promise to continue that rapid change, and trends developing now will shape solid waste management into the next century.

In 1960, communities had few options to implement as part of their solid waste master plans. Few had master plans to manage solid waste. Most simply sent their communities' wastes to landfills, and expected to do the same for the foreseeable future. Common disposal methods were burning dumps and a few incinerators with tall stacks as the principal means for pollution control. Even the first wave of recycling fever had yet to take hold.

In the late 1960s and early 1970s, the federal government made a large effort to close burning dumps. At about the same time, more stringent air pollution control technology requirements closed many of the older incinerators. The 1980s were typified by growth in WTE plants, better landfills, and late in the decade, a renewed public interest in recycling.

Today, solid waste managers recognize the importance of long-term planning, and that there are many routes to the right solution for their waste disposal problems. Many new options have gained popularity in the past 30 years, and most communities use a blend of them in their solid waste master plan. The role each option plays depends on local opinions and conditions, especially local economics.

Larry Schaper is a partner at the firm of Black & Veatch Engineers/Architects. He is responsible for solid waste management services. His 30 years of experience includes solid waste projects in 22 states and three countries.

Landfill Life Extension

Extending the life of existing landfills is the most common approach to obtaining required future capacity. One reason this approach is popular is that other options, such as siting new landfills, often provoke higher levels of public opposition. Often, regulatory agencies also have fewer requirements for expansions than for new sites.

Operators usually extend landfill life by expanding the area to be filled or increasing the height of the landfill. Another approach is through some form of waste processing, such as baling or shredding.

The new area of an expanded landfill may be subject to newer regulations. For example, older portions of the site may have been permitted prior to requirements for liners and leachate management systems. The result can be a lined section of the landfill adjacent to or on top of the older unlined sections.

If the existing landfill meets current landfill siting criteria, there is strong logic in maximizing the site capacity. In many cases, this means placing additional layers over a previously landfilled area. If cover material is available, maximum site capacity may be determined by the greatest side slope allowed by regulations.

Solid waste processing, such as baling or shredding, also has been used to extend landfill life. Madison, Wisconsin, for example, operated a shredded waste landfill for several years. However, for the purpose of extending landfill life, shredding has not gained widespread acceptance owing to the limited improvement in waste density and high capital and maintenance costs.

Baling equipment for landfills was heavily promoted in the early 1970s. Baling has been used on a limited basis since then, and some balefills are likely to be used in the future. The substantial cost involved for achieving a modest increase in landfill density is the main reason baling is not more popular. Using large landfill compaction equipment, average landfill densities can reach 1,100-1,200 pounds per cubic yard, compared to about 1,700 pounds per cubic yard in bales. Thus, baling compresses each ton of garbage to use about 32 percent less volume. In practice, the average density of a balefill is less than 1,700 due to the space between bales.

Some communities use balefills partly to reduce the level of public concern [illegible] municipal landfills in Illinois, for example, a county is adding balers because they reduce birds, litter, rodents and odors. If baling makes a substantial difference in public opinion concerning a new or expanded landfill, the additional costs may be easily justified.

State-of-the-Art Landfills

Some experts claim that landfills are an endangered species. The news media frequently quotes statistics indicating the rapidly decreasing number of landfills. This implies that landfills are closing rapidly, and soon most will be gone. However, permit applications aren't included in those statistics.

Some regulatory agencies privately admit that they are slowly processing a considerable backlog of permit applications.

The landfill, as a means of solid waste disposal, is a survivor. There is no better way of disposing of waste that isn't burned, composted, or recycled. Yet landfills are relatively inexpensive. Many regions, where environmentally acceptable land can still be obtained, will continue to consider landfilling as a potential solution for municipal solid waste (MSW) disposal.

Because landfills are generally regulated by the states, there are many definitions of "state-of-the-art". The variations among state regulations are expected to be substantially reduced when the U.S. Environmental Protection Agency's (EPA's) proposed Subtitle D (MSW landfill) regulations become applicable. These regulations were scheduled to be promulgated late this summer or fall.

The upper limit on degree of sophistication for MSW landfill design criteria is set by hazardous waste landfill standards. Requirements for hazardous waste site design are set forth in an EPA technology transfer seminar publication.[1] Experts usually agree that design standards for MSW sites can be less stringent than for hazardous waste sites, but often disagree on how much less stringent.

In spite of the fact that landfills are the last choice in the EPA hierarchy for solid waste management, state-of-the-art landfills will be a major factor in solid waste management for decades. This prediction can be made with confidence for several reasons.

A significant factor favoring landfills is the relatively low cost. Although new regulations will greatly increase the cost of landfills, new regulations are not unique to landfills. The new regulations will also increase the cost of alternatives.

Landfills are also the most logical choice for some materials. Parts of the waste stream will not burn (or should not be burned), can't be composted, and are too difficult to separate for economical recycling.

Finally, the lack of commitment by the public and their elected officials to the minimization of waste promotes continued landfill use. Moreover, waste minimization, such as by reduction of packaging materials, cannot be implemented easily by the general public.

Regional Facilities

Regional facilities will play an increased role in solid waste management. Several factors are responsible for this trend. Perhaps the most important reason is the more stringent state and federal regulations being promulgated. As regulations become increasingly complex and expensive to meet, many small operators will be unable to respond. When this occurs, larger regional facilities will replace the many smaller facilities.

