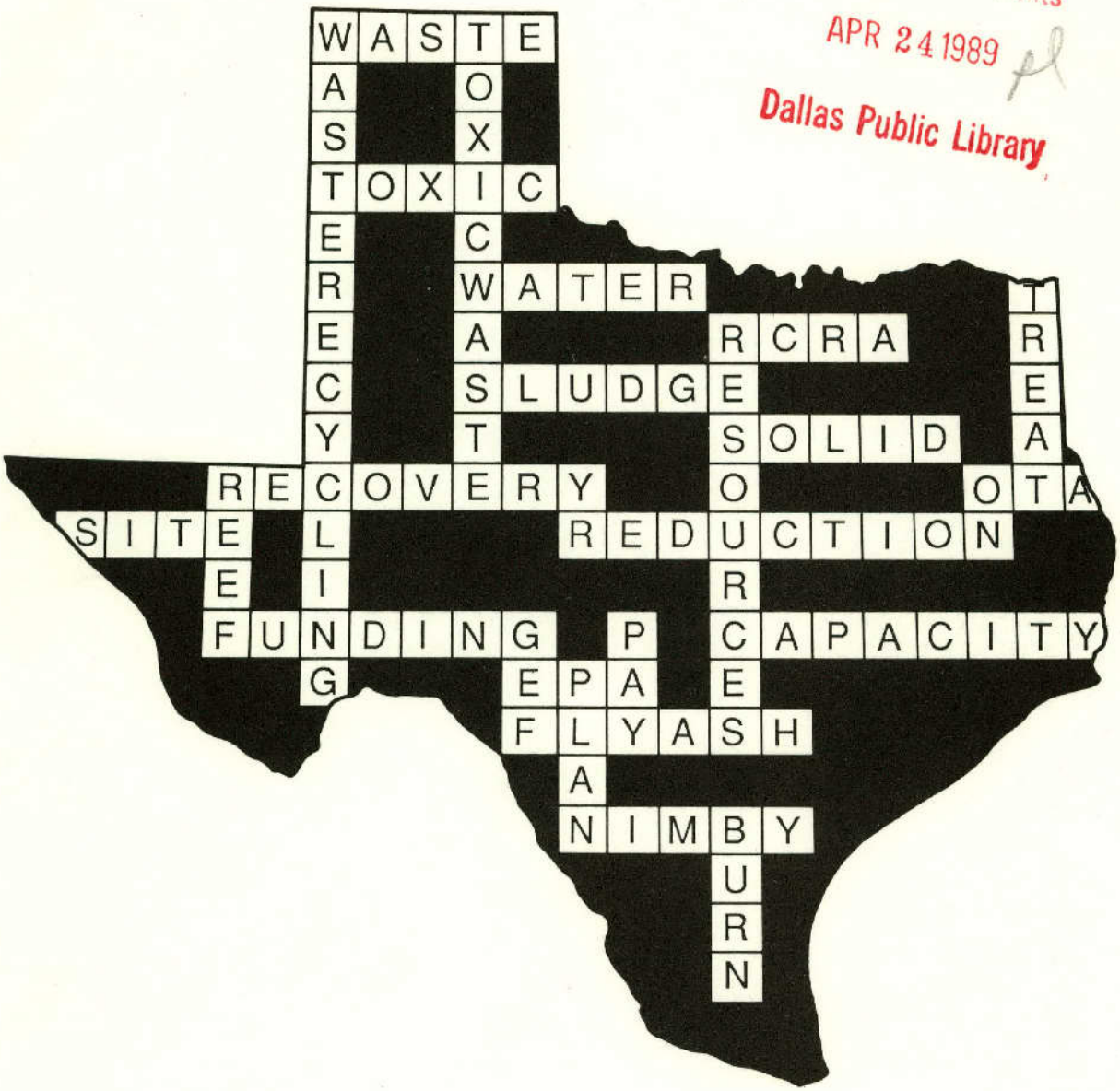
FINDING THE ANSWERS



1989 REPORT OF THE
TEXAS TASK FORCE ON WASTE MANAGEMENT POLICY

Texas Task Force on Waste Management Policy

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Lieutenant Governor William P. Hobby
Speaker Gibson D. Lewis
Members of the 71st Texas Legislature

Pursuant to its charge from the Governor, Lieutenant Governor and Speaker of the House, the Task Force on Waste Management Policy herewith transmits its interim report and recommendations.

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Special thanks are expressed to the offices of the Governor, Lieutenant Governor, and Speaker of the House for creating and supporting the Task Force; the Texas Department of Health, the Texas Water Commission, the Texas Air Control Board and the Legislative Council for providing staff and research assistance, and the many individuals, local officials, institutions and associations across the state who expressed interest, provided information, testimony and support for the efforts of the Task Force.

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Many exceptionally qualified people volunteered to serve on the Task Force, and their willingness to work on this very important issue was deeply appreciated. The Task Force is especially grateful for the active involvement of the following individuals who participated as resource persons without any financial reimbursement for related expenses:

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ACRONYMS

CAP	-	Capacity Assurance Project
CDC	-	U.S. Centers for Disease Control
CERCLA	-	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
EPA	-	U.S. Environmental Protection Agency
GCWDA	-	Gulf Coast Waste Disposal Authority
GRCDA	-	Governmental Refuse Collection and Disposal Association
HGAC	-	Houston-Galveston Area Council
HHW	-	household hazardous waste
HRS	-	Hazard Ranking System
HSWA	-	Hazardous and Solid Waste Amendments of 1984
JCAH	-	Joint Commission for the Accreditation of Hospitals
KTB	-	Keep Texas Beautiful, Inc.
MRF	-	materials recovery facility
MSW	-	municipal solid waste
MTR	-	Minimum Technological Requirement
NCP	-	National Oil and Hazardous Substances Contingency Plan
NIMBY	-	not in my back yard
NPL	-	National Priorities List
NSWMA	-	National Solid Wastes Management Association
O&M	-	operation and maintenance
OTA	-	U.S. Office of Technology Assessment
PET	-	polyethylene terephthalate
PRP	-	potentially responsible party
PURPA	-	Public Utility Regulatory Policies Act of 1978
RCRA	-	Resource Conservation and Recovery Act of 1976
RI/FS	-	Remedial Investigation and Feasibility Study
RRC	-	Railroad Commission of Texas
SARA	-	Superfund Amendments and Reauthorization Act of 1986
SDHPT	-	State Department of Highways and Public Transportation
SDWA	-	Safe Drinking Water Act
SQG	-	small quantity generator
TACB	-	Texas Air Control Board
TDA	-	Texas Department of Agriculture
TDH	-	Texas Department of Health
TSWDA	-	Texas Solid Waste Disposal Act
TWC	-	Texas Water Commission
UIC	-	underground injection control
UIJ	-	underground injection
WTE	-	waste to energy

EXECUTIVE SUMMARY

Three major foundations for economic growth and development in an industrial state are 1) a safe and adequate water supply; 2) a good education system encompassing primary, secondary and higher education; and 3) a safe and efficient waste management system.

Texas and other states have been slow to focus attention and resources on the waste management building block. Congress and state legislatures now are directing more attention to waste management policies, partially in response to serious problems such as spills, accidental release of contaminants, illegal dumping on land and at sea, and medical research that has linked environmental problems with human health.

Another catalyst for state and federal action has been the extraordinarily high costs associated with cleaning up dangerous and/or abandoned sites containing hazardous or toxic materials and substances. The potential for contamination of underground water sources by improperly dumped or buried waste is another concern driving governmental, industrial and public initiatives.

The Texas Task Force on Waste Management Policy was created by the 70th Legislature to conduct a comprehensive study of waste problems in Texas, with special focus on hazardous and industrial waste, municipal solid waste, wastewater treatment sludge, and infectious and other biomedical waste.

Based on the major state goal of sound regulatory policy to protect human health and the environment, 46 recommendations were developed by the Task Force following a series of public hearings around the state. Due to the scope and complexity of the issues under consideration, the Task Force formed two subsidiary panels. Ten months of sustained inquiry by the Subcommittee on Solid and Infectious Waste and the Subcommittee on Hazardous and Industrial Waste yielded two sets of recommendations which were reviewed, amended and adopted by the Task Force as a whole. The recommendations are designed to strike a balance among regulators, generators of waste, environmental interests, and the waste management industry.

The Task Force's final report is organized according to the focus issues identified by each subcommittee.

The solid waste subcommittee addressed capacity, out-of-state waste, regional and local planning, enforcement, tires, budgetary issues, agency organization, waste management alternatives, education, and infectious waste.

A major solid waste recommendation (9) relates to funding. Texas spends 8 cents per capital on solid waste regulation, versus an average of 45 cents spent by state governments generally. Since Texas generates almost 18 million tons of solid waste annually, even a modest surcharge of 50 cents per ton or less would help finance better enforcement and improved permit review. Enhanced enforcement should target both permit holders who violate standards and illegal dumpers who dispose of waste without any permit. Regulation of wastewater treatment sludge haulers and applicators has never been allocated staff, despite having been assigned to the Texas Department of Health since 1985.

In addition to these improvements, the solid waste surcharge could provide matching state funds for local and regional solid waste planning under the Comprehensive Municipal Solid Waste Management, Resource Recovery Conservation Act. That act, passed by the Legislature in 1983, has never been funded. Fully implementing it would provide an incentive for local governments and regional entities to include alternatives such as recycling and resource recovery in their waste management programs, which up to now have relied almost exclusively on landfilling.

The Task Force report supports, as an alternative to this practice, the concept of integrated waste management involving appropriate combinations of waste reduction, recycling, waste-to-energy, and landfilling.

More effective solid waste enforcement is the goal of several recommendations (35, 36, and 40). Two enforcement proposals relate specifically to tires (43 and 44). Recycling is promoted within the contexts of state marketing efforts (18) and state procurement (19 and 20). Two recommendations encourage increased education relating to waste management (25 and 26). The report acknowledges potential problems with out-of-state waste but advocates a cautious approach (4 and 45).

The Task Force supports retention of solid waste jurisdiction by the Texas Department of Health (1). The department's proposed regulatory system for biomedical wastes received general acceptance (5).

The second half of the report reflects the hazardous waste subcommittee's focus on the issues of capacity, land disposal alternatives, facility siting criteria, waste reduction/minimization, and Superfund cleanup and funding needs.

Federal laws and a rapidly approaching deadline require Texas to act promptly to insure a capacity certification for hazardous waste. The capacity assurance is a condition for obtaining federal Superfund assistance, which amounts to $200 million in federal money for Texas.

In the interest of this priority, the Task Force recommends revision of the Texas Solid Waste Disposal Act to include a capacity policy statement (6) and a clear directive for thorough and timely review by permitting agencies (7). Reflecting growing public concerns about waste treatment facilities, additional recommendations (29 and 30) address the need to improve disclosure and public information activities in the permitting process. Other permitting and siting concerns include an endorsement of the pre-application review process (28) and a proposal for incinerator-specific siting criteria (31).

Proposals designed to promote the use of alternatives to land disposal include incentives for waste reduction and recycling (16) and programs targeting household and small quantity generators of hazardous waste (15). The Task Force further supports reduction of hazardous waste by recommending the creation of and funding for a reduction/minimization organization within the Texas Water Commission (14) and the establishment of a Waste Reduction Advisory Committee (15).

The issue of cleaning up abandoned hazardous waste sites, better known as Superfund sites, received extensive attention. Task Force recommendations outline a detailed plan of action for the financing, investigation and remediation of these sites (11 and 12). Enhanced enforcement and inspection (13) should help to avoid future problem sites.

RECOMMENDATIONS

General Policy

1. **RECOMMENDATION**: The Legislature should retain the Texas Department of Health's jurisdiction over municipal solid waste. Suggestions to transfer jurisdiction to the Texas Water Commission or create a state environmental protection agency were carefully considered by the Task Force but were determined to be undesirable. (Section G)

2. **RECOMMENDATION**: The state should adopt a waste management policy which requires the same standard of protection for public health and the environment regardless of the waste management system (i.e., waste reduction, recycling, incineration, landfilling or any combination of systems). (Section H)

3. **RECOMMENDATION**: The Legislature should require statewide long-range local and regional solid waste management plans to assure the adequacy of solid waste facilities for the future. Local governments should be required to apply the preferred waste management hierarchy (Section 3(e)(3), Texas Solid Waste Disposal Act) in establishing their respective plans. (Sections A and C)

4. **RECOMMENDATION**: The Legislature should urge Congress to enact federal legislation requiring states to meet their municipal solid waste disposal requirements internally, either on an individual basis or by compact with other states. The federal legislation should include guidelines to assist states in resolving disputes concerning importation and exportation of waste. (Section B)

5. **RECOMMENDATION**: The Texas Task Force on Waste Management Policy concurs with infectious waste regulations prepared for adoption by the Texas Board of Health on October 4, 1988. (Section J)

6. **RECOMMENDATION**: The Texas Solid Waste Disposal Act should be amended to declare the public policy of this state to have adequate capacity, consistent with the hierarchy of preferred waste management technologies (Section (3)(e)(1)), for the proper management of the hazardous and industrial waste generated in this state. (Section K)

7. **RECOMMENDATION**: The Legislature should add a provision to the Texas Solid Waste Disposal Act and the Texas Injection Well Act to direct the agencies involved in the permitting of hazardous waste management facilities to assure the thorough and timely review of permit applications for facilities which meet applicable statutory and regulatory provisions. (Section K)

Funding

8. **RECOMMENDATION**: The Legislature should consider the municipal solid waste program of the Texas Department of Health a top priority for increased funding. (Section F)

9. **RECOMMENDATION**: The state should assess a per ton surcharge on landfill disposal of solid waste, and lesser surcharges for incinerator disposal and other alternatives with possible rebates for waste reduction or recycling. The Legislature should enact the surcharge but should give the Texas Department of Health discretion to raise or lower the surcharge amount in accordance with targeted spending levels. The Task Force suggests approximately half the revenue be dedicated to the Department for enforcement and permitting programs and the balance be dedicated to a combination of the following:

   (a) Funding of the 1983 Comprehensive Municipal Solid Waste Management, Resource Recovery, and Conservation Act, including 50/50 matching grants to regional entities and local governments for long-range solid waste planning;

   (b) Technical assistance to local governments on waste management, waste minimization or recycling (e.g., the establishment of a solid waste resource center within the Department);

(c) Supplemental funding to local-government solid waste enforcement programs under the Texas Solid Waste Disposal Act and Texas Litter Abatement Act;

(d) A statewide public awareness program about solid waste management;

(e) Supplemental funding for other state agencies having responsibilities in solid waste management;

(f) Research and development, particularly the stimulation of markets for recycled waste products; and

(g) Possible creation of a state municipal solid waste "superfund" for the cleanup of unauthorized tire dumps and contaminated municipal solid waste disposal sites. (Sections F, C, A, D, E, H and I)

10. **RECOMMENDATION**: The House of Representatives should modify its appropriations process to give responsibility for solid waste legislation and budgetary oversight of solid waste programs to the same committee. (Section F)

11. **RECOMMENDATION**: To finance the state's share of any federally funded Superfund activities and to provide for the investigation and remediation of State Superfund sites, the Task Force recommends that:

(a) The Texas Water Commission should define State Superfund site cleanup problems and associated costs;

(b) The Texas Water Commission should maximize efforts to list on the federal Superfund list any appropriate sites;

(c) The Legislature should establish an advisory committee to develop a proposal for a more equitable means of funding the cleanup of State Superfund sites, recognizing causes of the contamination and the hierarchy of preferred waste management techniques (Section 3(e)(1), Texas Solid Waste Disposal Act);

(d) Interest on State Superfund funds should be returned to the trust fund to increase total resources available for remedial action activities; and

(e) The Legislature should appropriate to the Texas Water Commission adequate funds to conduct necessary Remedial Investigations/Feasibility Studies (RI/FSs) as needed and identify new sites as appropriate. (Section O)

12. **RECOMMENDATION**: The Legislature should amend the Texas Solid Waste Disposal Act to provide authority to clean up sites contaminated by hazardous substances as well as hazardous wastes, to provide incentives for potentially responsible parties (PRPs) to come forward and negotiate in good faith toward a remedial action agreement and to strengthen the Texas Water Commission's ability to recover both direct and indirect costs.

In addition, the Task Force recommends the following changes:

(a) Once a Superfund site is identified, increased emphasis should be on establishing a process to promote PRP participation, with the Texas Water Commission providing oversight to assure quality of the work and timely completion of the project;

(b) The Act should be revised to provide for issuance and appeal of administrative orders;

(c) Mixed funding should be encouraged when the full number of PRPs has not been identified so that the work can be initiated and completed in a timely manner;

(d) The Texas Water Commission should be authorized to use fund monies to conduct investigative and remedial actions if identified PRPs have been given reasonable notice and have failed to perform such actions; and

(e) The Texas Water Commission should develop criteria for ranking sites and

should establish a minimum score in such ranking for the inclusion of sites on the State Registry. (Section O)

13. **RECOMMENDATION**:

    (a) The Legislature should support credible environmental regulations which provide greater predictability and confidence to hazardous waste generators, to the waste service industry and to the public. Regulations must be technically sound and be equitably applied to public and private facilities:

    (b) The Legislature should appropriate additional funds to the Texas Water Commission for permit application evaluation and enforcement. (Section L)

Preferred Alternatives

14. **RECOMMENDATION**: The Texas Water Commission should create a waste reduction/ minimization group within the Hazardous and Solid Waste Division. The Legislature should appropriate adequate resources for that purpose. (Section N)

15. **RECOMMENDATION**: The Legislature should direct the Texas Water Commission to establish a Waste Reduction Advisory Committee with balanced representation from various interest groups to advise the Commission and the Interagency Coordination Council. Topics for consideration may include:

    (a) The organization of state agencies and the required resources relative to hazardous waste reduction and minimization;

    (b) Incentives to encourage hazardous waste minimization, reuse, recycling, and the use of resource recovery and detoxification equipment;

    (c) Public awareness programs to educate citizens on appropriate disposal of household hazardous waste and other hazardous materials;

    (d) Assistance to local governments to meet the waste management needs of small quantity generators;

    (e) Hazardous waste exchange programs;

    (f) A clearinghouse for technical information concerning hazardous waste management;

    (g) Coordination of hazardous waste research and development; and

    (h) Other recommendations to more effectively implement the hierarchy of preferred hazardous waste management technologies. (Sections N and L)

16. **RECOMMENDATION**: The Legislature should develop incentives to encourage solid and hazardous waste reduction, recycling and waste exchange efforts (e.g., product design review, reduction or exemption of the ad valorem tax for the installation of capital equipment to reduce waste generation, etc.). (Sections H, L and N)

17. **RECOMMENDATION**: Federal, state and local governments should provide incentives to manufacturers who consume recycled materials and/or produce goods which are technically and economically recyclable. (Section H)

18. **RECOMMENDATION**: The Texas Department of Health should be directed to coordinate efforts with the Texas Department of Commerce to pursue development of markets for recycled materials, including composting products. The Legislature should establish a state recycling office within the Department or other appropriate agency to provide technical assistance to local governments and/or organizations interested in developing recycling programs. (Section H)

19. **RECOMMENDATION**: The Legislature should require state agencies to give preference in procurement to goods made from recycled instead of virgin materials (e.g., by authorizing the purchase of recycled materials where the cost is below 110% of the cost of competing nonrecycled products). (Section H)