A second factor favoring regionalization is the difficulty of siting new solid waste facilities. The inability of individual communities or cities to site facilities within their boundaries results in the need for regional facilities.

Privatization of many solid waste management operations also leads to regional facilities. When communities decide to transfer solid waste management operations to private firms, the need is most frequently met by large regional or national firms. These large private firms must compete

against other private firms, with the lowest bidder usually winning the contract. Large firms can optimize their competitive position by developing large regional facilities that provide economy of scale. Large firms have a significant advantage because bidders have the financial resources to stage the long, sometimes phenomenally expensive process required to site new facilities.

Regulatory agencies recognize that the weakest link in many solid waste operations is inexperienced and untrained staff. Agencies frequently encourage larger regional facilities which can afford the level of compensation necessary to hire and retain skilled operators.

The dramatic reduction of disposal sites in the last three decades is evidence that extensive regionalization has already occurred. This trend will continue and perhaps escalate in the 1990s.

Long Distance Haul

The concept of long distance haul has been around for many years. In the early 1970s, the city of Milwaukee, Wisconsin, sought proposals for solid waste disposal. One proposal (which turned out to be unsuccessful) was based on rail transport of Milwaukee waste to Fulton County, Illinois. More recently, long distance haul has become a growing element in solid waste management on both coasts.

As East Coast solid waste disposal facilities have become increasingly expensive, the incentive for long distance haul by truck or rail has increased proportionally. The West Coast has also become committed to the long haul concept. Los Angeles views long distance haul as an alternative to the difficult task of siting new local disposal facilities. Portland, Oregon, is another West Coast city that will have solid waste transported to the eastern part of the state. San Francisco has transported waste moderate distances for many years.

From an economic standpoint, long distance haul can be justified by many cities. This is especially true for rail haul. Once the waste has been loaded on the cars, the per-mile cost is relatively low.

Long haul for the Pacific Northwest achieves two objectives. First, it results in the ability to site landfills in a drier climate. High annual rainfall occurs in some parts of the Pacific Northwest and because it falls at a slow rate, more infiltrates into the solid waste. This leads to high quantities of leachate, methane, and odor from landfills. The second advantage of locating landfills in eastern Oregon and Washington is the lower population density. Simply put, in less populated areas, fewer people are landfill neighbors.

A factor limiting the growth of long distance haul is the reluctance of some governments to receive waste from another area. Crossing boundaries, particularly state lines, often complicates the process of gaining local acceptance of waste from other areas. Rural areas often rally against becoming "dumping grounds" for urban areas. Public reaction sometimes results in laws prohibiting outside wastes. However, rural landfills can offer benefits to its host community, such as new

jobs and some form of payment per ton of imported waste.

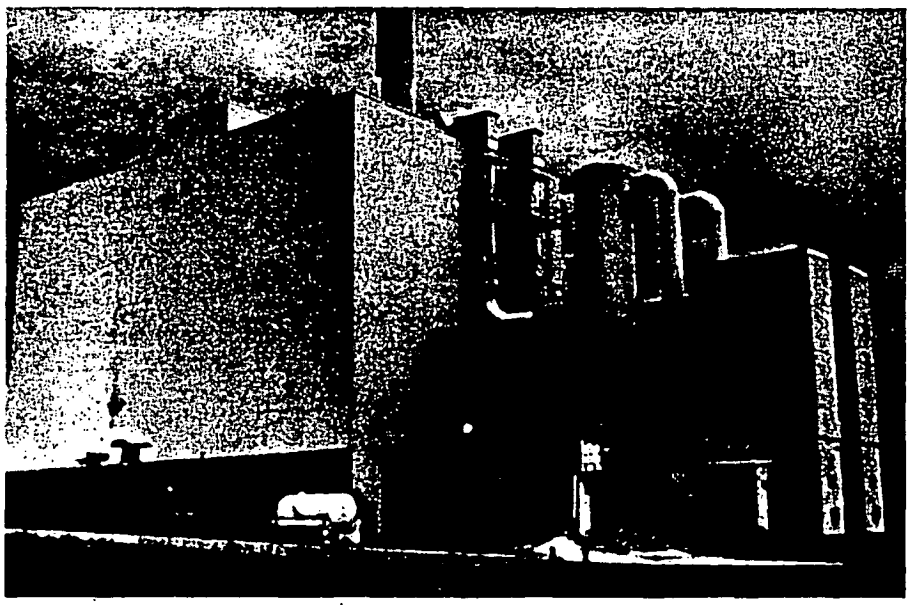
Waste-To-Energy

Waste-to-energy is a well-established and growing element of solid waste management. The number of WTE plants increased greatly during the 1980s. In early 1989, the EPA estimated that about 10 percent of municipal solid waste was incinerated.[2] Today, that figure approaches 15 percent, and is expected to reach 20 percent by the end of the decade.

Factors favoring WTE facilities are their demonstrated ability to reduce the dependence on landfills, their reliability as a renewable energy source, and their relative permanence as a part of a waste disposal plan. The large number of plants operating successfully is evidence to elected officials and the public that WTE is a dependable method of waste management. Particularly in areas where the population density and the concentration of urban development make new landfills less practical and more expensive, WTE offers a solid choice.

The key factors that have limited the rate of growth of WTE facilities include cost relative to other options, public perception of environmental risks, and an uncertain regulatory climate.

Relative cost has historically tempered the rate of growth of WTE facilities. Although currently pending regulations, more stringent air quality control and ash handling requirements will add to current WTE cost, new regulations will also raise the cost of its alternatives. It appears likely that regulatory uncertainty with respect to ash disposal will be resolved within the next year. Air quality regulations for WTE facilities, which have been a moving target, should be settled by the Clean Air Act reauthorization. These regulations should assist the WTE industry, even though they will also increase capital and operating costs. The public should have greater confidence in the environmental safety of modern WTE facilities. More citizens will view the new air quality and ash requirements as reasonable steps toward making WTE facilities good neighbors.



The waste-to-energy facility in Jackson County (Michigan) suffered a problem common to many MSW incinerators in the past few years—uncertainty over ash disposal. Operation at the 200-TPD mass burn plant began in October 1987, but was stalled for about eight months when the state initially classified incinerator ash as a hazardous waste. The state ultimately ruled ash to be a special waste, thus allowing the facility to resume disposing of its residue in a special cell at the county landfill.

Transfer Stations

Transfer stations, where waste haulers consolidate their loads, have been a prominent part of solid waste management for several decades. Many of the older stations were relatively small compaction-type stations. The equipment used in these compaction-type stations was heavily promoted by the manufacturers. Many stations were built.

Few statistics are available on the types and capacities of stations currently being built. However, it appears that fewer stations are being constructed, but capacities are increasing. One reason for the declining number of transfer stations is the smaller number of waste hauling companies. As small waste haulers are absorbed by larger firms, larger transfer stations are replacing the smaller stations which used to serve small haulers.

As the population grows and urban areas become more densely developed, disposal facilities tend to be located in more remote locations. The added cost of this additional haul distance makes more transfer stations feasible. Many state regulatory and planning agencies are doing what they can to promote regionalization. In some states, agencies are limited to verbal encouragement, but others can use tough interpretations of regulations to steer communities to regional facilities. With this plan, regions which had several disposal sites will have fewer, but larger, facilities. Fewer facilities result in higher transportation costs and the need for more transfer stations.

As discussed earlier, both the East and West Coast ship waste to sites in remote areas. Whether this long haul occurs by truck or rail, transfer stations are critical to the concept.

There is a growing trend for transfer stations to also serve as recycling or MSW compost centers. This concept was utilized at the Clackamas (Oregon) Transfer and Recycling Center, built in the early 1980s. Likewise, the transfer station in St. Cloud, Minn., is home to a 100-tpd compost facility serving three counties. Some cities are collecting commingled wastes and bringing them to a recycling center/transfer station. Phoenix, Arizona, currently has a station of this type under design.

Also, more attention is being paid to the way new transfer stations look. Siting transfer stations is frequently a difficult and expensive task. The odds of success in siting the station are enhanced when a strong commitment is made to aesthetically pleasing and well-landscaped facilities. Large transfer stations can be designed to look similar to attractive office buildings. This approach, combined with extensive landscaping, reduces the effect of the transfer station on surrounding development.

Though statistics to document trends are few, it is probable that a shift is occurring from transfer stations that utilize compaction equipment to those that do not. Where compaction-type stations are constructed, the equipment is larger and more sophisticated. Many stations have been built with equipment that compacts an entire transfer trailer load and ejects the waste into the transfer trailer.

Materials Recovery Facilities

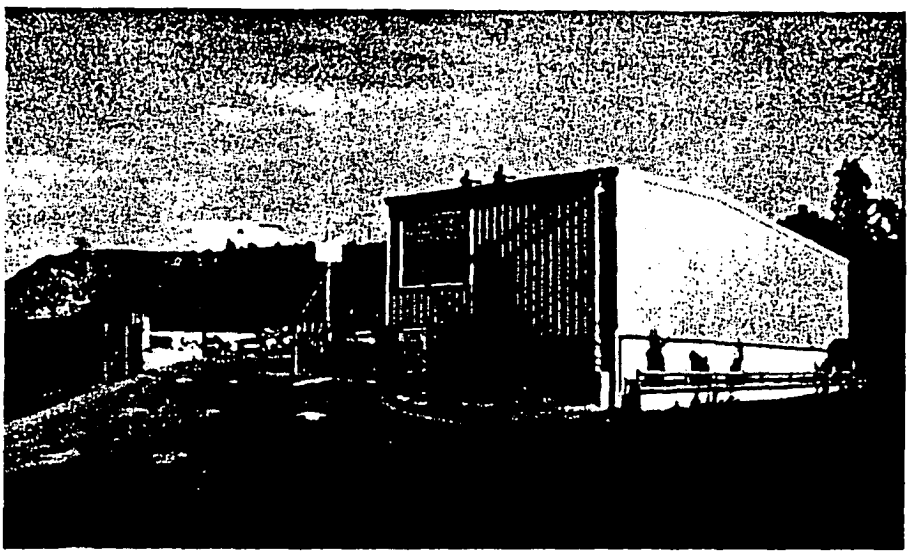
Municipal recycling facilities, also known as materials recovery facilities (MRFs), are the most rapidly growing element of the solid waste management system. As municipalities, states, and the federal government establish recycling goals, the need for municipal recycling facilities grows.