20. **RECOMMENDATION**: The Legislature should require the State Department of Highways and Public Transportation to use Texas tires, when available, in rubberized asphalt paving, and should grant authority to award contracts up to 110% of the cost of conventional materials for that portion of a paving contract utilizing Texas tires in rubberized asphalt. (Section E)

21. **RECOMMENDATION**: The Legislature should urge the Railroad Commission of Texas to set intrastate trucking rates comparable to interstate rates for transporters of recyclable materials, and to designate the materials as a special commodity for rate setting. (Section H)

22. **RECOMMENDATION**: The Texas Department of Health should be authorized to promulgate rules for the registration of recycling centers established in conjunction with existing permitted disposal or processing facilities, or at separate locations, without requirement for a Type V permit. (Section H)

23. **RECOMMENDATION**: The state should encourage the participation of volunteer and nonprofit organizations in promoting and operating recycling programs. (Section H)

24. **RECOMMENDATION**:

    (a) The Legislature should amend the Texas Solid Waste Disposal Act to encourage resource recovery projects within the context of the preferred waste management hierarchy (Section 3(e)(3));

    (b) The Legislature should encourage long-term contracts between municipalities and operators of resource recovery plants;

    (c) The Legislature should direct the Texas Department of Health and Texas Air Control Board to expedite associated environmental permits; and

    (d) The Legislature should direct the Public Utility Commission of Texas, when evaluating associated energy contracts, to consider the societal benefit of resource recovery without sole reliance on the issue of a utility's avoided costs. (Sections H and E)

Public Education

25. **RECOMMENDATION**: The State Board of Education, in cooperation with the Texas Department of Health and Keep Texas Beautiful organization, should implement an ongoing "Waste in Place" or similar waste management and resource conservation program in the curriculum of Texas' public school students. The Texas Education Agency should make related educational materials available at each of the state's 20 regional education service centers. (Section I)

26. **RECOMMENDATION**: The Legislature should direct the Department of Public Safety to include a discussion of highway littering offenses in its driver training curriculum and driver's license handbook. (Section I)

27. **RECOMMENDATION**: The Legislature should encourage state agencies to work with the federal government and private organizations in developing risk communications programs such as the Texas Risk Communication Project. (Section N)

Siting and Permitting

28. **RECOMMENDATION**: The Legislature should encourage the use of a pre-application local review process in appropriate situations and have the Interagency Coordination Council evaluate its effectiveness. (Sections M and A)

29. **RECOMMENDATION**: The Legislature should study the possibility of establishing an Office of Public Counsel to incorporate the Public Utility Commission Public Counsel and the Public Interest Advocate of the Texas Water Commission. (Section K)

30. **RECOMMENDATION**: The Legislature should examine the feasibility of pooling all hearings examiners for regulatory agencies in a general Office of Hearings Examiners. (Section K)

31. **RECOMMENDATION**: The Texas Water Commission should amend its location rules for hazardous waste management facilities to specifically address incinerators: the rules should include an adequate buffer zone from residences, schools, churches or public parks to allow for emergency response, be based on protection of public health and the environment and be supported by technical information. (Section M)

32. **RECOMMENDATION**: The Legislature should simplify public notice requirements for municipal solid waste facilities to include a notice of intent in a newspaper of general county circulation, and a sign posted on the premise, similar to public notice requirements of the Texas Clean Air Act (Vernon's Texas Civil Statutes, Article 4477-5, Section 3.271). (Section A)

33. **RECOMMENDATION**: The Texas Department of Health should notify affected parties when an application for a waste disposal facility is submitted to the Department rather than when the application is determined to be administratively complete. (Section A)

34. **RECOMMENDATION**: The Legislature should direct the Texas Department of Health, Texas Air Control Board and Texas Water Commission to offer to prospective solid waste permit applicants, upon written request to the Department, opportunity for a joint informal pre-permit discussion. (Section G)

Enforcement

35. **RECOMMENDATION**: The Legislature should provide the Texas Department of Health and Attorney General the option of seeking venue in Austin when prosecuting offenses under the Texas Solid Waste Disposal Act and Texas Litter Abatement Act. (Section D)

36. **RECOMMENDATION**: The Legislature should provide appropriations to the Texas Department of Health for the hiring of law enforcement officers with special training in environmental laws and regulations. (Section D)

37. **RECOMMENDATION**: The Legislature should clarify county authority selectively to enforce portions of the Texas Solid Waste Disposal Act without the necessity for a full county regulatory program under the County Solid Waste Control Act. For this purpose, counties should be eligible for funding as described in Recommendation 9(c). (Section D)

38. **RECOMMENDATION**: The Texas Department of Health should prepare literature for distribution to local officials summarizing local enforcement powers under the Texas Solid Waste Disposal Act and Texas Litter Abatement Act. (Sections D and I)

39. **RECOMMENDATION**: The Texas Department of Health should establish a hotline for reporting illegal dumping of solid waste. (Section D)

40. **RECOMMENDATION**: The Legislature should amend the Texas Solid Waste Disposal Act and Texas Litter Abatement Act to provide that multiple items of solid waste, disposed of illegally and traceable to a particular party, constitute a rebuttable presumption that such party has violated one or the other Act, or both. (Section D)

41. **RECOMMENDATION**: The minimum penalty for littering offenses should be increased to that of a Class A misdemeanor, with enhancement for subsequent offenses. (Section D)

42. **RECOMMENDATION**: The Legislature should amend the Texas Solid Waste Disposal Act to authorize recovery of attorney's fees, investigative costs and court costs at all levels of government. (Section D)

43. **RECOMMENDATION**:

    (a) The Texas Department of Health should define scrap tires as a component of the solid waste stream, require permits of facilities receiving them, and prohibit receipt by unpermitted facilities:

(b) The Legislature should establish a manifest system to track movement of scrap tires among permitted facilities and to facilitate enforcement actions against dumping tires in violation of the Texas Solid Waste Disposal Act and Texas Litter Abatement Act. (Section E)

44. **RECOMMENDATION**: The Legislature should require scrap tires to be shredded, split or quartered before storage or disposal, and should prohibit storage or disposal of them in whole whole form. The Texas Department of Health should have authority to regulate tire disposal and grant exceptions to the above requirements and prohibitions. (Section E)

45. **RECOMMENDATION**: The Texas Department of Health should review the feasibility of adopting rules to address municipal solid waste imported from outside Texas. (Section B)

46. **RECOMMENDATION**: The state should provide incentives to political subdivisions to establish solid waste facilities at coastal ports for waste disposal by waterborne vessels. (Section B)

INTRODUCTION

In 1969, the Texas Legislature enacted the Texas Solid Waste Disposal Act (TSWDA), which assigned regulatory jurisdiction for solid waste to state health and water agency officials. The Texas Department of Health (TDH) was given jurisdiction over municipal solid waste. The Texas Water Quality Board, predecessor to the Texas Water Commission (TWC), was given jurisdiction over industrial solid waste. Two decades later, that division of authority remains much the same.

Municipal solid waste encompasses the waste stream typically collected by a city garbage department or locally franchised hauler. Most of that waste steam is fairly innocuous: food, packaging, newsprint, grass and leaves, discarded worn-out household goods and similar items. Most businesses and institutions (e.g., schools) generate much the same type of waste stream.

Standing in contrast is industrial solid waste, encompassing a variety of chemical residues from manufacturing, mining, and agricultural processes. Responsibility for these wastes was delegated to the TWC and its predecessor water agencies because of special problems that such wastes pose for the safeguarding of the state's water supplies.

The federal Resource Conservation and Recovery Act of 1976 (RCRA) singled out the more dangerous nonradioactive wastes for special handling. Together with regulations of the U.S. Environmental Protection Agency (EPA), RCRA defined and listed certain chemical substances as "hazardous" wastes. Subsequent public exposure of leaking toxic substances at Love Canal in the late 1970s led to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), which established a federal "Superfund" for the cleanup of contaminated hazardous waste sites. RCRA and CERCLA were amended in 1984 and 1986, respectively.

Identification of hazardous waste complicated the state's regulatory framework. The TWC's industrial solid waste jurisdiction included a sizable portion of hazardous waste along with a larger fraction of nonhazardous waste. The TDH's municipal solid waste jurisdiction likewise included some of both, but its hazardous waste portion was small. As a consequence, the Legislature in 1985 consolidated all RCRA hazardous waste jurisdiction within the TWC.

Waste classification is not a simple matter, as can be seen in Figure 1. Many so-called "solid" wastes are in fact liquid. Figure 1 lists the major waste groups that are of relevance to this report. Hereafter, in most cases, "solid waste" will refer only to municipal solid waste.

Recent policy studies in Texas, especially during the 1983-1985 interim, have focused mainly on hazardous waste (Appendix 1). In the last two years, however, national publicity has focused attention on a solid waste disposal crisis that has enveloped the U.S. Northeast. One incident which dramatized the situation involved a New York "gar-barge" that sailed the East and Gulf coasts searching in vain for a dump site.

To avert the spread of that crisis to Texas, and to resolve lingering issues from the 1983-1985 hazardous waste studies, Lieutenant Governor William P.

Hobby and Speaker Gibson Lewis created a Texas Task Force on Waste Management Policy under the authority of HCR 137, 70th Legislature. Membership included legislators and citizens named by the two presiding officers and citizens appointed by Governor William P. Clements. A resource panel of experts assisted the Task Force.

The Task Force charge was expanded to cover the missions of two other interim committees on waste management authorized by HR 491, 70th Legislature, and SR 109, 70th Legislature, 2nd Called Session. In addition, infectious waste was targeted by the Task Force pursuant to HB 1869, 70th Legislature.

At an organizational meeting in December 1987, the Task Force formed two subcommittees. Senator Chet Brooks, the Task Force chairman, later named Representative Robert Saunders, the Task Force vice chair, to head a Subcommittee on Solid and Infectious Waste, and Mrs. Veta Winick, a Task Force public member, to chair a Subcommittee on Hazardous and Industrial Waste.

The full Task Force held public hearings on both topics in Houston, Lubbock, Austin, Fort Worth, Corpus Christi and Texas City. Over 100 persons from state agencies, local governments, business and industry, citizen groups, environmental organizations and other perspectives presented testimony. The subcommittees incorporated the numerous concerns and suggestions presented in public hearings and other communications into specific recommendations, which were reviewed, amended and adopted at a plenary session of the Task Force in October 1988.

Figure 1.—Major Waste Types by Category

WASTE TYPE (MAIN REGULATORY AGENCY)	DESCRIPTION OR EXAMPLES (MIXTURE OF COMMON USAGE AND LEGAL TERMINOLOGY)
AIR POLLUTANTS (TACB):	Airborne gaseous and particulate contaminants
POINT SOURCE DISCHARGES (TWC):	Municipal sewage and pretreated industrial liquid wastes, discharged into sewer systems or surface waters
NON-POINT SOURCE DISCHARGES (TWC):	Surface runoff that accumulates rural (herbicides, pesticides, fertilizer, animal excreta) and urban (oil, lead, debris) wastes from the landscape
HIGH-LEVEL RADIOACTIVE WASTE (NRC):	Spent fuel, transuranics, and highly radioactive isotopic wastes from nuclear power plants and the military; these elements are distinct from one another technically but are often grouped in common usage
LOW-LEVEL RADIOACTIVE WASTE (TDH):	Radiological wastes and contaminated rubbish from hospitals, laboratories, nuclear power plants and processing facilities, and other sources
URANIUM MILL TAILINGS (TDH):	Earthen residues that remain on-site after mining and extraction of uranium from ores
OIL AND GAS WASTE (RRC):	Salt water, drilling fluids, and other wastes associated with the exploration, development, and production of oil, gas, or geothermal resources
INDUSTRIAL SOLID WASTE (TWC):	Solid wastes from industrial sources: manufacturing, mining, and agriculture
Class I Industrial Solid Waste	Industrial solid wastes that are toxic, corrosive, flammable, strong sensitizers or irritants, or potential generators of strong pressure and may pose a threat to human health or the environment
Industrial Hazardous Waste	Class I industrial solid wastes that are defined or listed as hazardous by the EPA because of their ignitability, corrosivity, reactivity, or toxicity: acids and bases, heavy metals and metal plating wastes, solvents, cyanide wastes, ignitable compounds, reactive compounds and explosives, sludges with hazardous constituents, etc.; the three categories listed under municipal hazardous waste also apply for respective quantities of industrial hazardous waste
Nonhazardous Class I Waste	Industrial solid wastes that are considered by the TWC to be a threat to public health or the environment but are not defined by the EPA as hazardous
Class II Industrial Solid Waste	Industrial solid wastes that are neither Class I nor Class III; generally, combustible and/or biodegradable materials, including many ordinary components of municipal solid waste (excluding household hazardous), except that they come from industrial sources
Class III Industrial Solid Waste	Industrial solid wastes that are inert and essentially insoluble: rocks, bricks, glass, dirt, certain plastics, rubber, etc.; similar to construction/demolition debris and certain other municipal solid wastes, except that they come from industrial sources
MUNICIPAL HAZARDOUS WASTE (TWC):	Same as industrial hazardous waste, but from nonindustrial sources excluding households: laboratories, printing and allied industries, small metal fabricators, vehicle and equipment repair shops, laundries and dry cleaners, pest control services, funeral homes, etc.
Large Quantity Generator Waste	Municipal hazardous waste emanating from a source in quantities of 1,000 kilograms or more a month

Figure 1.—Major Waste Types by Category—Continued

WASTE TYPE (MAIN REGULATORY AGENCY)	DESCRIPTION OR EXAMPLES (MIXTURE OF COMMON USAGE AND LEGAL TERMINOLOGY)
Small-Quantity Generator (SQG) Waste	Municipal hazardous waste emanating from a source in quantities of 100 to 1,000 kilograms a month
Conditionally Exempt SQG Waste	Municipal hazardous waste emanating from a source in quantities of 100 kilograms or less a month
MUNICIPAL SOLID WASTE (TDH):	As used in this report, solid waste from nonindustrial sources (e.g., commercial businesses, institutions, and households), but excluding municipal hazardous wastes
Paper and Paper Products	Paper, paperboard, and cardboard including corrugated boxes
Metal	Aluminum cans, tin-coated steel cans, small scrap metal items, and white goods (i.e., refrigerators and large appliances); scrap metal that has exhausted its original usage but is commercially recycled without discard is not legally regulated but is usually counted in recycling estimates
Other Homogeneous Waste	Wood, glass, earthenware and porcelain, plastics, textiles, rubber
Putrescible Waste	Decayable food matter and kitchen grease
Yard Waste	Leaves, grass clippings, and tree limbs
Miscellaneous Household Waste	Grit and soil, vacuum lint, diapers, etc.
Vehicle Components	Tires, auto parts, and junked cars; batteries are household hazardous waste if retained by the vehicle owner, but become municipal hazardous waste if accumulated by dealers
Household Hazardous Waste	Household wastes containing hazardous constituents or exhibiting hazardous characteristics, but legally exempted from the EPA's hazardous waste definition due to source and scale, and thus treated the same as other municipal solid waste; containers or contents of cleaning fluids, polishes and waxes, hair dyes and sprays, photographic chemicals, oil-based paints and painting products, wood preservatives, insecticides, herbicides, and fungicides; used motor oil or antifreeze; batteries of all types; ammunition; smoke detectors
Special Wastes	Certain wastes from health-care related facilities (pathological waste, microbiological waste, animal waste, sharps, blood, etc.); ash from municipal solid waste incinerators; water and wastewater treatment plant sludges and similar sludges (grease and grit trap waste, septic tank pumpings, etc.); asbestos from institutions and commercial businesses; dead animals; SQG waste (hazardous) when authorized by the TWC for disposal at TDH-regulated facilities
Construction/Demolition Debris	Building wastes from nonindustrial sources; similar to certain Class III industrial solid wastes

NRC = U.S. Nuclear Regulatory Commission. RRC = Railroad Commission of Texas. TACB = Texas Air Control Board.
TDH = Texas Department of Health. TWC = Texas Water Commission.

MUNICIPAL SOLID WASTE

Overview

Everybody wants it picked up, but nobody wants it put down.

- EPA Municipal Solid Waste Task Force -

In the spring of 1987, a barge originating from Long Island, New York gained international attention as it roamed the Atlantic Coast and Gulf of Mexico for six months trying to dock and dump over 3,000 tons of solid waste for which no landfill room could be found locally. Four states and three countries, as far away as the Central American nation of Belize, turned away the unwanted cargo. Eventually, a Brooklyn solid waste incineration plant agreed to dispose of the waste.

A second vessel, known originally as the KHIAN SEA, outdid the first. Carrying over 13,000 tons of ash from solid waste incinerators in Philadelphia, it remained at sea for over two years. A furor arose in Haiti when part of its cargo was dumped on a beach and later had to be removed. Embassies from Third World nations collaborated in warning other countries of the potential menace and protested vigorously the attempt at what one editorial writer described as "waste imperialism." Ultimately, its cargo was disposed of at an undisclosed location en route from the Suez Canal to Singapore.

The two episodes are symptomatic of solid waste difficulties that have afflicted parts of the United States, particularly the upper Atlantic seaboard. Landfilling, the traditional form of disposal, is subject to a growing shortage of available space as sites exhaust their capacity or are closed for economic or environmental reasons. Simultaneously, new landfills or alternative management facilities are not adequately replacing the lost capacity. Pursuit of alternative disposal methods has been slow to develop, but is now beginning to experience some success. Other nations, in any event, have demonstrated no interest in being recipients of our solid wastes.

Costs for landfill disposal have risen sharply, reflected by a recent jump in the U.S. average for "tipping fees" charged by sanitary landfills for receiving waste. A National Solid Wastes Management Association (NSWMA) annual survey of about 80 sanitary landfills showed a startling average increase in 1987 to $20.36 per ton, a jump of $6.93 over 1986 (Figure 2). These numbers are skewed by fees of $35 to $60 per ton in some of severely affected northeastern states, but still indicate the gravity of our diminishing waste management capacity.

Americans generate in the range of 160 to 230 million tons of solid waste annually, depending on how the waste stream is defined. This equals between 3.6 and 5.2 pounds per person daily. Franklin & Associates, consultants to the EPA, are on the low side of this range. Recent NSWMA estimates are on the high side, as are individual state estimates (Figure 3). Texans, according to the TDH, generate about 18 million tons a year, or about 5.8 pounds per person daily.

Municipal solid waste encompasses a wide range of materials, as reflected in Figure 1 of the Overview. The relative composition of consumer and commercial wastes is shown in Figure 4.

Approximately 80% of America's municipal solid waste is managed by disposal in landfills. Nine percent (9%) is incinerated, 6% with associated energy recovery and 3% without. The remaining 11% is recycled.

Local governments operate about 80% of the country's municipal solid waste landfills. Fifteen percent (15%) are privately managed, and the remaining 5% are operated by the federal and state governments. Nationwide, the EPA in December 1986 counted a total of 7,608 municipal solid waste landfills, including 926 in Texas. Since then, the Texas total has remained stable or slightly increased while the national figure has plunged to about 6,000. These figures suggest Texas has relative landfill stability when compared to states where landfill space is rapidly declining.