A hotly debated issue in MRF design is the extent of mechanization which is practical. Many existing MRFs are extremely labor intensive. They consist of little more than belts conveying the waste past numerous sorters who place the separated waste into containers. Some equipment is then used for processing the waste before shipment, usually crushers for glass and balers for paper, cardboard, and plastics.

While lots of machinery exists for sorting materials from mixed waste, most of it has varied degrees of success. Improved equipment will develop, but its evaluation and acceptance will be sporadic. Americans often look to Europe or Japan for ideas when equipment produced here does not meet our needs. However, in the area of recycling equipment, the rest of the world is in about the same stage of development as the United States.

Yard Waste Composting

Yard waste composting, like the other solid waste management technologies, offers a partial answer to our waste dilemma. It is an environmentally sound approach to prolonging the life of existing landfills and reducing the need for future landfills.



The transfer station of the 1990s is often a multi-purpose site, adding services such as recycling, composting and special waste handling. This household hazardous waste drop-off center is part of the San Francisco Solid Waste Transfer and Recycling Center. It accepts all household hazardous wastes from the city and county of San Francisco, about 700,000 residents. In two years of operation, it has collected more than 130,000 containers, thus preventing over 66,000 gallons of waste oils, paints, solvents and the like from entering the landfill.

Composting's position in the waste management hierarchy depends on where the composting occurs. Backyard composting is source reduction because the waste never enters the waste management system. If yard wastes are collected and composted in a centralized facility, they are being recycled. This assumes the final compost can be marketed or placed somewhere other than a landfill. If there is no market, and the compost is landfilled, then it is a form of volume reduction.

State legislation is driving the trend towards yard waste composting. The National Solid Wastes Management Association reports that as of 1989, 10 states have banned leaves from landfills and seven of these also ban grass and tree trimmings.[3] The effective dates of the bans vary from 1988 to 1993. Where the legislation exists, composting is a logical alternative method of managing yard wastes. Ideally, each household could compost its own yard waste, but the difficulty of achieving 100 percent participation in backyard composting results in the need for community compost programs.

State legislation that sets recycling goals also encourages yard waste composting. In these states, yard waste composting is a key factor in meeting the goal. Waste composition studies indicate that, depending on the climate, yard wastes comprise between 10 and 25 percent by weight of MSW. The yard waste composting facility provides a medium cost method of achieving a substantial part of mandated recycling goals.

Centralized or community yard waste composting programs usually require a separate collection program. Multiple collection programs (one for yard waste, another for MSW, and still another for other recyclables) are inherently inefficient. Determining whether composting is economically competitive with other alternatives requires consideration of collection and composting operations costs, market value or disposal cost, and alternative collection and disposal costs.

Yard waste composting costs vary greatly depending on the type of compost facility. High technology facilities can shred or grind the material, screen out contaminants, and stir and aerate the compost piles. High technology approaches control the moisture, nutrients, and oxygen required by the process, producing compost as quickly as possible. But their cost is relatively high. Low technology approaches are less expensive, but take more time to produce compost, require a larger land area, and can have odor problems.

An EPA report[4] published in 1988 showed processing (excluding collection and transport) costs for yard waste composting ranging from $3.50 to $22.50 per ton. Total yard waste composting costs (including collection, transport, and processing but excluding revenues from marketed compost) cover a wide range, from $11.11 to $101.79 per ton, with an average of about $41.00 per ton. Revenues from

the sale of compost vary almost as widely, from $0 (or even a negative price) to $25 per ton.

The trend toward mandated recycling goals is increasing. These goals are a driving force behind yard waste composting. The number of yard waste composting programs is increasing rapidly. A factor which tempers a rush to yard waste composting is the cost of collecting and transporting the yard wastes to the compost facility. Markets for compost fluctuate, unless the compost is purchased in-house (by a city's park department, for example). Backyard composting, while attractive in many respects, is much more difficult to implement on a large scale.

Household Hazardous Waste

Household hazardous waste management is a dilemma to many officials responsible for developing and implementing a complete solid waste management plan. The challenge is to obtain the large amount of funding necessary to handle a small amount of the solid waste problem. Recent waste characterization studies for Hillsborough County, Florida,[5] indicate that household hazardous waste comprises about 0.4 percent by weight of waste from residential sources.

The list of household hazardous wastes is surprisingly long and varied. General categories of materials include solvents and paints, certain cleaning products, pesticides, pharmaceuticals, automotive products, ammunition, and batteries.

Two strong reasons for concern about household hazardous waste are damage to the environment and worker safety. Environmental damage resulting from household hazardous waste is possible regardless of the management method. If wastes are landfilled, the hazardous materials may appear in the leachate. If this leachate gets to the surface or groundwater, it may harm the environment. If the waste is incinerated, certain materials will concentrate in the ash. Cadmium and lead, found in many batteries, have been largely responsible for the concern over incinerator ash. Hazardous materials can also degrade the quality of compost produced from municipal solid waste.

Exposure of MSW collection, processing, or disposal facility workers is another reason for proper handling of household hazardous wastes. Numerous cases document the danger to workers from explosions or fires which have been traced to household hazardous waste.

The special household hazardous waste collection and disposal programs are quite expensive. A large, well-publicized program can cost $2 per collected pound. Smaller programs, with smaller quantities to collect and transport, can cost $9 per pound, or $18,000 per ton. This is much more expensive than for other MSW. While the number of household hazardous waste programs has greatly expanded, high cost is one reason the programs are not more common.

Improved consumer education is needed to reduce the quantity of household hazardous waste generated. Teaching the consumer to purchase only the quantities of products needed can be one means to reduce quantities.

Proposed Resource Conservation and Recovery Act (RCRA) legislation addresses the issue of hazardous constituents. Legislation pending in both the House and Senate would require the EPA to identify the most toxic and common products, and would require

recycling of lead acid and mercury batteries.

Federal legislation, increased consumer awareness, and more widespread availability of hazardous waste collection programs are three approaches to reducing the magnitude of the household hazardous waste problem. These efforts should receive the backing of solid waste professionals since the end result will be a waste stream which is safer for workers and a reduced threat to the environment.

What's Ahead?

The rapid change in solid waste management practices will continue into the next century. These changing trends are controlled by two key factors—legislation and economics. Legislation, in turn, reflects the level of public concern for issues such as worker safety, the environment, and depletion of natural resources. Economics dictate that the waste management techniques selected relate to available funds and the cost of alternate technologies.

Waste management techniques projected to serve a larger and more important role in the 1990s include WTE, long distance hauling, MRFs, yard waste composting, and special hazardous waste handling. WTE can be expected to increase its market share, growing as landfill availability declines and public confidence returns under new environmental regulations. Composting and recycling will also increase their share of the waste stream.

Although these alternatives will continue to reduce our dependence on land disposal, landfills will continue to handle the largest part of municipal solid waste generated, especially in more sparsely developed regions of the country. Transfer stations and expanding capacity of existing sites will help landfills remain as a major component in the MSW master plan. □

Mr. Schaper can be contacted at Black & Veatch, 8400 Ward Parkway, P.O. Box 8405, Kansas City, MO 64114; (913) 339-2000.

Notes:

[1] Requirements for Hazardous Waste Landfill Design, Construction, and Closure, United States Environmental Protection Agency Technology Transfer Seminar Publication, EPA/625/4-89/022, 1989, U.S. Environmental Protection Agency.

[2] "The Solid Waste Dilemma: An Agenda for Action", EPA/530-SW-88-052.

[3] *Recycling in the United States, Update 1989*, National Solid Wastes Management Association, Washington, D.C., 1989.

[4] Alison C. Taylor and Richard M. Kashmanian, "Study and Assessment of Eight Yard Waste Composting Programs Across the United States", U.S. Environmental Protection Agency, EPA/530-SW-038, April 1989.

[5] *Hillsborough County, Florida Solid Waste Composition Study*, Black & Veatch Engineers-Architects, 1990.

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But local governments should not expect recycling alone to solve their solid waste disposal problems.

Although markets for recyclables have been slow to develop and many communities still find landfilling cheaper than recycling, rising financial and environmental costs of continued landfilling will make recycling an increasingly viable and attractive waste disposal option.

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Baling Saves Landfill Space

Cumberland County, N.C., is home to segments of Fort Bragg and Pope Air Force Base, among the most active military bases in the country. Its daily volume of collected solid waste is 1,000 tons. The county landfill, which has a capacity estimated at 3 million tons, is 50 percent full and has about seven to eight years of life remaining.

The county previously buried only compacted-in-place loose fill garbage, collected by county, municipal and private collectors. But a steadily increasing waste quantity, plus a desire for space conservation and better handling and expense control, led local officials to purchase balers, according to Larry Carter, county director of solid waste management.

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County Sites Landfill Without Chaos

Local governments often confront chaos when implementing waste disposal alternatives, which may be expected when solutions are forced on a well-meaning but adversarial public.

New Jersey's Atlantic County Utilities Authority (ACUA) avoided chaos by confronting significant issues from the outset through a methodical process called the Nominal Group Technique. Two centrally located waste management facilities (an ash landfill and an interim/bypass waste landfill) were sited within just nine months.

Atlantic County long relied on sanitary landfills located within its share of the Pinelands, an expansive, pristine, and sensitive natural region. With capacity yet remaining for the 273,000 tons of solid waste generated annually by the county, political allegiance eventually shifted to the Pinelands Commission policy for the area: all landfills within the Pinelands must close by August 1990.

Recognizing that such fundamental change requires time, ACUA immediately developed specifications for a resource recovery facility. In order for prospective incinerator system vendors to respond to a request for proposals, however, a landfill to handle the ash residue had to be designated. With the assistance of Rogers, Golden & Halpern, a Philadelphia-based consultant, the authority began the siting process.

Eleven potential landfill sites were identified. The county chose the existing broad-based, citizen-inclusive Solid Waste Advisory Council to narrow down the sites.