The TDH divides landfills and solid waste management sites into nine categories. Types I through III comprise general purpose landfills of progressively smaller size and simpler nature. Type IV landfills handle only construction- demolition debris, brush and rubbish. Type V facilities include transfer stations, recycling and composting operations, waste incineration plants, and other waste processing activities. Type VI involves experimental waste treatment technologies. Type VII refers to land application of sludge as described in Section D. Type IX refers to landfill gas recovery projects as described in Section H, and Type VIII is an obsolete designation for municipal hazardous waste facilities, responsibility for which has been transferred to the TWC.

Significant progress has been made in the last 20 years in upgrading disposal sites across the state, but even more rigorous standards may soon be necessary if proposed "Subtitle D" regulations of the EPA are adopted. These would require existing sites to install

Figure 2.—Landfill Tipping Fees, 1982-1987

(per ton of solid waste)

Year	National Average	Recent Regional Averages			
		Northeast	Midwest	South	West
1982	$10.80				
1983	10.80				
1984	10.59				
1985	11.93				
1986	13.43	$20.59	$10.86	$10.95	$10.01
1987	20.36	39.23	12.71	12.27	10.75

Sources:

Johnson, Charles A., and Pettit, C.L. (1987). "The 1986 Tip Fee Survey." *Waste Age*, March 1987, pp. 61-64.

Pettit, C.L. (1988). "The 1987 Tip Fee Survey." *Waste Age*, March 1988, pp. 74-80.

groundwater monitoring equipment, and landfills opened after 1991 would require more stringent leakage prevention measures.

Solid waste incineration is called "resource recovery" or "waste-to-energy" (WTE) if the waste is used to produce fuel, steam or electricity. Most of the 70-plus incinerators currently operating in the United States are "mass burn" plants, based on older technology which requires minimal presorting of waste except to remove larger items. Newer "prepared fuel" units involve segregation of non-combustibles prior to burning, resulting in a more predictable fuel that can be fed to conventional boilers.

Smaller prefabricated versions of the mass burn systems are called "modular" units. Texas has four of these modular plants operated by the cities of Carthage, Center, Cleburne and Waxahachie. The first two sell steam to local poultry processors, the third sells electricity to a utility, and the fourth has been unsuccessful in finding customers for its energy output. The Texas Department of Corrections also operates three small incinerators, burning some of its waste to produce steam.

More than 500 communities in the United States operate recycling programs. Other voluntary and commercial efforts bring the total number of programs to over 4,000 across the nation. Some communities require separation of waste by type for curbside pickup, while other communities collect commingled waste and separate it at centralized materials recovery facilities (MRFs). Other components of recycling efforts are scrap dealers, manufacturers (e.g., glass industry), drop-off centers, container deposit systems and other elements.

Statewide recycling figures are not available, but the percent of waste recycled in Texas is probably below the national average. The City of Austin operates the largest curbside collection program in the state, and the City of Richardson operates three drop-off centers in conjunction with a nonprofit volunteer organization. Oregon, with 22% recycled wastes, leads the nation. Other state leaders include Vermont, Washington, Kentucky, and California.

Since 1983, several states (Oregon, Rhode Island, New Jersey, Connecticut, Pennsylvania and Florida) have enacted comprehensive legislation to reduce over-reliance on landfilling. Most have sought to expand waste reduction and recycling rather than to promote waste incineration. Various approaches include:

(1) a statewide recycling percentage goal;
(2) mandatory recycling among most or all localities;
(3) tonnage surcharges on solid waste disposal;
(4) tax exemptions for recycling equipment or activities;
(5) government procurement directives;
(6) technical and planning assistance to local governments;
(7) marketing studies to identify potential purchasers of recyclables;
(8) product design review or selected product bans; and
(9) public education programs.

Figure 3.—Comparison of State and National Estimates of Solid Waste Generation

	Pounds Per Capita Daily	Million U.S. Tons Annually	Source		Pounds Per Capita Daily	Million U.S. Tons Annually	Source
Florida	10.979	—	(1)	NEWSDAY	5.178	230	(9)
Alaska	10.959	—	(2)	Minnesota	5.162	—	(2)
Virginia	9.281	—	(2)	NSWMA	4.953	220	(10)
New Jersey	7.142	—	(3)	Rhode Island	4.893	—	(11)
California	7.131	—	(4)	South Carolina	4.800	—	(2)
Maryland	6.980	—	(2)	Hawaii	4.685	—	(2)
Kentucky	6.322	—	(2)	Oklahoma	4.522	—	(2)
Texas	5.815	—	(5)	Pennsylvania	4.315	—	(2)
Delaware	5.743	—	(2)	Montana	4.064	—	(2)
Michigan	5.652	—	(2)	Oregon	4.023	—	(2)
Tennessee	5.643	—	(2)	Indiana	3.963	—	(2)
Massachusetts	5.615	—	(6)	New Mexico	3.653	—	(2)
Idaho	5.490	—	(2)	Missouri	3.651	—	(12)
New York	5.380	—	(7)	FRANKLIN	3.584	159	(13)
Washington	5.343	—	(2)	Nebraska	3.403	—	(2)
STATE MEDIAN	5.310	—	(8)	Maine	3.231	—	(2)
Arkansas	5.278	—	(2)	West Virginia	2.845	—	(2)

Sources:

(1) Mattheis, Ann (1988). "Florida May Not Have Its Act Together." *Waste Age*, February, p. 97.

(2) Brown, R. Steven, et al. (1987). "Solid Waste Programs in the States." *Journal of Resource Management and Technology*, September, galley copy.

(3) Glenn, Jim (1987). "7,500,000 People, Two Landfills." *Biocycle*, November/December, p. 36.

(4) Rubin, Hal (1987). "California Faces a Disposal Crisis." *Waste Age*, September, p. 133.

(5) Texas Department of Health (1988). "The Status of Municipal Solid Waste Management in Texas." Report to the Texas Task Force on Waste Management Policy, May 10, p. 6.

(6) Cowen, W. Tod (1987). "Massachusetts Fiddles as Capacity 'Burns' Away." *Waste Age*, December, p. 119.

(7) Hershkowitz, Allen (1987). "Burning Trash: How It Could Work." *Technology Review*, July, p. 26.

(8) The 30-state median was taken from the average of the estimates above and below.

(9) Firstman, Richard C., et al. (1987). "The Rush to Burn: America's Garbage Gamble." *Newsday*, reprint of November 13-22 series, pp. 4 and 7.

(10) Wingerter, Eugene (1988). "A Year in the Spotlight." *Waste Age*, April, p. 52.

(11) Hilton, Betty (1987). "Rhode Island Chooses the Fast Lane." *Waste Age*, November, p. 165.

(12) State of Missouri, Environmental Improvement and Energy Resources Authority (1987). STATE RESOURCE RECOVERY FEASIBILITY AND PLANNING STUDY, Volume I–Summary Report. Jefferson City: EIERA.

(13) Franklin & Associates (1986). Figures presented by Mr. Ed Klein, U.S. Environmental Protection Agency, at the public hearing in Dallas of the EPA Municipal Solid Waste Task Force, May 13, 1988. Franklin's 1986 national estimate was converted to pounds per capita daily based on the U.S. Census Bureau's 1986 population estimate. The per capita figure was then applied to the 1987 population estimate to get an updated approximation of annual national tonnage.

As solid waste problems have intensified in some areas of the nation, the federal government has turned its attention to the subject. In February 1988 the EPA created an internal Municipal Solid Waste Task Force (hereinafter, the EPA Task Force) to develop a national strategy for solid waste management. The panel held public hearings in May in Boston, Seattle and Dallas, and issued a draft report in September.

Texas has passed three noteworthy solid waste measures in recent years. One enactment, following in the wake of similar legislation for hazardous waste, established as public policy a hierarchy of preferred waste management methods for municipal solid waste: waste reduction; recycling; resource recovery; and landfilling (Section H of this report)

A second measure, the Texas Litter Abatement Act, was a non-substantive consolidation of existing litter laws which supplements the Texas Solid Waste Disposal Act in the area of enforcement (Section D). A third, the Comprehensive Municipal Solid Waste Management, Resource Recovery, and Conservation Act, encourages regional solid waste planning (Sections C and F) and requires cities and larger counties to ensure solid waste services throughout their respective jurisdictions.

This last act also creates a permanent Municipal Solid Waste Management and Resource Recovery Advisory Council, affiliated with the TDH. The advisory group will ensure a degree of continuity as the state further studies and evaluates its municipal solid waste management policies.

A. CAPACITY

Waste disposal coasts are the fastest rising item on any municipal budget. / It's starting to cost so much for disposal that you don't even need to bring in revenue for recyclables. You just need to get them out of the waste stream.

- Two Northeast solid waste officials -

Not many years ago the northeastern United States had adequate landfill capacity but wasted the opportunity, despite adequate warning, to put in place an effective long-term program. Now that part of the country has a disposal crisis . . . .Texas can and should learn from these mistakes.

- Texas waste management industry executive -

At the Texas Task Force on Waste Management Policy's first public hearing in Houston, the Subcommittee on Solid and Infectious Waste developed a list of nine issues upon which it focused its subsequent deliberations. One of these, a major reason for this part of the Task Force study, was the issue of solid waste management capacity. Simply put, Texas would like to forestall the kind of problems now facing other states.

Figure 4.—Composition of Municipal Solid Waste, 1986

Paper and paper products, including cardboard	41.0%
Yard wastes	17.9
Food wastes	7.9
Wood, rubber, textiles, and leather	8.1
Plastics	6.5
Metal	8.7
Glass	8.2
Miscellaneous inorganic wastes	1.6

Source:

Franklin & Associates (1986). Figures presented by Mr. Ed Klein, U.S. Environmental Protection Agency, at the public hearing of the EPA Municipal Solid Waste Task Force, Dallas, May 13, 1988.

Capacity typically is assessed in terms of landfill space, since landfills are the dominant form of waste management in both Texas and the United States. Recycling and incineration capacity must also be addressed, however, since they are preferred methods of waste management according to the hierarchy adopted by the 70th Legislature.

Texas had 20,171 acres of remaining landfill space in 1987. This capacity is being consumed at a rate of 1,747 acres annually, and would last about 12 years if no new acreage were added. To remain static, Texas must either add the same amount of new landfill each year or, should it fall short of that target, make up the difference by means of waste reduction, recycling or incineration.

The 12-year figure is only an average. The situation varies from locale to locale. Texas cities for the most part have ample capacity, based on the state's NSWMA survey participants whose tipping fees were less than half the national average. Even where communities have only a few years of landfill capacity remaining, most are in the process of acquiring new acreage, or in some cases pursuing alternatives. Texas' urban areas may have to site new landfills in more distant outlying locations than before, and some rural areas may experience difficulty locating geologically appropriate sites. Despite these factors, the TDH sees no real crisis at the present time.

In contrast to landfilling, and in fact largely because of the availability of comparatively cheap open spaces in Texas, the state's recycling and incineration capacity is seriously underdeveloped. Austin's municipally operated recycling program, the only one of its kind in the state, diverts only 4% of the city's solid waste stream. Texas, moreover, has only the four small municipal incineration facilities mentioned in the Overview, although several cities are currently examining that alternative.

Two factors could affect the state's future landfill capacity. The proposed Subtitle D regulations, plus a separate EPA-mandated ban on open burning scheduled to take effect August 31, 1989, would impact primarily rural Type II and III landfills. Subtitle D will increase compliance costs, possibly leading to the premature retirement of some facilities, while the prohibition on open burning will reduce landfill operators' ability to reduce waste volume. Some witnesses complained to the Task Force about these measures, and the TDH has suggested to the EPA that the open burning ban could be applied more selectively, taking into account Texas' geographic variety.

An impediment to the permitting of new waste management facilities generally is the conflict between permit applicants and affected residents who resist the siting. Local protesters frequently are referred to as NIMBYs, an acronym for "Not in my back yard."

Opposition to landfills during the Task Force and EPA Task Force hearings was confined mainly to the fringes of large cities, indicative of the controversy that ensues when waste disposal sites are situated amidst a growing suburbia. The TDH reports, though, that permit hearings for landfills throughout the state routinely take several days as more applications are contested. The permitting process also is hampered by an insufficient budget for personnel, thereby producing a growing backlog of unprocessed applications.

Controversy over resource recovery projects is less frequent, mainly because Texas has yet to pursue that option extensively. Elsewhere in the United States, public opposition to proposed incinerators, especially mass burn units, is common. Even recycling is not immune, as demonstrated by a challenge to a proposed materials recovery facility in Pennsylvania.

The only progress against this siting controversy seems to be when a permit applicant offers offsetting amenities and concessions in conjunction with the facility. A Wisconsin state law has had some success in encouraging negotiations toward this end, as have regional projects elsewhere in which the host community receives payments, subsidies and/or public improvements in exchange for accepting a regional facility.

Both permit applicants and opponents aired specific complaints about Texas' permitting process. The process, applicants contend, absorbs too much time and money. By virtue of a 1987 legislative change, for example, public notice requirements for solid waste permit applications are more stringent than those for hazardous waste. As for the opposition that can lengthen the process, applicants argue that the environment should be adequately protected if their proposals meet the regulatory agency's technical specifications. Peripheral concerns, they argue, are irrelevant. One witness alleged that local opposition in some siting controversies has been financed in part by applicants' competitors. Subcommittee members debated whether this practice should be made subject to disclosure, but made no recommendation.

Residents near landfills cited birds, rodents, heavy traffic, roadside spills, dust, foul odors, contaminated water supplies and lowered property values as reasons

for their concern. One landfill opponent complained that the permitting process gives affected residents inadequate time to review proposals and prepare a response, while the regulatory agency's own review of an application sometimes appears rather cursory. This witness and others argued for greater independent review of information supplied by an applicant, and for expanding the scope of permit hearings to include an assessment of need. Mere satisfaction of technical criteria, said opponents, does not address whether other sites or management methods are preferable, nor whether there is real demand for proposed new capacity. Requiring certificates of need thus found some favor, as did proposals to split the present process and hold separate hearings on technical criteria and land use considerations.

The Task Force anticipates that better regional planning as outlined in Recommendations 3 and 9(a) will help address public concerns regarding need for new facilities. Recommendations 32 and 33 would require earlier public notice of permit applications and would standardize associated notice requirements. Recommendation 28 from the Subcommittee on Hazardous and Industrial Waste calls for continued review of the pre-application process referenced in the second half of this report. Recommendation 9 generally, including 9(e), supports increased funding for processing of applications and permits.

The Task Force recommendations generally promote an improved balance between landfill and alternative waste management methods and represent a collective statement in support of maintaining adequate waste management capabilities.

B. OUT-OF-STATE WASTE

> *In southeastern Ohio, residents instituted a . . . recycling program . . . , only to learn that the space they thought they were conserving in 'their' local landfill was being filled by trash that was being imported from Oyster Bay, New York.*
>
> - Ohio state attorney general -

As states in the Northeast urgently seek remedies to their solid waste management problems, one short-term solution has been to export waste to other states. Truck convoys carry garbage along the interstates 24 hours a day, hauling solid waste to landfills in western New York and Pennsylvania, West Virginia, Ohio, Michigan, and Kentucky. Transportation costs, though exorbitant, are unavoidable given the lack of nearby landfill space. In one Long Island town, homeowners pay a yearly average of $450 for pickup, shipment and disposal in this fashion.

Spurred by public outcry, some of the recipient states are rebelling. In Ohio, which generates 11 million tons of solid waste annually and accepts an additional 2 million for disposal, state legislators introduced HB 592 in 1987 to establish a 100-mile-radius service area around each Ohio landfill and restrict disposal of solid waste generated outside that area. The measure was an attempt to avoid a flat prohibition against importing out-of-state waste, which the U.S. Supreme Court previously had disallowed on constitutional grounds. Even so, despite the proposal's circuitous nature, the Ohio state attorney general in an opinion requested by state lawmakers declared the bill unlikely to survive a constitutional challenge.

Legal difficulties with waste ban attempts trace back to the case *Philadelphia v. New Jersey*, decided in 1978. New Jersey, at that time a net importer of solid waste, had passed a law in 1973 to halt waste inflows from Philadelphia, just across the river. That city and several others sued, along with private landfill operators in New Jersey for whom the trade was a lucrative business.

The suit eventually reached the U.S. Supreme Court, which by 7-2 vote declared New Jersey's law to be in violation of the U.S. Constitution's interstate commerce clause. While recognizing that some harmful or detrimental articles were not legitimate subjects of the clause, the court majority held that none were excluded from free trade guarantees on a prima facie basis+that is, without closer judicial scrutiny. What the court objected to most strenuously was New Jersey's attempt at economic isolation and protectionism. Granted, said the majority, the state might want to conserve its remaining landfill space, but its method of doing so placed the full burden of that conservation on outside waste and placed no similar burden on its own. Ironically, New Jersey now is a net exporter, trucking more than half its wastes elsewhere.

Two justices dissented from the 1978 opinion. They saw no distinction between New Jersey's action and the type of quarantine laws (e.g., for diseased cattle) that the court traditionally has upheld. The Ohio attorney general likewise views the ruling as an aberration, given prior decisions that have invoked a "balancing test" to weigh the principle of free interstate commerce against conflicting local interests.

Nevertheless, *Philadelphia v. New Jersey* has held firm as a precedent for subsequent similar rulings. Federal courts struck down a 1980 Oklahoma law banning the importation of industrial waste except from states whose waste disposal standards were comparable to Oklahoma's. A 1987 executive order by West Virginia's governor prohibiting importation of solid waste likewise fell by the legal wayside.

Conversely, the courts have upheld governmental bans applicable specifically to publicly owned or operated landfills. Hence the City of Portland, Oregon can exclude waste from nearby Washington, and small states like Delaware and Rhode Island, whose solid waste disposal systems are operated entirely by public entities, can do precisely that which was precluded for New Jersey and West Virginia. Higher disposal fees for out-of-state wastes also appear to be generally acceptable.

As alternatives to HB 592, Ohio's attorney general offered a potpourri of proposals to state legislators designed to send a discouraging message to other states—the establishment of more publicly owned landfills, the levy of special surcharges on out-of-state wastes or the imposition of a short-term moratorium on the licensing of new facilities. Suggested public safety measures included the inspection of incoming waste and background checks on applicants for private landfill permits. A more general strategy was to adopt more stringent but universally applicable waste management requirements. If, for example, Ohio adopted measures to exclude from landfill disposal certain recyclables or household hazardous wastes without regard to their origin, out-of-state generators would have to take them elsewhere or sort them to meet the new requirements. A final suggestion, directed to Ohio's Congressional delegation, was a federal law mandating that solid waste move across state borders only by interstate compact.

Opinion in other quarters opposes waste import bans. A representative of the NSWMA, testifying before a Congressional subcommittee, observed that neighboring communities in adjacent states commonly ship solid wastes across the border to their mutual advantage. The generating community may receive discount landfill tipping fees compared to local facilities while the recipient community may earn needed revenue. Similarly, a Texas witness before the EPA Task Force supported the continued free interstate movement of solid waste. States seeking legal "end runs" around the 1978 decision, he said, may tend toward a vicious spiral wherein each state tries to outdo all others in setting stringent standards that the other states' wastes cannot meet.