The interactive Nominal Group Technique for decision making (Andre Delbecq and Van de Ven, 1968) includes a series of "weighting" exercises wherein, based on participants' personal choices, consensus is reached about the relative importance of siting criteria; values applied to the actual data for each candidate site; arithmetically scored; and then combined. To maintain participant objectivity, the location of the 11 sites was held confidential until the top-ranked sites were determined by the advisory council, so that each participant made a siting decision based on objective, quantified, compiled data rather than on arbitrary opinion or conjecture.

To identify the most suitable site, the ratings given to each site for each criteria were combined to create one overall index value per site. At an advisory council workshop, 14 council members were given a set of specially prepared cards, each bearing the label of one criterion. Each "deck" contained the full assortment of 19 criteria, one per card.

Once the designation of weights was complete, they were compiled on a computer and a statistical analysis was performed. This review provided the basis for each member's presentation regarding the importance assigned to specific criteria. At the conclusion of a 30-minute open discussion, the weight assignment process was repeated, beginning the next round.

After two rounds were completed, the advisory council determined that stability had been reached because weights did not shift significantly between rounds.

The Atlantic County Board of Chosen Freeholders subsequently voted to accept a 277-acre site in Egg Harbor Township, the same location slated for the resource recovery facility itself and a new recycling center. □

EXHIBIT D

FIGURE 1

LANDFILL EXPANSION AREA LIFE ESTIMATE
OPERATIONS CHANGE TO BALEFILL

ORIGINAL EXPANSION AREA VOLUME = 875,000CY

AREA FILLED TO DATE = 275,000CY (JULY-DEC. 1986, AND MARCH 1988)

APPROXIMATE REMAINING VOLUME = 600,000CY

BALEFILL LIFE AT 600TPD

600,000CY x .95 REDUCTION FOR COVER = 570,000CY
570,000CY x .675T/CY = 384,750T
384,750T/600TPD = 641 DAYS
641 DAYS/286 OPERATING DAYS PER YEAR = **2.25 YEARS**

TO REACH THE THREE YEAR GOAL (MRF ON LINE), 1993 AND 1994 TONNAGE WILL HAVE TO BE REDUCED BELOW 600TPD

600TPD = 171,600TPY IN 1992 500TPD = 143,000TPY IN 1993
171,600TPY x 1.48CY/T = 253,968CY
143,000TPY x 1.48CY/T = 211,640CY

ASSUMING WE DO NOT BEGIN FILLING IN THE EXPANSION AREA UNTIL 11-91 AND FOR THE MONTH OF NOVEMBER 1991 WE CONVENTIONALLY FILL IN THE EXPANSION AREA, THE FOLLOWING SCHEDULE CAN BE PROJECTED:

570,000CY TOTAL CAPACITY REMAINING IN EXPANSION AREA
- 37,820CY VOLUME LOST DUE TO NOVEMBER 1991
- 253,968CY BALED 12-91 TO 12-92
- 211,640CY BALED 12-92 TO 12-93
66,572CY REMAINING TO FILL IN 12-93 TO 12-94

66,572CY/286 DAYS = 233CY PER DAY OR 160TPD IN 12-93 TO 12-94
THIS RATE WOULD NOT ACCOMMODATE ALL THE COMMERCIAL TRUCKS. THE COMMERCIAL WASTE STREAM IS APPROXIMATELY 210TPD.