The Texas Task Force on Waste Management Policy heard a cautionary note. Low Texas tipping fees ($7-$10 a ton) and low coastal barging costs ($10-$12 from the East Coast) may attract significant solid waste importation from other regions. For hazardous and industrial wastes, however, Texas is a net exporter. Thus any support of a movement toward greater interstate restrictions might work against the state's overall interest.

Nonetheless, the Task Force supports the principle that states should take care of their own waste wherever possible. Unimpeded interstate waste mobility, one member contended, can undermine efforts by recipients to implement waste management reforms. Pennsylvania, New Jersey and California already have shown interest in sending waste to Texas. A flood of out-of-state waste could adversely affect Texas' available disposal capacity.

Imported waste might require additional health safeguards. Suggested options might be to inspect waste shipments as contemplated in Ohio and/or restrict imported waste to that which can be disposed of within three days of its initial collection. These actions would address mainly "putrescible" (i.e., potentially rancid) wastes.

Increased regulatory workload is another potentially negative factor. In Arkansas, where a landfill expansion permit to accommodate imported waste is pending, state agency officials are spending significant extra time and salaries to ensure that the destination facility is adequately upgraded. Special taxes or surcharges might therefore be appropriate to compensate for this drain on state revenue.

A category of imported waste of serious concern to the Task Force is the solid waste dumped by vessels at sea and subsequently deposited on Texas beaches with the tide. Testimony suggested a need for sufficient and improved waste disposal capacity at Gulf Coast ports to provide seafaring vessels somewhere other than the ocean to dispose of their trash. Recommendation 46 reflects this proposal.

The Task Force generally supports action at the federal level to regulate interstate shipment of solid waste as stated in Recommendation 4. Recommendation 45, however, would reserve Texas a measure of control over incoming wastes if interstate flow continues unregulated.

C. REGIONAL AND LOCAL PLANNING

> *The municipal solid waste management planning fund is created as a special fund in the state treasury . . . . The (Texas Department of Health) shall use the planning fund to provide financial assistance to local governments and planning regions for the development of regional and local solid waste management plans and to public agencies and planning regions for the preparation of screening, feasibility, and implementation studies . . . .*
>
> *The municipal solid waste resource recovery applied research and technical assistance fund is created as a special fund in the state treasury to be used for the purpose of accomplishing applied research and development studies and providing technical assistance to public agencies to carry out investigations and to make studies relating to resource recovery and improved municipal solid waste management.*
>
> - HB 1719 (1983), still unfunded -

In metropolitan areas of Texas, where large populations produce large amounts of municipal solid waste, landfills compete for space with residential or other uses of available land. Consequently, landfills migrate toward sites that are still vacant, reasonably cheap and environmentally suitable for waste burial.

In rural areas of the state, where smaller populations produce smaller amounts of waste, the ratio of space to waste is more favorable. Potential sites are relatively plentiful, excluding acreage devoted to agriculture, mining, timber production, recreation and similar pursuits.

Despite their differences, both areas may see a need to expand solid waste management planning, including regional programs. For metropolitan areas, the motivation is common interest among clustered communities in coordinating this increasingly difficult area of municipal services. For rural areas, the incentive is the anticipated cost of pending Subtitle D and open-burning regulations which, to the extent consistent with waste transportation feasibility, may stimulate shared landfills, joint resource recovery facilities or cooperative recycling and marketing efforts.

The Texas Legislature in 1983 placed a greater responsibility on cities and county governments to take care of their constituents' solid waste needs. The Comprehensive Municipal Solid Waste Management, Resource Recovery, and Conservation Act, HB 1719 as amended by HB 134 in 1985, requires all cities and each county over 30,000 population to review solid waste management services within their respective jurisdictions, and to assure provision of such services by December 31, 1989. The act also sought to promote local and regional solid waste initiatives by means of two special funds for planning and technical assistance from the state. The funds were to be derived from legislative appropriations, and in the case of planning assistance were to be matched on a 50-50 basis at the local or regional level. The TDH was given the responsibility for reviewing and approving the plans.

Five years later, no legislative appropriations have been made to either state fund. Having required local governments to provide solid waste service, the state has not implemented technical and planning assistance needed to encourage solid waste initiatives throughout the state.

Though unfunded by the state, Texas' three largest metropolitan areas independently have pursued regional planning efforts as contemplated by HB 1719. The Houston-Galveston Area Council (HGAC), including as a participant the three-county Gulf Coast Waste Disposal Authority, began assessing regional waste management needs in April 1983 as HB 1719 was proceeding toward enactment. The Alamo Area Council of Governments and the North Central Texas Council of Governments followed suit in 1985 and 1986, respectively. The HGAC plan is the only one approved by the TDH to date, but the other regions expect approval within the next few years.

The TDH in a report to the Task Force proposed that the state require development of solid waste management plans by all regions of the state at a rate of six per year, beginning with the most populous areas and proceeding down through the smaller ones. The three efforts described above represent a start toward this goal.

The Task Force adopted Recommendation 3, a general planning requirement for local governments and regional entities, linking such planning to the waste management hierarchy articulated in the Texas Solid Waste Disposal Act. Simultaneously, however, Recommendations 9(a) and 9(b) propose that the Legislature follow through on funding the state assistance programs authorized by HB 1719. This is one of several budgetary matters, as explained subsequently, that need prompt legislative attention.

D. ENFORCEMENT

We're the only permitted people in that area that I know of. Most everybody else is bootlegging.

- Local waste hauler -

Greatly in need of increased budgetary resources is the enforcement of the state's solid waste laws. Adequate inspection and monitoring personnel are essential not only to environmental protection, but also to public confidence in associated regulatory institutions.

Enforcement is related to the issue of waste management capacity. If citizens are skeptical of existing environmental surveillance, or if they perceive a lack of sufficient protection, attendant distrust can fuel siting controversies, leading to delays in permitting new waste management facilities.

The two state statutes relevant to enforcement are the Texas Solid Waste Disposal Act (TSWDA) and the Texas Litter Abatement Act. The TSWDA says where solid waste should go—in permitted facilities or in collection receptacles leading to them. TDH regulations amplify how the waste, having arrived, should be managed. The TSWDA and Texas Litter Abatement Act jointly prohibit disposal anywhere else.

Transgressors under the two acts fall into four categories as outlined in Figure 5. Permit violators put waste in the right place, but do it in variance to their permits. The others—outlaw operators, promiscuous dumpers, and common litterbugs—put it in the wrong place. The worst offenders, from the viewpoint of both honest businesspeople and state enforcement officials, are the outlaw operators. Illicit haulers, one half of this illegal team, compete commercially with waste management services that follow the law. Colluding landowners currently may enjoy many protected property rights, but allowing dumping without a TDH permit is not one of them.

Several Task Force witnesses expressed problems with the first category, permit violators. Houston area residents complained about mismanagement of nearby solid waste landfills. Highly vocal also were citizens of Austin and Waller counties who objected to improper land application of wastewater treatment sludge. Such land application can supply valuable soil nutrients, and was defended by other witnesses for its potential contribution to Texas agriculture when done as prescribed by the TDH. Sludge, however, can contain toxic, pathogenic, and malodorous components. In the case of Austin and Waller counties, violations created local controversy that intensified when the TDH, strapped for inspection staff, allegedly failed to adequately monitor the two counties' sludge application sites or to halt regulatory violations.

Some support was offered for greater local control of permitted waste sites. One county commissioner advocated county ordinance making powers to enforce proper solid waste management practices. In the sludge application controversy, Austin and Waller counties enacted ordinances to require testing of each sludge load and to ban loads found to contain harmful constituents. Neither ordinance has been tested judicially, and neither has been enforced by the TDH. The TSWDA and other state laws give counties nominal waste management authority, but a county's actions are prone to legal challenge unless the county has adhered carefully to rulemaking requirements and has implemented a full-scale local licensing and regulatory system comparable to the state's.

Unauthorized disposal, especially by outlaw operators and promiscuous dumpers, remains a serious problem in certain areas of the state. Since initial passage of the TSWDA in 1969, state health officials have closed approximately 4,000 illegal dump sites. The TDH is aware of 225 still operating.

Local enforcement against illegal dumping is hindered by a combination of limited resources and unfamiliarity with state law. Local officials, even when faced with blatant lawbreakers, may be unaware of their legal remedies or may have more pressing offenses to prosecute.

In other cases, when the TDH intervenes and solicits the support of the attorney general's office, local indifference sometimes hampers enforcement. State prosecutors may be greeted at the county courthouse by a reverse NIMBY syndrome, wherein improper practices are accepted or tolerated if attributable to local residents or businesses and not perceived to be a clear danger to human health. Shutting down illegal activities in such instances can be difficult and time-consuming for state attorneys, since it may mean a form of death penalty for local establishments that governmental officials at that level are reluctant to invoke.

One promising counterexample in local enforcement is a pilot project in Bexar County. Sponsored by the State Department of Highways and Public Transportation (SDHPT), Keep Texas Beautiful, Inc., and the Bexar County Commissioners Court, the project

employs a full-time peace officer assigned to a precinct constable's office. The officer's specialty centers on combatting unpermitted dumping and littering (types II through IV in Figure 5). Averaging 50 tickets a month and a conviction rate of 96%, the officer has more than recovered his salary and benefits through the levy and collection of fines. A similar project independent of SDHPT sponsorship is underway in Galveston County.

At the state level, enforcement capabilities are spread thin. Responsible for 1,384 permitted facilities—landfills, transfer stations which consolidate waste streams prior to disposal, and other operations—plus the 225 identified illegal dump sites, the TDH has only 13 inspection and monitoring personnel. The department's separate sludge management program, which includes the oversight of haulers and regulation of land applicators, does not have a single full-time employee equivalent. At one point, in 1985, the Legislature contemplated eight sludge personnel, but funding for that purpose never materialized.

To gauge how Texas' solid waste inspection fares on a comparative basis, Task Force staff conducted a survey of other state programs. Figure 6 presents results from 30 respondents.

Three Texas numbers are big—the population of solid waste generators the TDH serves, the geographic territory its inspectors must cover, and the landfills to be inspected. A fourth, the number of inspectors, is proportionately small, as can be seen from the ratios comparing Texas and the median of responding states.

Fewer inspectors means less frequent inspections. For Type I through IV landfills, the TDH averages about 1.74 inspections per year. Per visit, reports the agency, inspectors find an average of five violations. The consequence for regulatory purposes is that violations may go undetected for several months, delaying corrective actions.

The Task Force staff, at the request of the Subcommittee on Solid and Infectious Waste, conferred also on enforcement with the attorney general's office and Bexar County pilot program officials. Resulting suggestions, applicable particularly to outlaw operators, included providing peace officers for solid waste enforcement, increased recovery of prosecution costs, and the option of seeking venue in Travis County as is authorized by over 30 statutes in other subject areas (Figure 7).

Recommendations 35-36 and 42 adopt these proposals, while Recommendations 39-41 support enforcement efforts against promiscuous dumpers and litterbugs, respectively. Recommendation 9 augments state funding for enforcement, and Recommendations 9(c) and 37-38 enhance local governments' potential to assist or participate in that enforcement.

Figure 5.—Four Violators of Solid Waste Disposal Laws

I.	Permit Violators	Operate a permitted facility but act occasionally or regularly in violation of applicable standards.
II.	Outlaw Operators Illicit Haulers Colluding Landowners	Regularly dispose of waste, or allow disposal of waste, at fixed unofficial and unpermitted dump sites.*
III.	Promiscuous Dumpers Leaders Followers	Deposit one-time junk loads randomly at convenient sites along the roadside, often begetting a fixed eyesore as other promiscuous dumpers with loads to discharge stop at the same spot and pile their junk on top of the first person's.*
IV.	Common Litterbugs	Toss soft drink cups or other minor trash, often from vehicle windows, in moments of transitory delinquency.

* Distinction: Generally, if an illegal dump site is small (e.g., an acre) and located next to a frequented road or intersection, it probably signifies promiscuous dumpers, with the landowner as an innocent victim. If an illegal dump site is larger, however (e.g., 40 acres), and seems to attract steady truck traffic, it probably signifies outlaw operators, with the landowner as a willing participant.

Figure 6.—Solid Waste Inspection Data

	Population (1,000,000s)	Square Miles (10,000s)	Landfills (100s)	Inspectors (number)
Alabama	4.08	5.08	1.22	-
Alaska	0.53	57.08	1.79	-
Arizona	3.39	11.35	0.96	3.00
Arkansas	2.39	5.21	0.84	4.00
California	27.66	15.63	4.00	14.00 + Local
Colorado	3.30	10.36	1.22	-
Connecticut	3.21	0.49	0.91	-
Delaware	0.64	0.19	0.03	4.00
Florida	12.02	5.42	1.26	20.00
Georgia	6.22	5.81	1.98	7.00
Hawaii	1.08	0.64	0.19	-
Idaho	1.00	8.24	0.95	-
Illinois	11.58	5.56	1.68	-
Indiana	5.53	3.59	0.96	-
Iowa	2.83	5.60	0.83	4.00
Kansas	2.48	8.18	1.24	2.50
Kentucky	3.73	3.97	1.07	10.00
Louisiana	4.46	4.45	0.93	-
Maine	1.19	3.10	2.94	-
Maryland	4.54	0.98	0.42	7.00
Massachusetts	5.86	0.78	2.03	-
Michigan	9.20	5.70	0.58	-
Minnesota	4.25	7.95	1.05	10.00
Mississippi	2.63	4.72	1.08	3.00
Missouri	5.10	6.89	1.06	14.00
Montana	0.81	14.54	1.29	1.50
Nebraska	1.59	7.77	0.42	2.50
Nevada	1.01	10.99	1.07	1.00
New Hampshire	1.06	0.90	0.70	7.00
New Jersey	7.67	0.75	0.73	-
New Mexico	1.50	12.13	2.13	2.00
New York	17.83	4.74	3.04	48.00
North Carolina	6.41	4.88	1.24	10.00
North Dakota	0.67	7.07	1.00	1.00
Ohio	10.78	4.10	1.49	Local
Oklahoma	3.27	6.87	1.23	11.00
Oregon	2.72	9.62	1.27	3.85
Pennsylvania	11.94	4.49	1.36	84.00
Rhode Island	0.99	0.11	0.11	-
South Carolina	3.43	3.02	0.80	-
South Dakota	0.71	7.60	0.55	-
Tennessee	4.86	4.12	1.20	8.00
TEXAS	16.79	26.20	9.26	13.00
Utah	1.68	8.21	1.12	0.00
Vermont	0.55	0.93	0.69	2.00
Virginia	5.90	3.97	1.47	8.00
Washington	4.54	6.65	1.18	11.00
West Virginia	1.90	2.41	1.41	-
Wisconsin	4.81	5.44	9.33	-
Wyoming	0.49	9.70	0.78	-

Summary:	Inspectors per 1,000,000 Population	Inspectors per 10,000 Square Miles	Inspectors per 100 Landfills
Median of Survey States	1.57	1.26	5.44
TEXAS	0.77	0.50	1.40

Figure 7.—State Agency Enforcement Statutes Providing for Venue in Travis County

Citation	Subject Area	Travis County Venue: State's Option	Travis County Venue: All Cases
Vernon's Texas Civil Statutes:			
Art. 46i-8	Obstruction to air navigation control	X	
Art. 852a, Sec. 8.07	Savings and loans; supervisory orders		X
Art. 1446e, Sec. 9.06	Gas utilities	X	
Art. 2461-5.09(h)	Credit unions		X
Art. 4437f-2, Sec. 9(e)	Ambulatory surgical centers	X	
Art. 4437f-3, Sec. 9(e)	Birthing centers	X	
Art. 4447u, Sec. 12(a)	Home health services		X
Art. 4476-5, Sec. 4(d)	Food, drugs, and cosmetics	X	
Art. 4476-15, Sec. 3.05(a)	Controlled substances	X	
Art. 4477-1, Sec. 25(e)	Sanitation and health	X	
Art. 4590f, Sec. 12	Radiation sources	X	
Art. 4590f-1, Sec. 3.03(c)	Low-level radioactive wastes		X
Art. 5221f, Sec. 17(e)	Manufactured housing standards	X	
Art. 5221f-1, Sec. 8(c)	Industrialized housing and buildings		X
Art. 5561cc, Sec. 9(a)	Chemical dependency treatment facilities		X
Art. 5920-11, Sec. 32(f)	Surface coal mining and reclamation	X	
Art. 6701d, Sec. 108F	Illegal vehicle equipment		X
Art. 8751, Sec. 12(c)	Irrigators	X	
Art. 9201, Sec. 11(b)	Flammable liquids at service stations	X	
Insurance Code, Art. 4.08, Sec. 14(c)	Life insurance companies; unclaimed funds		X
Insurance Code, Art. 21.21, Sec. 14(b)	Refund of insurance premiums		X
Insurance Code, Art. 21.48, Sec. 12	Insider trading and proxy regulation	X	
Codified Statutes:			
Agriculture, Sec. 71.012(c)	Fruit, plant, and shrub quarantines		X
Government, Sec. 416.034 (uncodified 1987 amendment)*	Fire protection personnel; appointments		X
Government, Sec. 442.012(b)	Historic landmarks, etc.	X	
Human Resources, Sec. 32.039(n)	False medical assistance claims	X	
Human Resources, Sec. 42.074(a)	Child-care facilities	X	
Natural Resources, Sec. 131.303	Uranium surface mining and reclamation	X	
Property, Sec. 74.705	Unclaimed property	X	
Tax, Sec. 21.24	Mobile homes; filing of movements		X
Tax, Sec. 24.04	Transportation business intangibles		X
Water, Sec. 16.236	Unapproved levee construction		X
Water, Sec. 29.051(b)	Salt water haulers	X	

* See note in pocket part.

Source: Office of the Attorney General.

E. TIRES

The 1700 block of Logan Street in Fort Worth has developed an unsavory reputation: It is the most popular tire graveyard in the city. Drive down the narrow street and you will encounter hundreds of tires, discards of the automobile world that litter the right-of-way and spill over onto adjoining property.

- Fort Worth Star-Telegram -

Among the major problems dumped illegally, and a waster of space even when disposed of properly in landfills, are tires. Two local officials who testified at the Lubbock public hearing characterized tires as their biggest headache. The Task Force heard considerable testimony on the subject, and the Subcommittee on Solid and Infectious Waste consequently pursued it as an unofficial tenth topic for special discussion.

Slides shown by witnesses at the Fort Worth hearing illustrated tire illegalities dramatically. In one case, dumpers emptied countless truck loads of tires into a deep, dry creek bed in Wise County. Heavy rains subsequently flooded the creek, washing thousands of tires downstream where they overflowed the banks and were strewn over 100 acres of farm and pasture land, effectively ruining the property for purposes of agricultural production.

Also pictured were tire dumps near the Fort Worth stockyards, on city streets within a half mile of the Tarrant County courthouse, and in surrounding suburban and rural areas. In many cases, where an illegal tire site becomes established, promiscuous dumping of other trash follows. Street heaps of tires may be cleared by the city, only to reappear a few days later in the same location.

The United States averages about one discarded tire per person per year, or approximately 240 million annually. In Texas, the figure is in excess of 16 million. The number of old tires accumulated in this country since the advent of the automobile is estimated at two to six billion.

On a bulk basis, scrap tires have little net value. Traditionally, dealers have relied on "tire jockeys," who remove tires from the dealer's premises with the understanding that a small percentage of reusable or recappable ones will be included. The tire jockey culls and sells the better ones for profit, then discards the remainder, usually illegally to minimize disposal costs. This system likewise minimizes disposal costs for the dealer, who gets rid of motorists' trade-ins practically for free. A small percentage, but still a significant amount, trickle into landfills.

Tires do not leach anything dangerous into the water table, but they take up valuable landfill space and create special concern owing to their shape, content, and resistance to compaction. Once buried, they create air pockets and collect potentially dangerous methane gas that forms in landfills from the decomposition of organic waste. Over the long term, because of these trapped gases, whole tires float to the surface and damage the landfill cap which is necessary to proper landfill management.

Alternatively, when dumped in the open, tires collect stagnant water and become prolific breeding grounds for disease-carrying mosquitoes. In many states, including Texas, large tire piles have caught fire and burned out of control for weeks, leading to exorbitant public expenditures to contain and extinguish the flames and clean up the mess afterwards. Usually, lightning is blamed, but property owners are sometimes suspected of setting tire fires themselves after unfavorable public health inspections.

A few tires can be converted to landscape borders, erosion barriers, highway crash bumpers, and artificial reefs or breakwaters, not to mention the traditional backyard tree swing. Those destined for landfills can be shredded into smaller pieces to mitigate the difficulties associated with that disposal solution. Mobile shredding units are available in some areas to do this on-site. For the vast majority of tires, however, potential applications normally requires grinding them up more finely into "crumb rubber," which in turn necessitates monetary investment and measures to remove any steel belting.

This end product, the crumb rubber, has two promising applications. First, it is a high-grade fuel. Tire rubber has a thermal energy content of 14,000 to 16,000 BTUs per pound, higher than any other solid waste and comparable to bituminous coal or anthracite (Figure 8 in Section H). A 14-megawatt electric power plant in Westly, California centers solely around a gigantic pile of 40 million tires which it burns whole but with the drawback that newer steel-belted radials are unusable. Some manufacturers burn tires or tire rubber to produce steam, and a city-owned resource recovery plant in Akron uses shredded tires to supplement other solid waste fuel.

The other promising application, pioneered in Arizona, is to combine the crumb with asphalt for

paving. The resultant rubberized asphalt costs more than conventional asphalt initially, but its greater durability makes it less expensive over the long term. Texas leads all other states in using rubberized asphalt for highway paving, but the supply comes wholly from out-of-state rubber produced in the course of tire recapping. Moreover, the current annual level of 10,000 to 15,000 tons, if derived instead from whole tires ground to crumb rubber, would consume only 580,000 tires, or about 3.5% of Texas' yearly used tire generation. Task Force witnesses proposed a gradual increase in the percentage of Texas highway paving which incorporates rubberized asphalt, and a gradual increase in the percentage of that material which comes from Texas tires.

Without new ventures in this field, the market for tire rubber is small compared to the number of discards. Essentially, then, a solution involves cultivating the type of entrepreneurship that can match an available resource to expanded waste-to-energy, highway paving, or other applications. That, in turn, requires curtailing promiscuous dumping, whereby tires go into the creek or bar ditch "free" with an ultimate price for cleanup to be paid later, usually with taxpayers' dollars.

Closure of unpermitted tire piles and dump sites can be frustrated by competing legal claims that the tires are held for eventual recycling or resource recovery and hence are not yet "waste." The Task Force found such claims unconvincing, given the virtual absence of potential markets for used tires in whole form. One member proposed a requirement, applicable both to landfill disposal and to tire rubber held in storage, that scrap tires (i.e., those no longer usable for transportation) be shredded, split or quartered.

Recommendations 43 and 44, incorporating this and other proposals, represent a compromise adaptation of a broader enforcement scheme that was offered to the Task Force on tires. At a minimum, this solution controls illegal dumpers and reduces tires' impact on landfills. Indirectly, it creates new supplies of potentially saleable tire rubber. Recommendations 20 and 24, following through on the demand side of the equation, seek to stimulate greater markets for the two major potential applications, rubberized asphalt and resource recovery. Recommendation 9(g) provides for possible cleanup of old tire dumps.

F. BUDGETARY ISSUES

The department has outlined . . . a relatively painless way to generate funds for our solid waste programs. A 50 cents per ton fee for landfill disposal would produce about $9 million per year . . . . The cost to each Texan would be about 50 cents per year.

- Member, Texas Board of Health -

If people understand why a charge is (levied), and if they in turn know that . . . money is going to the proper place to accomplish what they've paid for, I think that they're going to be willing to pay for that.

- City of Plainview official -

This report has noted several shortcomings with respect to legislative funding of TDH solid waste regulatory functions as provided for in state law. Several witnesses, reflecting this concern, urged a review and augmentation of the TDH budget. As one said, the state needs to put its dollar resources where its policy is. The Texas Task Force on Waste Management Policy backs these views with a special degree of emphasis and unanimity.

The list of current TDH responsibilities includes, first, full implementation of the 1983 Comprehensive Municipal Solid Waste Management, Resource Recovery, and Conservation Act (HB 1719), including associated technical and planning assistance at the local and regional level. Except for regional planning efforts in Houston, Dallas-Fort Worth and San Antonio, that act has barely been implemented. Second is enforcement. The TDH has too few monitoring and inspection staff to adequately cover the state. Third, fourth and fifth come the processing of permits, the regulation of sludge hauling and disposal, and the effective execution of other underfunded statutory functions. This section and those following identify several additional functions for resurrection or inauguration, including state solid waste planning, the promotion of solid waste management alternatives, expanded public education, and possibly the cleanup of certain solid waste dump sites.

A history of recent TDH funding might begin with passage of HB 1719 in 1983. Attached to that legislation was a fiscal note which, combined with other TDH solid waste funding requests, totalled $4.2 million annually. The Legislature approved HB 1719, but failed to approve any appropriations for implementation. In fairness, this was the beginning of three consecutive legislative sessions that were increasingly austere for state government generally.

The TDH in its request for the 1985 session sought the same $4.2 million annual figure, though as a Level 4 item in its request package. A means to supply the funding, via a fee of 25 cents per ton on municipal solid waste disposal, received legislative consideration but was dropped in conference committee. Again, the request went unfunded.

Meanwhile, the agency in 1985 was pummeled from three separate sides. First, in the course of TDH sunset review, responsibility for municipal hazardous waste was transferred to the Texas Water Commission. This meant a loss of personnel who had worked part-time on nonhazardous waste matters, and a loss of supportive RCRA funding. Second, the sunset renewal legislation authorized collection of fees for each regulated municipal solid waste facility, depending on its size and type and other factors, but fee receipts were directed to general revenue rather than dedicated to the TDH, while that agency in turn incurred new administrative expenses to collect them.* Third, the Legislature that year gave the TDH new responsibilities relating to sludge, but without an accompanying increase in resources to accomplish the task.

In 1986, as oil prices slumped and the State Comptroller's revenue estimates fell, the Legislature in special session reduced the state budget for the second half of the fiscal biennium. That same year, the TDH lost all supportive federal funding. The $4.2 million figure was offered again as the agency's solid waste budgetary request to the 1987 session, once more to no avail.

Since 1985, the TDH has lost 20% of its former solid waste funding. Since 1986, it has received less than 50% (now 38%) of the amount recommended by the Legislative Budget Board (LBB) and Governor's Office of Budget and Planning. The current annual state solid waste budget is $1.4 million—an expenditure of about *8 cents* per person per year, versus an average *45 cents* per person for solid waste programs in other states. These figures reflect a more general trend whereby, according to the Council of State Governments, state spending on environmental programs in Texas ranks 50th among the states if calculated on a per capita basis and 49th if calculated as a percentage of total state spending.

The agency's most recent solid waste funding request was $4.5 million for each of the upcoming fiscal years (i.e., 1990 and 1991). The TDH received guidance from the LBB to reduce this amount to $1.75 million, but the Texas Board of Health raised the request back to $3.7 million.

One unfunded project is an updating of the state solid waste management plan authorized by the TSWDA. The TDH first issued a state plan in 1971, using grants received under the federal Solid Waste Disposal Act of 1965 and federal Resource Recovery Act of 1970. An updated plan was issued in 1981 using additional federal grants under RCRA. The TDH intended to update the state plan every five years, but federal funds no longer are available, and funding proposals for the project have been defeated the last two legislative sessions during appropriations deliberations.

The Commissioner of Health, speaking at the Task Force's organizational meeting, attributed the agency's recent solid waste funding to an apparent breakdown between the Legislature's fiscal note and appropriations procedures. Being given more and more to do with less and less budgetary resources, he said, leads to the paradox of being asked to do almost everything for almost nothing.

An improvement, the commissioner suggested, would be to assign substantive solid waste legislation and agency budgetary review to the same committee. This proposal effectively would apply only to the House of Representatives, where substantive legislation typically goes through the Committee on Environmental Affairs but budgetary review for the state solid waste program goes through the Committee on Public Health as part of the total TDH budget. The chairman of the Task Force's Subcommittee on Solid and Infectious Waste, who also is chairman of the House Environmental Affairs Committee, expressed frustration as well with the current system and consequently supported this proposal.

The commissioner also raised for Task Force consideration the per-ton surcharge proposal from the 1985 session. Other witnesses before the Task Force suggested a range of 50 cents to $1.00 per ton, which would cover the TDH's current concerns. New Jersey and Iowa have similar surcharges of $1.50, Pennsylvania's new fee is $2.00, Vermont's in the Northeast goes as high as $6.00, and an advisory panel to Louisiana's governor has suggested $10.00.

Recommendation 8 emphasizes the need for increased legislative funding of the state's municipal solid waste program. Recommendation 9 adopts the

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* The complaint here is a subtle one. The law allows the TDH to set fees at rates sufficient to cover its composite program costs, excluding HB 1719. Its composite program costs, however, are exactly equal to what the Legislature appropriates to the agency to spend. Even if the TDH raised the fees to collect more, the excess would go to general revenue.

surcharge proposal and suggests several priorities to which resultant revenue should be directed. Recommendation 9(e) suggests increased funding of not only the TDH, but also other agencies with functions relating to solid waste. Recommendation 10 deals with the appropriations review process in the House of Representatives.

G. AGENCY ORGANIZATION

You have to go to the Air Control Board. You also have to go to the Water Commission for the hazardous waste. You go to the Health Department for landfills of certain types.

- Task Force member -

Either leave it as is or create (a state EPA). We don't need any more transferring, is what I'm saying. Because every time you merge . . . , you've got a period of reorganization, a period of readjustment, and it's disruptive to the program.

- Former state solid waste program director -

At the first meeting of the Subcommittee on Solid and Infectious Waste, discussion of budgetary jurisdiction in the Legislature drifted into discussion of reorganizing state agencies that deal with pollution control and waste management. The thought was that creation of an umbrella agency, a state equivalent of the U.S. Environmental Protection Agency (EPA), might reduce some of the difficulties that result from fragmenting waste management among the TDH, the TWC, the Texas Air Control Board and the Railroad Commission of Texas (Figure 1 in the Introduction). Concern was expressed also that the solid waste bureau at the TDH appears tucked into a small organizational corner of an agency that deals mainly with unrelated health matters, and might therefore benefit from a move elsewhere.

Even at the federal level, where there already is an umbrella agency, the concern has been raised that major environmental laws (e.g., the Clean Air Act, Clean Water Act and RCRA) are insufficiently standardized and coordinated to deal with waste and pollutants on a comprehensive multimedia basis (i.e., air, water, and soil). Waste is waste, and pollution is pollution, says the U.S. Office of Technology Assessment (OTA), regardless of where the wastes or pollutants are deposited. Yet major federal laws have separate definitions as to the wastes and pollutants that they are intended to control. The objective, in the view of the OTA, should be to minimize the composite negative impacts of harmful contaminants, wherever they ultimately go.

The subcommittee's interest in the matter centered on the concern that if activities cross jurisdictional lines, the applicants, operators and other interested parties have to sort out and deal with personnel in multiple agencies. This issue went beyond the usual suggestion for a "one-stop" permitting process, which currently is the case for municipal solid waste facilities. Rather, it reflected apprehension about a system where permit applicants, opponents or others seeking information have to phone or visit several places to figure out the bureaucratic maze and complete their business. The public should know where to seek assistance and be able to get it expeditiously, was the argument. The public should not have to guess where to go, wait for agencies to straighten out jurisdiction, or spend extra time going from one place to another.

An additional factor raised by this discussion was administrative efficiency. The pooling of agency hearing officers (Section K) falls along these lines, as might an umbrella structure for pooling all environmental inspection staff. One advocate for a state EPA suggested a consolidation of environmental research capabilities. A single state agency, for instance, could evaluate emerging technologies, sorting out the workable from the unworkable. Centralizing this function would save local governments duplicative effort and protect them from being sold exorbitant or trouble-prone equipment.

Dissent on the issue of a state EPA came in three forms. Regardless of where the state's solid waste program is assigned, said one regional official, its success is still dependent on backing it with sufficient financial resources. If that program has not been as strong as possible in the past, lack of budgetary commitment is the reason rather than a deficiency in the bureaucratic structure. Therefore, the corollary: The state's first step in improving regulation, before proceeding to the issue of possible reorganization, should be to beef up TDH solid waste funding.

A second rebuttal is that having a state EPA would not necessarily solve the problem of citizen-agency communication. The same number of employees, and the same size bureaucracy, presumably still would be present. Thus the citizen still would have to hunt for the right division, the right official and the right room or phone number. An example: One witness pursuing a

new technology, the co-composting of yard waste and sewage treatment sludge, complained to the EPA Task Force that he had been passed back and forth between two sections of the Dallas regional EPA office because no one in either section accepted jurisdiction.

The third and perhaps most telling comments came from a former solid waste program director in Texas, whose remarks were amplified by other agency officials. His comments require a divergent explanation: On the subject of reorganization generally, the Subcommittee on Solid and Infectious Waste asked for input from another legislative interim panel, the Special Committee on the Organization of State Agencies created by HCR 36 from the 1987 session. A staff member from that panel presented a draft report on its findings to the subcommittee. The draft report echoed much of the discussion here. It noted that regulatory agencies and industry officials seemed satisfied with the current system; environmentalists, perhaps less so. Neither industry officials nor environmentalists appeared to favor a wholesale consolidation of environmental agencies. Instead, they agreed that reorganization of regulatory functions should proceed incrementally. The special committee, adopting this approach, passed up any recommendation for a state EPA and limited its proposed reorganization to a transfer of municipal solid waste from the TDH to the TWC.

The former solid waste program director disagreed sharply with the incremental approach, and opposed implicitly this specific transfer proposal. Having witnessed the 1985 transfer to the TWC of the TDH's previous authority over municipal hazardous waste (a change which, as already noted, reduced TDH's ability to pursue its remaining functions), he deplored the prospects for repeating that kind of episode. Either leave things alone (first choice), or create a state EPA all at once (second choice), he said when his opinion was solicited. Piecemeal transfers of jurisdiction, one after another, the witness said, are too continuously disruptive.

A prosecutor with the attorney general's office, during staff discussions on the issue of enforcement, likewise commented negatively on the chaos that accompanies frequent reorganizations (e.g., the 1985 reorganization of state water agencies, which followed only eight years after a previous reorganization).

A Texas Board of Health member, testifying in Corpus Christi, added that now was not a good time to move solid waste jurisdiction, due primarily to major regulatory changes already anticipated with respect to Subtitle D. The board, he said, favored retention of solid waste management by the TDH.

The Task Force, accepting the latter arguments, adopted Recommendation 1 in favor of the status quo. A second proposal, Recommendation 34, attacks the problems perceived in public communication with agencies.

H. ALTERNATIVES

It is the public policy of this state that, (for) municipal solid wastes . . . , preference shall be given to the following methods, to the maximum economically and technologically feasible and with consideration given to the appropriateness of the method to the type of solid waste . . . , in the following order: (A) minimization of waste production; (B) reuse or recycling of waste; (C) treatment to destroy or reprocess the waste for the purpose of recovering energy or other beneficial resources if the treatment does not threaten public health, safety, or the environment; or (D) land disposal.

- Texas Solid Waste Disposal Act -

(In trying to reduce waste), there is a serious disconnect. When a company designs a product and brings it to market, that's the end of its responsibility. If it costs a lot of money to dispose of that product when someone is done with it, that's someone else's problem.

- EPA official -

Recycling involves more than simply separating valuable materials from the rest of the trash. A discard remains a discard until somebody figures out how to give it a second life—and until economic arrangements exist to give that second life value.

- Recycling advocate -

The fact is that resource recovery plants do not create heavy metals+it's already in the solid waste delivered to the plants. Until the heavy metals are either removed from the products that the public

discards . . . or (until) the products are removed from the waste stream through recycling, heavy metals will be sent to landfills either as raw garbage or as ash residue.

- Resource recovery advocate -

In recent years, a rough consensus appears to have emerged favoring an "integrated" approach to municipal solid waste management. The concept can be a little ambiguous and open to subtle differences of opinion as to what exactly it means. Some see it as mere diversification—applying a mix of alternatives rather than relying on a single process. Others see it as a hierarchy—taking a preferred alternative as far as it can go, applying the next alternative in sequence, and so on, before resorting to the least preferred.

Japan exemplifies the latter thinking, which is articulated in the Texas Solid Waste Disposal Act and has found adherents in the recent draft report of the EPA Task Force. The hierarchy, according to the EPA, need not be rigidly applied in every instance if special local circumstances render it infeasible. The basic goal of integrated waste management, nevertheless, should be to match each component of a locality's solid waste stream with the most appropriate means for reutilization or disposal. No matter how "integrated" is defined, the emphasis is on curbing over-reliance on landfilling.

The fates of different alternatives under integrated waste management are tied together. Waste-to-energy advocates, for example, are faced with the unpleasant political reality that incinerators are hard to site if recycling efforts have not been maximized. Even Japan with a high recycling rate has siting controversies over waste-to-energy plants, but at least the pro-recycling argument is muted and the opposition confined to a narrower range of issues that can be more easily settled. In turn, recycling proponents confront the unpleasant fact that recycling rates in Japanese cities top out at about 65%. The very ideal of a waste management hierarchy, moreover, presumes that some solid waste will filter down to a choice between resource recovery and landfilling. Some products (e.g., light bulbs) are very hard to recycle because of different components that are inextricably blended. Thus, a reasonable compromise under the integrated approach is to ensure that alternatives complement each other and do not compete with one another.

Landfills

Landfills, on the hierarchy's bottom rung, have their defenders. The argument is made that they are minor contributors to groundwater pollution; or, at least, modern sanitary ones are.

On the other hand, about 15-20% of the National Priorities List (NPL) federal Superfund sites are municipal solid waste landfills. Texas, with none so far, is fortunate in this regard, but problem sites are still being sorted out for possible NPL inclusion. Even for the more modern facilities, there is concern about the cumulative impact of hazardous substances that go to Type I-III facilities, either through illegal hazardous waste disposal or as part of the household hazardous waste stream. Another environmental concern is landfill gas, including the methane that was mentioned earlier in connection with tires. Landfill gas builds pressure leading to potential migration and requires controls to prevent excess methane concentrations that can cause explosion. Capacity is another landfill issue, as discussed previously.