KAJ 7-24-91

EXHIBIT E

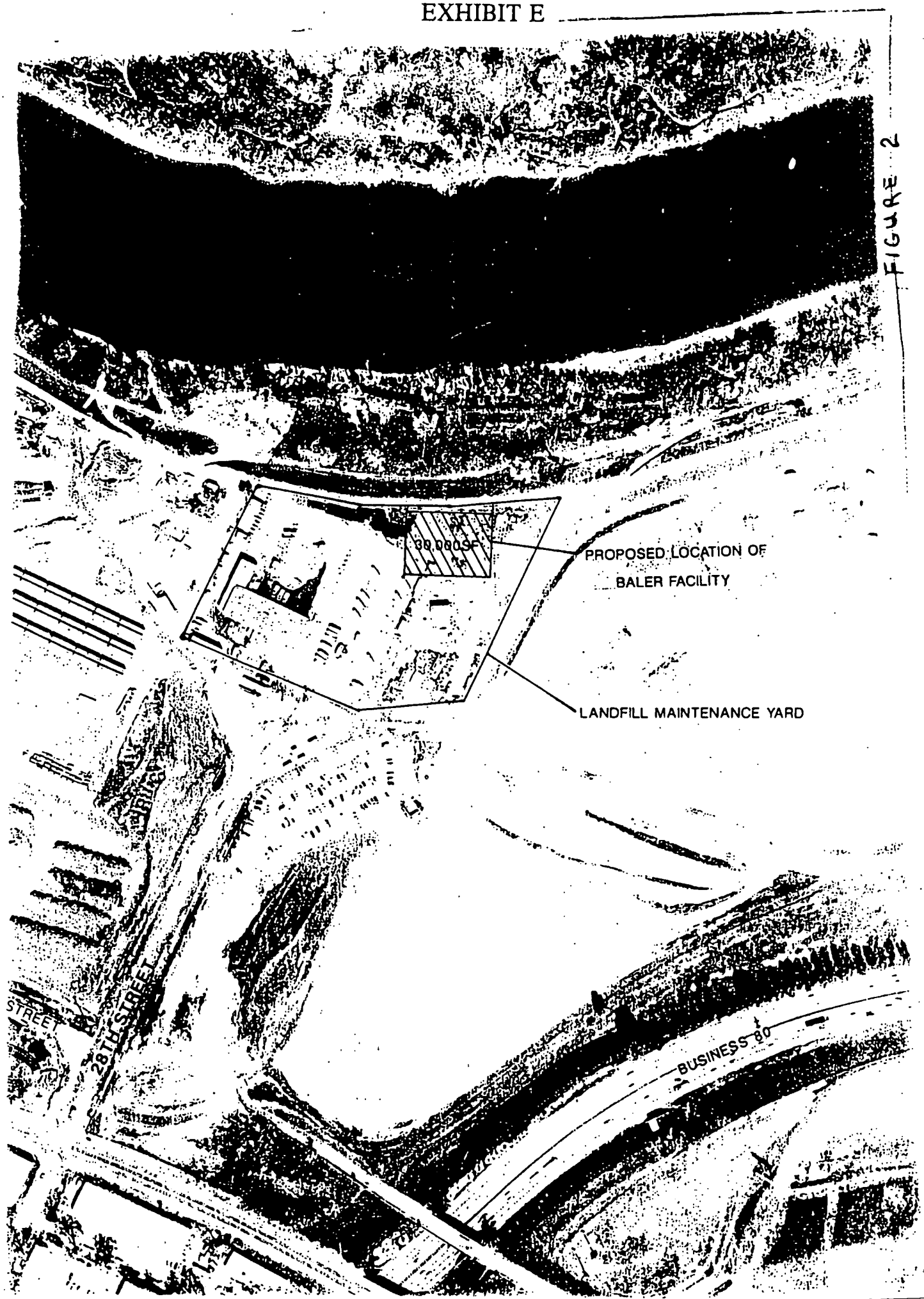


FIGURE 2

Item # 9.1

To whom.

Plz do not send me copies of attached

ran time original - 7minutes aset
Today: down time 45
ran Time 1hour 45 min

I will not accept copies Like this in the future

Thank you

Mary Ann H.