Landfill methane, it should be noted, can be recovered for energy. The TDH classifies such projects as Type IX facilities. Texas' first landfill gas recovery project began operations in Houston in November 1986 and is producing about four million cubic feet per day of marketable gas, which goes to a gathering company. A second such project started this past summer in Lewisville, where it sells gas to an electric utility.

Incineration

Resource recovery utilizes solid waste energy more directly and produces a residual only 10% of the original volume and 35% of the original weight. Figure 8 shows the typical energy content of major solid waste components in comparison to conventional fuels. Florida, where shallow aquifers discourage landfilling, leads the nation in installed resource recovery capacity.

Europeans, who have operated mass-burn units for a number of years, incinerate up to 50% of their solid waste, mainly to produce steam if energy is recovered at all. The United States, at 9%, trails far behind. Resource recovery plants are on the increase in this country, but the rate of growth has slowed and many projects are now being cancelled.

Prepared-fuel plants experienced problems in the 1970s. Prone to mechanical defects, explosions and excess pollution, about 70% of the larger ones failed. Experts attribute these problems to poor design, including an insufficient attention to the characteristics of the waste being burned. In the 1980s mass-burn units have experienced unscheduled down time and

other difficulties, leading to diminished confidence among Wall Street financial sources.

The high plastics content of the U.S. waste stream, plus a scaling up of size and temperatures to enable generation of electricity for utilities, have rendered the technology awkward due to resultant problems of acridity and corrosiveness. In the case of both prepared-fuel and mass-burn units, however, American engineers are learning from past mistakes. Two newer plants of the latter variety, one in Oregon and one in Connecticut, have received particularly good reviews for their emission control systems.

Air quality is one of two related issues which, together, have excited controversies with respect to proposed resource recovery facilities. Gaseous emissions from such facilities include carbon monoxide, sulfur dioxide, nitrogen dioxides and hydrogen chloride. Airborne pollutants in the form of fly ash include chlorinated dibenzo-p-dioxins and dibenzofurans, heavy metals and other particulate matter. In July 1987, the EPA reported to Congress on air quality aspects of municipal solid waste incinerators. Simultaneously, the agency announced its intention to propose regulations on the subject.

If the fly ash is trapped by air pollution control equipment, the issue moves to its disposal by landfill. The problem shifts from the sky to the ground, and potentially to the water table beneath the earth's surface. Residue ash also includes the bottom ash that remains behind in the incineration chamber. Mixing the two residues can make the bottom ash, which is relatively harmless, more toxic. Ultimately, either together or separately, the fly and bottom ash must be dealt with effectively.

Heavy metals in incineration ash include lead and cadmium. In 1987, controversy arose when test samples showed that levels of the two sometimes exceed EPA toxicity limits for defining hazardous waste. Some environmentalists favor the ash's classification accordingly and push for required disposal in hazardous

Figure 8.—Solid Waste Energy Content by Major Component

(BTUs per pound)

Solid waste components are given in lower-case type; conventional fossil fuels, for comparison, in upper-case.

CRUDE OIL	18,000-19,000
Tires	14,000-16,000
BITUMINOUS COAL AND ANTHRACITE	14,000-15,000
Plastics	14,000
Rubber and leather	8,750
Wood	8,000
Textiles	7,500
Paper, paperboard, and cardboard	7,100
LIGNITE	7,000
Yard wastes	2,800
Food wastes	2,000
Ferrous metals	300
Glass	60

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rather than solid waste landfills. The EPA and National Solid Wastes Management Association favor policies combining the use of "monofills" (landfills devoted specifically to ash) and "co-disposal" (disposal with other waste in a solid waste landfill), the choice between the two dependent on the contaminant level. Some resource recovery advocates argue, however, that the whole ash controversy is a false issue since the solid waste from which the ash originates, if not burned, still contains the lead and cadmium and goes to a landfill, where it presents as much or more threat in terms of potential leachate.

Congress is now involved in settling the matter. Four different bills were offered in 1988 to set general regulatory requirements (i.e., air quality and ash disposal) for municipal solid waste incinerators. The EPA's recently proposed Subtitle D regulations also have implications for the handling of ash.

Besides environmental controversy, resource recovery faces problems in economic feasibility. Sales of electricity to utilities by waste-to-energy plants is governed by the federal Public Utility Regulatory Policies Act of 1978 (PURPA). Purchase rates under PURPA must reflect, though not necessarily equal, the utility's "avoided cost"—the cost of the next increment of the utility's capacity which is made unnecessary by the availability of electricity from such outside sources. The Public Utility Commission of Texas (PUC) makes avoided cost calculations in this state.

Unfortunately for prospective investors (e.g., cities), Texas has excess electric generating capacity. Under such conditions of oversupply, where cogenerators and small power suppliers offer a specific utility more power than it actually needs, the utility must give preference to those that produce power from municipal solid waste or renewable fuels. This, for waste-to-energy advocates, is the good news. The bad news arises in cases of excess capacity, wherein the avoided cost becomes a ceiling on the purchase price. For practical purposes, contracts in Texas with cogenerators and small power producers run 20-25% below the avoided cost amount. Legislation introduced at the state level in 1987 seeking to make potential resource recovery projects more viable would have provided contract prices in excess of the avoided cost, but it failed enactment.

Waste management industry officials and Task Force members expressed dissatisfaction with the situation, describing the difficulty of obtaining contracts with utilities. Their comments indicated annoyance at utilities' frequent reluctance even to seriously discuss potential resource recovery projects. A representative of the landfill gas recovery project in Lewisville, which does have a utility customer, suggested at a minimum that major contract provisions be standardized in an effort to avert undue negotiation costs and delays.

Utility representatives warned against uneven effects on ratepayers of setting contract rates legislatively in excess of avoided cost. A utility's service area, they argued, rarely coincides with the service area covered by a waste-to-energy facility. For instance, a community builds a resource recovery plant and sells power to the local electric company. A consumer living in a nearby city may get his electricity from the same utility but send his trash to a local landfill site. If the state provides for a rate for waste-to-energy purchases in excess of the avoided cost, he not only has to pay for his own garbage disposal but has to subsidize that of the other community.

One Task Force member raised the counter-argument that the small price differential between the two rates and the small size of the power purchases relative to the utility's total electric output means the rate impact and subsidy amount will be trivial. The point may be moot, however, since the Federal Energy Regulatory Commission in April 1988 ruled against state actions that attempt by legislative fiat to set purchase rates higher than the avoided cost.

An interesting legislative proposal passed recently in Illinois. It provides that where a resource recovery plant owned by or contracted to a local government sells electricity to a utility, the utility must purchase electricity from the plant at the same retail rate for which the local government purchases electricity from the utility. The utility, to compensate for its extra payment above the avoided cost, receives a credit on state utility taxes equal to the difference between the rate that it pays the local government and the rate that it would otherwise pay based on avoided cost. A special condition is that the local government in order to qualify for the higher rate must adopt a solid waste management plan with a recycling goal equal to 25% of the waste stream.

Recycling

Percentage goals for recycling have been established by several states. The most ambitious, as shown in Figure 9, is New York's target of 50%. Rhode Island sets a more moderate pace, starting with 15% and increasing to 25% within the next 20 years. A goal for Texas of 25%, equal to that proposed recently by the EPA as a national goal, was suggested by one Task Force witness.

Figure 9.—State Recycling Goals

State	Percentage	Year
Connecticut	25%	1991
Florida	30%	1994
Maryland	20%	1992+*
Minnesota	25%	1993**
New Jersey	25%	1989
New York	50%	1997
Rhode Island	15%	1992
	20%	2000
	25%	2005

* Program implementation does not begin until 1992.
** Pending legislation approving a recommendation of a select committee appointed by the governor.

Sources:

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The type of law that has received the most publicity is container deposit legislation. Ten states—California, Connecticut, Delaware, Iowa, Maine, Massachusetts, Michigan, New York, Oregon and Vermont—have such laws. California's version is somewhat more complex than the other nine. Leading environmental organizations continue to back adoption of container deposit legislation at the state or federal level. There is dissent, however, among some recycling supporters, who prefer recycling programs be linked to local-government waste pickup and disposal systems. Container deposit laws, in this view, set up an inefficient and duplicative separate system, preempt part of the waste that would contribute to lowering costs for curbside recycling and materials recovery facilities, target (and direct the public's awareness to) only a portion of the total waste stream, and do not necessarily ensure that the collected containers are actually recycled instead of just landfilled.

Mandatory recycling laws impose on cities or counties a requirement to establish recycling programs or provide recycling opportunities to citizens—curbside collection of recyclables, materials recovery facilities, or special drop-off centers. They create a mandatory obligation for local government, that is, but not necessarily for the individual citizen. Rhode Island and Connecticut target cities generally; Oregon, cities over 4,000; Pennsylvania, all cities over 10,000 and some cities over 5,000. Florida focuses its program at the county level. New Jersey, whose law is the most stringent, gives counties recycling planning duties and cities the duty to adopt recycling ordinances. In its case, recycling is not just available to the citizen; instead, the citizen is required by city ordinance to recycle certain materials.

Another variety of state laws make landfill or resource recovery permits conditional on the consideration or pursuit of recycling, or require solid waste disposal facilities to offer drop-off recycling in conjunction with disposal. States with one or the other provision include Iowa, Minnesota, New York, Washington, Wisconsin and Pennsylvania.

Independent of state directives, numerous communities across the country have implemented recycling programs, sometimes mandatory and sometimes voluntary. In this context, "mandatory" refers to an obligation imposed by the local government upon the citizen. Programs of this nature inevitably cause some grumbling because of their coercive nature, but they show lower operating costs per ton of recycled waste due to higher participation rates. In turn, net costs—operating costs minus sales of the recyclables—are likewise lower. The coercion usually applied is that one's garbage is not picked up if one fails to separate the recyclables. Peer pressure from neighbors who notice this failure is an additional incentive.

Voluntary programs rely more on publicity and education, or they may offer prize money to randomly selected citizens who participate on a given collection day. Larger cities generally have voluntary programs and collect only the easier recyclables. Expansion into all neighborhoods, into additional recyclables, or into mandatory recycling, is for them a big undertaking and occurs in stages. Thus the percentage of diverted waste is at first low. The highest diversion rates occur in small towns with mandatory programs that recycle everything possible (e.g., Wilton, New Hampshire, and Prairie du Sac, Wisconsin). Given landfill and lawmaking trends, however, certain larger cities are pushing recycling more aggressively (e.g., Seattle, Newark and Portland).

One point deserves special emphasis: the mere diversion of reusable materials from the waste stream is not recycling. As stressed by Task Force witnesses and recycling experts, ready markets for the materials must be at hand. Recyclables are not recycled until they return to commerce. If no purchaser is available, they will simply pile up and be carted to the landfill. Essentially, this is the same situation as applies to tires and resource recovery. Expanded separation of useful waste components must be accompanied by the entrepreneurial creation of expanded markets to absorb that waste. Doubts as to how fast market demand for recyclables can grow is the reason for professional skepticism directed at states with little experience in the field, large populations, and overly ambitious percentage recycling goals.

There is some friction at the local level between recycling and resource recovery advocates. Communities that have committed sizable investments to waste-to-energy plants often enact "flow control" ordinances to direct combustible components of the waste stream to incineration. Recycling proponents argue that flow control locks out further consideration of their preferred alternative. Resource recovery proponents respond that if their opposite numbers have their way, so much paper and other combustibles will be diverted that there will be little left to burn.

Actually, recycling usually removes both combustibles and noncombustibles. If there is a rough balance between the two, the BTU quality of the incinerator waste is maintained, although the total quantity of combustibles decreases. This issue points to the merits of the integrated approach to waste management planning. In that context, if planned in advance, flow control can be useful in directing appropriate solid wastes to a combination of recycling, resource recovery and landfilling.

As the United States accelerates recycling efforts, there is also potential for friction between new public-sector enthusiasts and existing private-sector recyclers. The scrap metal and waste paper industries have voiced special concerns in this regard. Government action, in their view, should not disrupt the marketing arrangements that they, as earlier entrants to the recycling field, have cultivated. That is, public-sector recyclables should not so overwhelm the private-sector's recyclables as to displace them and usurp their former markets. Nor should the vast arrival of public-sector recyclables drastically drive down prices due to oversupply. The public sector, in essence, should work to increase market demand for recyclables rather than just contribute to the supply.

These businesses also object if government subsidizes competing facilities, or even if it creates unsubsidized but duplicative facilities without looking first to see whether planned recycling services can be handled by existing industry capacity.

Such sentiments agree somewhat with those of one prominent environmentalist in the field, who sees local governments as best geared to generate recyclable commodities and the private sector as best suited to broker and market them. Government at all levels, in this view, can have a beneficial role by providing inducements to the private sector.

Other sources echo this last point, emphasizing various incentives to recycling that government can provide. Several states—Florida, Indiana, New Jersey, New York, North Carolina, Oregon, Rhode Island, and Wisconsin—offer tax breaks, although some of these relate to state income taxes and hence are inapplicable to Texas. Four states—Illinois, Michigan, New Jersey, and Pennsylvania—have conducted or commissioned special studies on market development. At least 18 states, including Texas, have enacted government purchasing laws giving preference to recyclables, though most are limited to paper products.

In the course of the Task Force's deliberations, there was discussion of removing certain disincentives, including state trucking regulations which effectively preclude waste management businesses from obtaining hauling permits that are necessary to recycling initiatives. A related issue was the discrepancy between interstate trucking rates and intrastate rates in Texas.

Another concern dealt with the circumstance where a recycling facility is established in connection with a landfill. Recycling has the positive effect of extending the landfill's life span, but in so doing invalidates the duration of the landfill permit, thereby necessitating a permit amendment with attendant long and laborious hearings. Members of the Subcommittee on Solid and Infectious Waste supported remedies to avoid such red tape.

The intrinsic properties of different solid waste components affect how recyclable and marketable they are. For purposes of analysis, recycling and recyclables can be divided into three categories, using a glass juice bottle as an example. This classification system system will be used throughout the remainder of this subsection.

Type 1 recycling occurs when the juice bottle is recycled whole (e.g., refilled). *Type 2* occurs if the juice bottle is crushed into cullet, which becomes raw material for the manufacture of a new but basically identical product (e.g., another glass juice bottle, though perhaps not the same size or shape). *Type 3* occurs if the juice bottle is crushed and the cullet used to produce some different product (e.g., a glass window pane).

Types 1 and 2 approach the recycling ideal, unless the overall demand for fruit juice bottles is declining. Type 3 is ideal only if the demand for the secondary products (i.e., window panes or something else) closely approximates the amount of waste generated in the form of the primary product (i.e., empty juice bottles).

- Glass

Bottles and other containers account by weight for about 70% of the glass products produced annually in the United States. Flat glass, such as window panes, accounts for another 15-20%; specialty glass products such as television tubes, the remainder. Glass containers approximate the Type 1 or 2 ideal, except for complications that arise from necessary color separation into clear, green and amber. Flat glass, in turn, presents no technical barrier to Type 2 or 3 recycling, but there is little effort so far to segregate it from the residential waste stream. Specialty products, intended for greater durability, are difficult to recover and typically are sent to landfills. All told, about 10% of this nation's glass is recycled. Potentially, the figure could be much higher. In Texas, glass container recycling is expanding rapidly. A plant in Waco expects to expand its operations from about 40,000 tons (190 million containers) in 1987 to 100,000 tons (480 million containers) in 1989.

- Metal

Metal comes in many forms and varieties. Type 1 recycling opportunities are limited (e.g., the reuse of a paper clip). Types 2 and 3, where technically and economically feasible, are promoted by scrap metal dealers and selected manufacturers. The major consumer sources of metal wastes are aluminum beverage containers and tin-coated steel cans. Demand for the former is strong because of the relatively high energy expenditures involved in processing aluminum from virgin ore. Resultant premium prices produce a national recycling rate of 40-50% for aluminum cans. The U.S. steel can recycling industry is likewise growing. Steel and aluminum generally are processed from scrap into metal sheets, which then become a new product. Hence, metal from cans goes through several reincarnations, perhaps becoming an automobile fender and later another can.

- Paper

Paper and paper products vary by grade. Estimates suggest a national recycling rate of 20-33%. Volatile waste paper prices can render the market unsteady. Commercial and industrial recycling is well organized and adapted to such fluctuation; recycling from consumer solid waste, less so. Unlike the case with metal, which in principle can be remelted and recycled indefinitely, paper fibers break down through successive reuse, so that descendant products degrade sequentially from business paper to cereal boxes and tissue toward a Type 3 dead end. Contamination with other materials, such as the plastic coating on milk cartons, hastens the process. At some point, paper fiber becomes landfill material or potential stock for resource recovery. In the meantime, paper is important to the total recycling effort, since it comprises the largest portion of the solid waste stream. Newsprint, usually discarded, is the likeliest candidate within this waste stream for significantly improving recycling rates.

- Plastics

The proliferation of plastics in modern goods has drawn criticism in many quarters. Consigned to Type 3 recycling because of chemical properties that preclude Type 2, plastics are barely recycled even within that realm. Nationally, the rate is only 1%. Plastics in the

solid waste stream comprise a wide assortment of resins. Polyethylene terephthalate (PET) from plastic soft drink containers can be recycled into automobile parts, fiberfill stuffing for pillows and jackets, and other products such as blisterpak (i.e., the plastic bubble material which, attached to cardboard, encapsulates small consumer items). A different resin found in plastic milk jugs can be converted similarly into toys, mud flaps and other products. Unfortunately, PET and milk jugs are a minor fraction of total plastic wastes.

Some companies, therefore, are pursuing the recycling of mixed resins to produce a lumber-like material that can be manipulated with woodworking equipment. Applications include highway posts and road signs, park benches, picnic tables, playground equipment, marine structures such as boats and piers, and fencing. Several major biotechnology researchers in the private sector and a new research center at Rutgers University are pursuing other alternatives. Their progress may be aided in the future by product labelling that will help in sorting waste plastics by resin. The total market, however, is very small at this time, and even if expanded, the end products themselves have little continuing recycling potential.

As a fuel for waste-to-energy plants, plastics have a high BTU content but produce dioxins and furans unless burned at high temperatures to fully break down their components. Critics have questioned why a basically inert and durable material, nonbiodegradable unless designed otherwise, is incorporated so widely into disposable consumer commodities rather than put to use in products with a longer lifetime. Admittedly, some of the products made from recycled plastic lumber fit this criterion of extended durability, but they probably could be made directly from virgin plastics in the first place, avoiding the troublesome short-term intermediate products.

- Yard wastes

Yard wastes such as leaves and grass comprise a significant portion of the solid waste stream, especially in the summer and fall. Because of the valuable landfill space they consume, yard wastes are top candidates for composting to recycle nutrients for new organic growth. Food wastes, to the extent separation is feasible, can be added, and newer co-composting technology mixes yard wastes with wastewater treatment sludge. Composting requires careful quality control, however. Markets are available in agriculture and horticulture, but only if the compost material meets specifications. Two of the better known programs are those in Dodge City, Kansas, and Portland, Oregon. Co-composting is underway in New Castle County, Delaware, and Portage, Wisconsin. In Texas, the Bryan-College Station area is pursuing some composting of solid waste. Also, the Texas Agricultural Extension Service office in Dallas has consulted with the cities of Plano and Fort Worth on better turf management methods to reduce the amount of grass clippings in their municipal solid waste streams.

- Tires/construction-demolition debris

Two other problem wastes are tires and construction-demolition debris. As explained previously, the problem with tires is the inadequate development of Type 3 markets for rubberized asphalt and crumb rubber fuel. As for construction-demolition debris, two companies in New York and Switzerland are working jointly on an innovative process to sort out useful metals, wood, dirt and crushed rock, which can then be sold cheaply or even given away to avoid the East Coast's exorbitant landfill tipping fees. This technology, however, is still in the research phase.

- Household hazardous wastes

Household hazardous wastes can be very troublesome. Automobile batteries, which contain toxic metals, are recycled at a rate of about 48%. Recycling technologies for most other batteries, however, are still not in place, even if the public bothered to divert them from the waste stream, which it does not. Home auto mechanics generate more than 200 million gallons of waste oil annually, of which only about 10% is recycled. Home improvers commonly discard leftover paint, and the 20% of the population that moves each year may throw out pesticides and cleaning fluids rather than tote them to a new home. Nationally, about 300 communities per year conduct special household hazardous waste collection days. Participant Texas cities include Beaumont-Port Arthur, Freeport and Austin. Alabama has a special state program to address waste oil, and in Santa Monica, California, the city's recycling program operates a paint exchange center. Again, as with plastics, labels on household hazardous waste products would assist with public recognition and recycling. Special deposit legislation has been proposed in some states for large batteries.

Waste Reduction

Because of waste characteristics that detract from recycling, incineration and landfilling, Americans are examining the nature and life cycle of the products they buy and consume. This examination suggests some degree of widening regulatory control over what gets

manufactured. Critics are drawing connections between what is made, what it contains, what purpose it serves, and how easy or hard it is to dispose of or put to another use. Questioners ask why, for example, the United States must throw away 2.0 billion disposable razors and 1.6 billion disposable pens each year.

The packaging industry is bearing the brunt of the attack. State and local governments, for example, are banning certain styrofoams produced with chlorofluorocarbons that contribute to ozone layer depletion. Other proposed legislation requires beverage containers to be reusable, recyclable or biodegradable. Environmentalists advocating the discouragement of throwaway goods have recommended that new containers without a means or market for reuse be curtailed, and that Americans move toward standardized refillable containers. New York and Massachusetts lawmakers have expanded the focus beyond beverage containers to packaging in general. Both states have introduced measures to tax most packaging at three cents per item—with a discount if the packaging is either recyclable or made from recycled materials, and a full exemption if the packaging is both. Products would carry logos to assist the purchaser, the objective being to create a consumer preference for environmentally favorable packaging.

The EPA in the course of developing a national solid waste strategy has stressed as one element a greater attention to product composition and design. One witness before the EPA Task Force suggested that industry be encouraged to undertake this responsibility itself. If not, government probably will. For instance, Minnesota has enacted a law giving its pollution control agency the authority to review new or revised packaging. In exceptional instances, that agency can prohibit the sale of packaging that constitutes a solid waste disposal problem or that presents special environmental dangers.

Task Force recommendation 16 supports solid waste reduction incentives including attention to product design. Recommendations 9(f) and 17-18 promote the development of markets for recyclables, recommendation 19 addresses the issue of government procurement, recommendation 23 encourages recycling participation by volunteer and nonprofit organizations, and recommendations 21-22 remove certain disincentives to recycling. Recommendation 24 establishes a state policy in favor of increased resource recovery and adopts related proposals. Recommendation 2 proposes that all solid waste management alternatives be subject to equivalent levels of environmental protection.

I. EDUCATION

We have met the enemy, and he is us.

- Pogo (comic strip character) -

(In the) second grade . . . , students study the importance of containerizing trash. (They conduct an) experiment where half the classroom is permitted to use wastebaskets (and) the other half is not. (The) experiment continues for six days.

- Pamphlet on "Waste in Place" program -

Both Task Force members and witnesses stressed the importance of education in achieving solutions to current and future waste management problems. By this, several things were implied. The waste management industry's public image needs improvement, for instance, where NIMBY opposition to proposed facilities is sometimes rooted in a distrust of obsolete practices (e.g., open dumps) that the industry already has abandoned. Education thus relates to the capacity issue.

Texans also would benefit if their individual responsibilities for solid waste management were emphasized. Consumers need to be better informed about the waste stream and how to reduce it, motorists need to not litter, and residential garbage producers need a reminder that they, not some stranger or evil polluter, generate the solid waste that has to go somewhere. Increased practical knowledge regarding consumer purchases, recycling, disposal alternatives and other matters is especially desirable.

The most familiar public promotional activity relating to solid waste in Texas is the "Don't Mess With Texas" program of the State Department of Highways and Public Transportation (SDHPT). That agency undertook its campaign in an attempt to reduce some $26 million in annual costs to clean up highway litter. Preliminary results appear favorable. SDHPT consultants report a two-year litter reduction rate closely comparable to that achieved in states with container deposit legislation.

Not content with the one campaign, the SDHPT has established an "Adopt a Highway" program to promote voluntary cleanup of roadside litter. Since then, the General Land Office has borrowed that approach with its "Adopt a Beach" program. One Task

Force member suggested that the state, with these initiatives, has a good head start by which to achieve a greater public understanding of solid waste matters.

Testimony mentioned also the most logical place for solid waste education, the state's public school system. Witnesses before the Texas and EPA task forces proposed the incorporation of solid waste information in the curriculum across all grade levels. Again, there is a foundation on which to build. Keep Texas Beautiful (KTB), a nonprofit group affiliated with the national Keep America Beautiful organization, has implemented its "Waste in Place" program in almost 1,000 of the state's 3,400 elementary schools. Progressive study units for kindergarten through sixth grade are sanctioned by the Texas Education Agency and are expanding beyond mere anti-littering education to teach fifth and sixth graders about sanitary landfills, resource recovery and recycling.

KTB representatives have suggested also, for purposes of litter reduction, that the subject be included in driver's education and associated instructional booklets of the Department of Public Safety. The Task Force chairman, responding to one witness's discussion of local-government unfamiliarity with enforcement provisions of the Texas Solid Waste Disposal Act and Texas Litter Abatement Act, felt that educational booklets or informational brochures could be helpful for local leaders.

One Task Force member commented, in keeping with this last suggestion, that adult Texans might be as much or more important a target for solid waste education as their children. Two efforts are underway in this regard. First, local chapters of KTB have promoted community awareness programs to supplement the SDHPT's media campaign with grassroots litter reduction activities. Second, the TDH in conjunction with the Gulf Coast Waste Disposal Authority and other sponsors held in May 1988 the first of a series of planned conferences to bring together city and county officials from throughout Texas for an exchange of ideas with knowledgeable panelists in the solid waste field. The second conference is slated for September 1989 in Austin.

Recommendation 9(d) provides generally for funding of expanded public educational programs relating to solid waste management, leaving to further legislative and state-government deliberations the exact nature of that effort. Recommendation 25 suggests enhancements to the public school curriculum. Recommendations 26 and 38 adopt the suggestions relating to driving trainees and local officials.

J. INFECTIOUS WASTE:

> *All of the furor . . . about (getting) AIDS (from the hospital waste stream) is an emotional reaction to a perceived but unreal threat. It's almost impossible to get AIDS (that way). The threat that AIDS poses is to the hospital worker. It ceases at the (hospital) door.*
>
> - Infection control physician -

The East Coast, origination point of garbage barges and other exportation of waste, has triggered another wave of commotion relating to medical waste. In August 1987, a 50-mile garbage slick containing hypodermic needles, pill boxes, and other waste thought to be infectious washed up on a stretch of New Jersey shore. That incident was repeated on a lesser scale the following July, when a smaller mass of seaborne blood vials and syringes surfaced along the New Jersey coast and Long Island. Negative publicity on the subject broadened due to incidents in Indiana and Delaware where children were found playing with discarded vials and needles from dumpsters behind doctors' offices. Two of the Indiana vials contained blood contaminated with the AIDS virus (HIV). The series of events has caused strong reaction—not always supported by medical facts—that has become an unwelcome supplement to the general AIDS scare.

Due to a perceived infection risk, sanitation workers and other waste management personnel have expressed reluctance to handle biomedical waste. In one New York case, landfill employees refused to unload a barge containing nursing home wastes because of past experience with loads that included scalpels and medical tubing. In another case, Delaware's Solid Waste Authority refused further acceptance of certain medical wastes at its main facility because of blood bags, needles, and operating room material found by workers.

Few confirmed incidents of waste management personnel contracting infection—HIV, hepatitis or other diseases—have been attributed to occupational exposure. Documented literature on the subject is practically nonexistent. In one case, one of the few on record, a waste management company paid workers' compensation claims to two employees who contracted hepatitis. The payment was made without challenge, however, and consequently without investigation and confirmation that the infection actually resulted from handling waste.

Figure 10.—Generators of Biomedical Wastes

Health-Care Facilities Licensed by the TDH:

(1) abortion clinics;
(2) ambulatory surgical centers;
(3) birthing centers;
(4) emergency medical services;
(5) home health agencies;
(6) special residential care facilities;
(7) hospitals; and
(8) long-term care facilities (e.g., nursing homes).

Other Potential Health-Care Related Generators:

(9) blood banks and blood drawing centers;
(10) clinics, including (but not limited to) medical, dental, and veterinary;
(11) clinical, diagnostic, pathological or biomedical research laboratories;
(12) educational institution health centers;
(13) educational institution research laboratories;
(14) end stage renal dialysis facilities;
(15) funeral establishments;
(16) mental health and mental retardation facilities, including (but not limited to) hospitals, schools, and community centers;
(17) minor emergency centers;
(18) occupational health clinics and clinical laboratories;
(19) pharmacies;
(20) pharmaceutical manufacturing plants and research laboratories;
(21) professional offices, including (but not limited to) the offices of physicians and dentists; and
(22) veterinary clinical and research laboratories.

Source: 13 Tex. Reg. 5310 (October 21, 1988).

The issue could benefit from specific evaluation and corrective or educative steps to minimize worker risk. That discussion, however, has led to conflicting viewpoints between health professionals, who perceive little danger from traditional waste handling methods if properly applied, and groups such as the National Solid Wastes Management Association, who are not so sure. Biomedical waste is a subset of what the TDH calls "special waste" (Figure 1 of the Introduction).

Biomedical waste includes animal carcasses and waste, blood and blood products, microbiological wastes (e.g., cultures and vaccines), pathological wastes (i.e., bodily organs, tissues and fluids removed in the course of surgery, biopsy or autopsy), sharps (e.g., needles and scalpels), and an assortment of other soiled medical paraphernalia (e.g., gowns, gloves, sheets, gauze, bandages, tubes, bags, etc.) that are either reused or disposable. Some of this waste certainly may be considered infectious.

Hospitals, among the largest generators of biomedical waste, produce between 8-16 pounds of total solid waste per patient bed per day, or significantly more than the average residential consumer. Other significant generators and peripheral contributors of biomedical wastes are listed in Figure 10.

Infectious waste is difficult objectively to identify. It requires a scientific evaluation, similar to that applied to hazardous wastes (the latter, based on a determination of ignitability, corrosivity, toxicity or reactivity). With infectious waste, the threat is in the form of tiny microbes, impossible to see with the naked eye. Even after sterilization, formerly infectious waste may be visually indistinguishable from actively infectious, unsterilized waste. As a rough estimate, perhaps 10% of hospital solid waste may be considered infectious, when first generated.

The EPA and health professionals classify a waste as infectious if it is capable of producing an infectious disease. This definition, though accurate, is not very useful by itself. More precisely, an infectious waste must contain pathogens of sufficient virulence and quantity so that exposure could result in an infectious disease in a susceptible host (i.e., there must be a suitable causative agent, someone to receive it, and a route of entry).

In a medical setting, the major infection control concerns are tuberculosis, certain enteric diseases, and a variety of blood-borne diseases. A health care worker, for instance, can be coughed on by a tuberculosis patient, inhale the pathogen, and become infected. An orderly or laboratory worker can handle bedpan wastes or stool specimens from a typhoid victim, inadvertently contaminate his or her hand, not wash thoroughly, ingest it from contact between the hand and mouth, and develop the disease. A nurse can draw blood from a hepatitis carrier, accidentally get a needlestick while capping the syringe (a habit now discouraged), and acquire the illness.

Blood-borne infections (e.g., hepatitis, malaria, syphillis, and HIV) are of special concern, so long as the blood is wet and the virus potentially transmittable. Once the blood dries on a bandage, dressing, or other

surface, however, the virus dies. It cannot magically rejuvenate or jump onto a bystander, and hence no longer poses a threat.

HIV particularly is a weakly transmitted virus. Requiring a pH-correct cellular medium to survive, it lives no more than a few minutes in an inanimate environment. It is present in dilute quantities in various bodily fluids, but one gets it almost exclusively via sexual relations, blood transmission, or perinatal contact (i.e., mother to child). As a threat to health care workers, HIV and AIDS are dwarfed by Hepatitis B, which kills an estimated 200 such employees annually. Blood-borne diseases generally pose lesser risk to garbage haulers, unless the waste material still contains a live virus of sufficient strength to infect and the virus escapes its packaging and finds a mode of entry through otherwise intact skin, such as a wound.

Precisely because hospitals, with their concentration of various sicknesses in one location, have a high potential for transmission of infectious disease, they have long adopted safeguards to protect patients, visitors, doctors, nurses, and other health care workers. In the last few years, with the advent of AIDS, prior practices have changed. Hospitals once singled out specific patients for "isolation" procedures. Now, for safe handling of blood and bodily fluids, these facilities have turned to "universal precautions," in which standard safety measures are applied to all patients' blood and body fluids as a deterrent to undiagnosed HIV infection. The federal Centers for Disease Control (CDC) in Atlanta officially adopted universal precautions as policy in 1987. Even more recently, a similar precautionary system referred to as "body substance isolation" has gained acceptance. Patients who can transmit infections through other means (e.g., by coughing) are still treated as before.

Universal precautions and other infection control measures are accompanied by methods for dealing with associated biomedical wastes. Here, practices differ more widely and there is not complete agreement on what wastes should be considered infectious. Some hospitals, for example, use red bags to containerize waste which is to be segregated for more careful or convenient handling. Not everyone agrees, however, that all such "red bag waste" is infectious. Extensive use of that system may in part represent precautionary overkill, some believe.

The EPA in 1978 proposed infectious waste regulations as part of its original RCRA implementation. Those proposals provoked substantial negative comment, and the agency eventually dropped them altogether. The EPA issued a draft manual on the subject in 1982, and a set of guidelines in 1986. The CDC, following closely, issued a set of infectious waste guidelines in 1983, which were then revised in 1987 as part of its announcement on universal precautions. A third organization, the Joint Commission for Accreditation of Hospitals (JCAH), has issued yet another version.

Waste management industry representatives have preferred the original 1982 EPA formulation over that offered by the EPA in 1986, or alternatively the 1986 version with its more inclusive definition of infection waste, instead of the CDC guidelines. Infection control physicians have indicated a preference for the CDC guidelines, which have a more restrictive definition. Approximately 80% of the nation's hospitals, as of 1988, follow the CDC regime. JCAH guidelines are in between those of the EPA and CDC and refer only to hospitals, not to other health care facilities.

Generally, the three organizations break biomedical wastes into several categories, identify which should be construed as infectious, and prescribe various menus of treatment or disposal+incineration, autoclaving (steam sterilization), thermal inactivation, chemical disinfection, flushing into a sanitary sewer, mortuarial cremation or burial, and normal solid waste disposal. The CDC and EPA guidelines are not too far apart. They agree that blood and blood products, pathological wastes microbiological wastes and sharps should be classified as infectious wastes. They disagree on communicable disease isolation wastes (i.e., almost anything generated by a quarantined patient), which the EPA lists as infectious but the CDC leaves to local discretion. They also disagree about certain veterinary wastes, which the EPA includes as infectious but the CDC does not.

Some hospitals that follow the CDC add optional types of waste such as disposable equipment contaminated by traces of blood or body fluids. The waste management industry proposes the inclusion of certain surgical wastes (e.g., bandages and gauze), but most health professionals disagree. The health professionals object to broadening the term "infectious waste," arguing that objective medical science supports a fairly narrow definition. Medical practitioners also cite the potential cost of a broad definition as another concern.

Biomedical waste collection services in Texas identify flaws in the current system from another angle. They characterize hospital waste management as adequate but, reflecting concerns voiced by Task Force members, find shortcomings among medical clinics, doctor's offices, nursing homes and other smaller establishments. Health care practitioners at these

locations appear uninformed about and sometimes unreceptive to TDH regulations governing disposal of infectious and pathological wastes. Typically, biomedical waste from these establishments is mixed with ordinary garbage—a practice that appears to violate TDH regulations.* Biomedical waste haulers favor some combination of a clear definition for infectious waste, applicable and legally binding handling procedures, manifesting or other accountability methods, certification of infectious waste generators and/or haulers, and precautionary educational efforts targeting waste management workers. An additional suggestion was a prohibition against disposing of Texas infectious wastes across state borders.

Guidelines from the EPA, CDC, and JCAH are merely that—guidelines, not regulations. Recognizing differences among the three, hospitals are addressing the problem with caution, even while outside interests are clamoring for more stringent regulation among health care providers generally. Several states—including Connecticut, Indiana, Missouri, New York, Ohio, and Louisiana—enacted new or revised infectious waste laws in 1987 and 1988. The National Solid Wastes Management Association, meanwhile, is urging the U.S. Occupational Safety and Health Administration to address worker safety both outside and inside the medical community.

Faced with potential expansion of the waste that may be designated as infectious, hospitals simultaneously are encountering restrictions on their ability to dispose of it. The issue involved concerns hospital incinerators. Biomedical waste contains 10-25% plastics, including the chlorinated kind that can produce dioxins, furans, and hydrogen chloride unless combustion temperatures are strictly regulated or other pollution control technology applied.

States such as New York and Virginia have drafted new regulations on the subject, while others such as Delaware and Pennsylvania have imposed moratoriums on new permits until they do. The Texas Air Control Board recently revised its regulations so that only a few new hospital incinerators (i.e., those burning only pathological wastes, paper, wood, and nonchlorinated plastics) will be exempted from future permitting requirements.

The TDH has two sets of existing regulations relating to biomedical waste. The first set applies to the eight facilities listed in the top half of Figure 10. For these, but not the entire 22, the TDH has licensing authority and hence jurisdiction over internal procedures to avoid infection transmittal. Each of the eight, as part of their respective licensing requirements, have individual performance regulations that speak generally to how certain biomedical wastes should be handled.

The other set of existing regulations applies potentially to all 22 facilities listed in Figure 10. It affects the handling of "infectious" (undefined) and pathological waste outside the generating establishment+ specifically, the disposal of such waste in sanitary landfills. The regulation allows disposal in Type I landfills if the wastes are double-bagged in plastic, conspicuously marked, and segregated from routine solid waste. It is these provisions that waste haulers contend smaller medical facilities are violating.

HB 1869 enacted in the 1987 session directed the TDH to adopt updated infectious waste regulations, reserving further legislative consideration of the subject. The TDH published proposed regulations in October 1988 and held a public hearing in early November. Following the routine comment period, the Texas Board of Health will act on final adoption probably in February. Review of the TDH proposals, as stated in the Introduction, is one of this Task Force's special study areas.