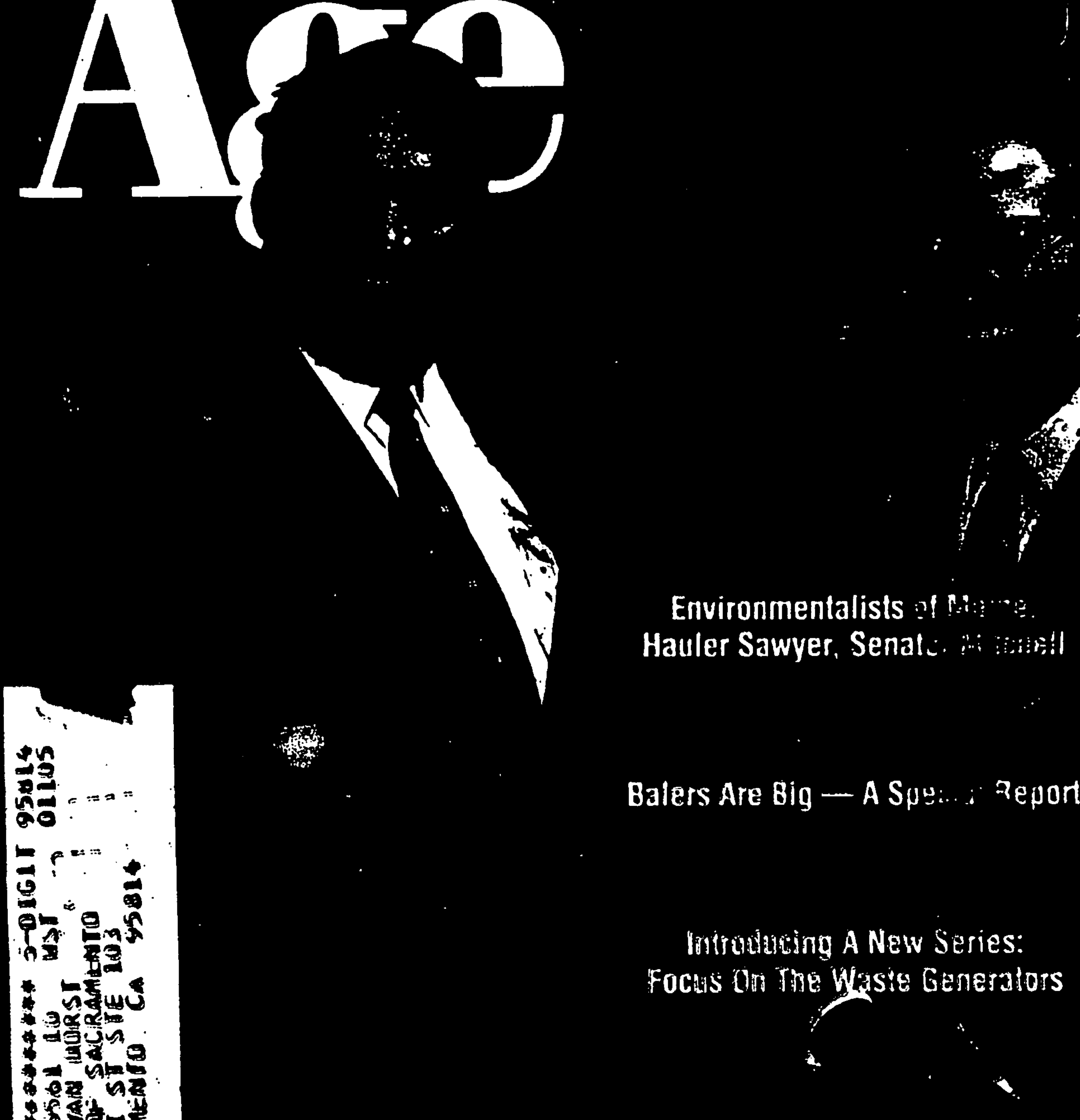
5/29/92

EXHIBIT C

Waste Age

The Authority for Control of Waste Systems and Technology

September 1989



Environmentalists of Maine, Hauler Sawyer, Senator Mitchell

Balers Are Big — A Special Report

Introducing A New Series: Focus On The Waste Generators

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GARY VAN VORST
CITY OF SACRAMENTO
1231 I ST STE 103
SACRAMENTO CA 95814

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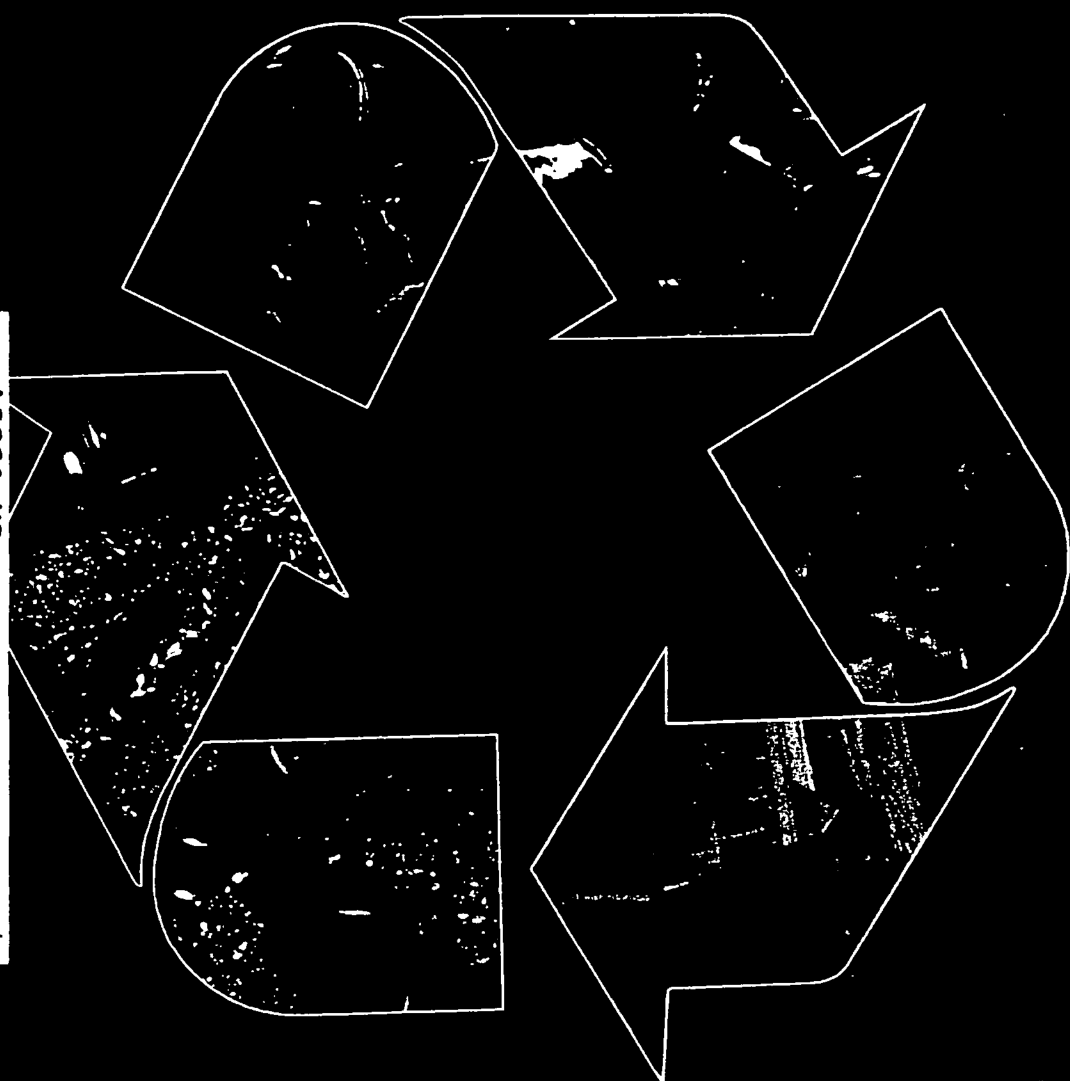

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