The pending regulations, which are based on TDH authority under the TSWDA and numerous health laws, propose to standardize internal handling practices for specified biomedical wastes generated by licensed health-care facilities (i.e., the first eight listed in Figure 10). The wastes that are covered, and the array of treatment techniques appropriate for each, are given in Figure 11. The waste categories, treatment techniques, and overall precautions are similar to those of the CDC and EPA guidelines. The TDH proposal is somewhat stricter than its CDC counterpart, though not as strict as that of the EPA. Figure 12 compares the three.

Within one year of adoption, the TDH is to follow up with additional regulations affecting collection and disposal of wastes from the entire 22 facilities listed in Figure 10. These will affect only the disposition of regulated wastes after they exit such facilities. The regulations to be considered for adoption involve some preliminary changes to the current provisions regarding disposal in sanitary landfills.

The United States Congress has approved legislation governing biomedical waste management in some states. The Medical Waste Tracking Act of 1988, enacted in October 1988, directs the EPA to devise and implement a two-year demonstration waste tracking and regulatory program in New York, New Jersey, Connecticut, and the states contiguous to the Great

* Mixing the two could also prove detrimental if Texas moves toward the type of materials recovery facilities on the rise in other states, where hand labor is used to sort and recycle commingled trash.

Figure 11.—Proposed Rules: Treatment and Disposal Techniques for Special Waste From Health-Care Related Facilities

Type of Waste	Steam Sterilization	Incineration	Thermal Inactivation	Chemical Disinfection	Other
(1) Animal Waste:					
(a) carcasses	L	L			
(b) body parts	L/S	L			
(c) whole blood, serum, plasma, other blood components	L/S	L	L/S	L/S	
(d) animal bedding	L	L			
(2) Bulk blood and blood products:	L	L		L/S	S
(3) Microbiological wastes:					
(a) cultures and stocks of infectious agents and associated biologicals	L	L	L	L	
(b) cultures of specimens from medical, pathological, pharmaceutical, research, clinical, commercial, and industrial laboratories	L	L	L	L	
(c) discarded live and attenuated vaccines	L	L	L	L	
(d) disposable culture dishes	L	L	L	L	
(e) disposable devices used to transfer, inoculate, and mix cultures	L	L	L	L	
(4) Pathological wastes:					
(a) the following materials removed during surgery, autopsy, or biopsy					
(i) body parts	B	L			B
(ii) tissues, including fetuses	B	L			B/S
(iii) organs	B	L			B/S
(iv) bulk blood and body fluids	L	L	L/S	L/S	S
(b) products of spontaneous human abortion					
(i) body parts, tissues, or organs	B	L			B/S
(ii) bulk blood and body fluids	L	L	L/S	L/S	S
(c) laboratory specimens of blood and tissue	L/S	L			S
(d) anatomical remains		B			B
(5) Sharps:					
(a) hypodermic needles	P	P		P	
(b) hypodermic syringes	P	P		P	
(c) scalpel blades	P	P		P	
(d) pasteur pipettes	P	P		P	
(e) broken glass	P	P		P	

B = followed by interment
L = followed by deposition in a sanitary landfill in accordance with 25 TAC 325.136
P = followed by placement in a puncture-resistant leak-proof container and deposition in a sanitary landfill in accordance with 25 TAC 325.136
S = followed by grinding and/or discharge into a sanitary sewer system in accordance with local sewage discharge requirements

NOTE: Column 5 (Other) refers to interment or sanitary sewer discharge without treatment.

Figure 12.—Comparison of Biomedical Waste Designations and Treatment/Disposal Methods: CDC, EPA, and TDH

Type of Waste?	CDC		EPA		TDH	
	Infectious Waste?	Treatment/ Disposal	Infectious Waste?	Treatment/ Disposal	Special Waste?	Treatment/ Disposal
Microbiological (stocks and cultures of infectious agents)	Yes	ST	Yes	ST	Yes	ST
		IN		IN		IN
		—		TH		TH
		—		CH		CH
Blood and blood products	Yes	ST	Yes	ST	Yes	ST
		IN		IN		IN
		SS		SS		SS/4
		—		—		CH
Sharps (needles, etc.)	Yes	ST	Yes	ST	Yes	ST
		IN		IN		IN
		—		—		CH
Pathological (tissues, organs, etc.)	Yes	IN	Yes	IN	Yes	IN
		—		SS		—
		—		BC		BC/5
		—		—		ST
		—		—		TH/5
		—		—		CH/5
Animal waste (animals intentionally exposed to pathogens)	No	—	Yes	IN	Yes	IN
		—		SX		—
		—		—		ST
		—		—		TH/5
		—		—		CH/5
Communicable disease isolation	Yes/No	HP	Yes	—	No	—
		—		ST		—
		—		IN		—
		—		SS/5/1		—
Contaminated laboratory waste	No	—	Optional	ST/2	Yes/3	ST
		—		IN/2		IN
		—		—		TH
		—		—		CH
		—		—		SS/4
Surgery and autopsy waste	No	—	Optional	ST/2	No	—
		—		IN/2		—
Dialysis unit	No	—	Optional	ST/2	No	—
		—		IN/2		—
Contaminated equipment	No	—	Optional	ST/2	Yes/3	ST
		—		IN/2		IN
		—		CH/2		CH

BC = burial or cremation by mortician
CH = chemical disinfection
HP = according to hospital policy
IN = incineration
SS = sanitary sewer discharge
ST = steam sterilization
SX = steam sterilization with incineration or grinding
TH = thermal inactivation

1 = according to CDC guidelines
2 = if infectious, using methods indicated
3 = subset of microbiological or pathological
4 = according to local sewer ordinance
5 = selected subcategories only

Lakes (10 states total). Targeted wastes subject to segregation, handling, labelling and disposal requirements will follow closely the categories listed in Figure 12. Other states are invited to participate in the demonstration program, if the governor so petitions. The Task Force generally concurs with the pending TDH regulatory proposals, as stated in Recommendation 5. One member entered a formal comment, suggesting minor revisions. Congress enacted the federal pilot program too late for Task Force consideration.

HAZARDOUS WASTE

Overview

> *. . . a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness, or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.*
>
> - RCRA definition of hazardous waste -

Hazardous waste management focuses on the dangerous residuals that can result from the production of manufactured substances. Because these hazardous residuals are able to migrate through the earth's environmental system via air, land and water, hazardous waste solutions must be sagely attuned to the total picture.

The generation of hazardous waste is a relatively recent phenomenon. It increased significantly between 1945 and 1970, coinciding with the expansion of the chemical industry in America and overseas. Effective management of this waste continues to challenge our best efforts in management and development of new technology. What once were state-of-the-art handling procedures no longer are considered so. Today's waste problems require a broadening of perspective with input and cooperation from many disciplines and professions. The approach utilizes data from industry, environmentalists, all levels of government, and many branches of the technical and scientific community.

Past hazardous waste management mistakes have provoked public distrust of new management methods, even where the latter are scientifically sound. In effect, the improvements make little difference. Today's waste management practitioners and government regulators are perceived by a wary public as somehow suspect. Public objection has effectively slowed or stopped replacement and expansion of hazardous waste treatment capacity. The American public's fears and concerns must, therefore, be acknowledged and addressed.

Progress in waste management can be enhanced by studying the policies and practices employed by other industrialized countries. While we can learn from others' successes, their failures can be equally educational. Studies of waste management in industrially advanced countries reveal basic policy differences between the approach taken by the United States and that taken by other nations.

Most other countries exhibit a more cooperative relationship between regulatory officials and industry, with regulatory decisions being made frequently at the local levels of government. National guidelines are generally subject to industry waivers on the basis of local conditions, and facility compliance tends to be evaluated on a case-by-case basis. In addressing abandoned site cleanups, other nations' attention to the impact of cleanup efforts on current capacity needs has resulted in an emphasis on the on-site treatment of abandoned site wastes. In turn, this preserves existing facility capacity for wastes currently being generated.

As for future planning, Sweden, West Germany and the Netherlands have five-to 10-year national waste plans to guide both governmental and industrial investments. Even those countries without explicit planning systems (e.g., Japan, the United Kingdom and Canada) utilize formal land use planning authorities to perform facility needs assessments.

The United States relies far more heavily on strict federal regulation, which is often implemented at the state level. The intent of Congress is to allow states to administer the federal regulatory program on an equivalent or more stringent basis. Design and discharge standards are mandated nationally, however. The U.S. is generally recognized as having one of the most advanced cleanup efforts. Federal policy declares on-site treatment to be the preferred method for cleaning up abandoned site waste. There is concern, however, that actual remediation efforts are slow to reflect this policy. The frequent removal of wastes for treatment at more advanced facilities could aggravate the country's current capacity problem. Until recently, America was

perceived as lagging behind other nations in the area of long-term planning. In 1986, the U.S. initiated its current capacity planning efforts. An amendment to federal law now requires all states to provide assurances of adequate capacity for the next 20 years.

Public anxiety about hazardous waste sites is significant throughout the country. The U.S. Environmental Protection Agency (EPA), in a survey of expert opinion, reported recently that contaminated hazardous waste sites fall roughly in the middle of the spectrum of environmental concerns. A 1987 Roper Poll, however, indicated that citizens rank the issue as a top priority. This citizen concern, reflected politically, has produced a series of federal laws on the subject. Spanning the last decade and a half, this federal activity is briefly outlined in Figure 13. A more detailed discussion of the federal statutes is provided in Appendix 2.

RCRA and HSWA deal with the regulation of current hazardous waste disposal sites, whereas CERCLA (the Superfund program) and SARA address the cleanup of abandoned hazardous waste sites. RCRA allows for transfer of program administration to the states if they can demonstrate their state programs are substantially the same as or more stringent than the federal program. HSWA permits delegation of the new program components upon states' showing of equivalence. As of May 1987, 39 states including Texas have made the necessary demonstrations and have been granted full authorization for the "base" RCRA program, (i.e., the program as it existed prior to the 1986 HSWA amendments). Texas has not yet been authorized for the HSWA components. To date, Georgia is the only state which has received HSWA authority.

Statistics on the hazardous waste situation in Texas are disturbing. Texas ranks first in the nation in the amount of hazardous chemical waste its industries produce. In 1986, Texas produced 21% of the national total, or almost 65 million tons of the 300 million tons produced in the country. Figure 14 pinpoints the areas in Texas where these wastes are generated.

Untreated hazardous wastes are disposed of in four principal ways in Texas. They are landfilled, incinerated, disposed of in underground injection wells or applied to the land where they degrade. Although the majority of hazardous waste in Texas goes into landfills and injection wells, other alternatives such as waste reduction and recycling are becoming increasingly more attractive. These alternative methods, and those of the future, probably will become the key to controlling hazardous wastes in the state. In brief, recent federal laws and standards have forced state-level attention to hazardous waste issues.

Texas statutory definitions of hazardous waste mirror federal law and the accompanying federal regulations. These regulations list wastes from specific industrial processes as hazardous, based on the wastes being ignitable, corrosive, toxic or reactive. Radioactive wastes and household hazardous wastes usually are not considered hazardous under federal or state law.

Implementation of the federal regulatory programs is distributed among several state agencies in Texas. As mentioned previously, Texas has been authorized to administer the base federal RCRA program within the state. This task is the responsibility of the Texas Water Commission (TWC). The TWC also directs the cleanup of spills and state-designated Superfund sites in Texas on behalf of the EPA. The Texas Department of Health (TDH) has a supportive role via its administration of the state water safety program mandated federally under the Safe Drinking Water Act (SDWA). The state's Underground Injection Control (UIC) plan is directed by the TWC, except as it relates to oil and gas activities, over which the Texas Railroad Commission of Texas has jurisdiction.

The state law under which the TWC regulates the federal RCRA and CERCLA programs is the Texas Solid Waste Disposal Act (TSWDA). Figure 15 illustrates the breakdown of environmental regulatory functions in Texas relating to hazardous waste, as directed by legislation or regulation. The figure includes some areas of overlapping agency jurisdiction.

Texas' hazardous waste management policy was significantly overhauled in the 1985 legislative session based on the work of the 1984 Governor's Task Force on Hazardous Waste Management. The 70 recommendations proposed by that Task Force resulted in a combination of state legislation and agency actions, which produced new information on waste management in Texas. Meanwhile, Congress developed HSWA, and additional concerns have been articulated at the national and state level. These concerns led to inclusion of the topic within the charge to the Texas Task Force on Waste Management Policy.

The Subcommittee on Hazardous and Industrial Waste, acting on testimony presented at the first public hearing, agreed on five focus issues to guide its investigation of the state's hazardous waste policy: 1) capacity; 2) shift from landfill disposal; 3) siting criteria for incinerators and other facilities; 4) waste minimization/ reduction; and 5) state Superfund cleanup and spending needs.

Figure 13.—Federal Regulatory Framework For Hazardous Waste Management

Federal Law	Purpose
Safe Drinking Water Act (SDWA) 1974 Amended 1977	Requires the EPA to set national drinking water standards to protect public water supplies; gives the states primary enforcement responsibility. Also, establishes an underground injection control (UIC) program to protect groundwater.
Resource Conservation and Recovery Act (RCRA) 1976	Requires the EPA to establish standards for the generation, treatment, transport, storage, and disposal of designated hazardous wastes. Elements of the program include a permit system and a manifest system. Regulations govern monitoring, waste identification, packaging, and construction standards for facilities. Also, contains guidelines related to solid waste management.
Hazardous and Solid Waste Amendments to RCRA (HSWA) 1984	Requires the EPA to implement land bans, restrict land disposal of free liquids, and establish minimum technological requirements for landfills. Also, lowers the exemption level for SQGs. The program shifts the focus of RCRA to an emphasis on minimization and treatment practices.
Comprehensive Environmental Response, Compensation, and Liability Act (Superfund) (CERCLA) 1980	Authorizes emergency removal of hazardous substances released into the environment and long-term remedial cleanup of hazardous waste sites. States assist in compiling priority list, share cost of cleanups, and provide disposal sites.
Superfund Amendments and Reauthorization Act (SARA) 1986	Sets new cleanup standards, requires health assessments at Superfund sites, includes incentives for expedited cleanups, and greatly expands the role of the states and the public in cleanup efforts.

Source:

Special Committee on the Organization of State Agencies (1988). "Federal Environmental Legislation" Compiled by Jim Reed for the Natural Resource Subcommittee, June 17.

Figure 14.—Where Hazardous Wastes are Generated in Texas*

Location	Tons	Percent
Greater Houston	34,851,000	54%
East Texas	8,642,366	13%
DFW/North Texas	7,454,143	12%
Corpus Christi/Coastal Bend	4,763,000	7%
Golden Triangle	4,762,000	7%
Austin Area	2,001,140	3%
Other	2,338,112	4%
Statewide Total	64,811,761	
National Total	300,000,000	

* 1986 data.

Source:

Texas Water Commission (1988). "Governor's Briefing on Hazardous Waste." Staff briefing by Bill Newchurch to Governor William Clements, Austin, February 18.

Figure 15.—Texas Regulatory Framework for Hazardous Waste Management

Functions as directed by legislation or regulation	Agencies	
	Texas Water Commission	Texas Air Control Board
1. Issues permits for industrial solid waste disposal facilities.	X Art. 4477-7, Sec. 4(e)(4)A, VTCS	(Reviews air quality aspects of application. Separate air permit is not required.)
2. Issues permits for hazardous waste management facilities.	X (Same as #1)	(Same as #1, except for incineration, when a separate permit is required.)
3. Administration of state hazardous waste programs.	X Art. 4477-7, VTCS	
4. Regulation of industrial solid waste disposal.	X Art. 4477-7, VTCS	
5. Administration of underground storage tank program.	X Ch. 26, Water Code	
6. Runs both federal and state Superfund programs; cleanup of hazardous waste sites.	X Art. 4477-7, VTCS	
7. Conduct of the state's coastal oil and hazardous spill prevention and control.	X Ch. 26, Water Code	
8. Runs the state underground injection control program, except for that related to oil and gas.	X Ch. 26, Water Code	

Source:

Special Committee on the Organization of State Agencies (1988). "Environmental Regulation in Texas." Compiled by Jim Reed for the Natural Resource Subcommittee, August 17.

K. Capacity

Judging by the grassroots response in northeast Texas, the clamor for safe handling of hazardous waste is a wind that could sweep across Texas. It may even become the issue of the 1990s . . . .

- Texas Observer -

The (New Jersey hazardous waste facilities) siting process was designed to assure that reason would prevail over hysteria and that science would prevail over politics.

- Public Works -

The capacity issue touches all other issues involved in the management of hazardous waste. Capacity planning is important to comprehensive waste management and serves as a guide for complex decision making. Many of the concerns expressed by witnesses during the Task Force's public hearings and in informational briefings convened by the Subcommittee on Hazardous and Industrial Waste relate to the issue of capacity.

Congress made a major attempt to address the nation's hazardous waste planning deficiencies in 1984. The federal Superfund Amendments and Reauthorization Act (SARA) requires that each state be able to assure the EPA that it has sufficient treatment and disposal capacity to take care of all hazardous wastes expected to be generated internally or imported from elsewhere over the next 20 years. The provisions of SARA, which effectively require Texas to act immediately, are being felt by state officials, industry and the public. SARA's capacity requirement intensifies the crunch created by ongoing siting controversies, while the Hazardous and Solid Waste Amendments (HSWA) emphasize a shift from land disposal.

The SARA capacity assurance requirement is not just a paper pronouncement but has sanctions attached. For example, assurance of capacity must be submitted to the EPA by October 19, 1989, as a condition for obtaining Superfund remedial action assistance. With 26 Texas Superfund sites already qualified for 90% federally assisted cleanup, at least $200 million in federal money hinges on successful completion of the state's capacity certification within the next 12 months.

The TWC is responsible for the Capacity Assurance Project (CAP) on behalf of the state. Because of the project's potential impact, TWC staff was asked to update the subcommittee periodically about the project's progress. An examination of the project's scope illustrates the extent to which the capacity issue underlies all of the subcommittee's focus topics.

The capacity assurance plan under development by the TWC consists of five parts. Part 1 will document the TWC's comprehension of Texas' current hazardous waste generation, treatment and disposal structure. This will include regulated hazardous waste generated within Texas, RCRA regulated waste shipped into and out of the state, and the in-state capacity to manage hazardous waste, including out-of-state waste. The subcommittee considered a recommendation, suggested by a Task Force member, that hazardous waste residuals be included as a specific waste category in the state's capacity assurance plan. Discussion with TWC staff confirmed that this idea already was being implemented.

Part 2 will provide information on Texas' use of waste minimization in the capacity assurance process. The EPA recognizes that some states may use waste minimization to help them assure the availability of adequate management capacity, whereas other states may choose to assure adequate capacity without claiming waste reduction benefits. Since Texas is subscribing to the former approach, the TWC will include information on existing legislative authority for a waste minimization program, the general nature of the program, any anticipated legislative or administrative changes in the RCRA program, and current state minimization efforts.

Part 3 will address Texas' projections for waste generation and the subsequent demand for waste management capacity. Under the certification guidelines, Texas must project the amount of waste that will be generated within its borders for the second, fifth, and 20th years after the baseline year of 1987 (i.e., 1989, 1992, and 2007). The projections must take into account the effects on waste generation or disposal of possible future developments, such as economic expansion or contraction, minimization activities, and the possibility of regulatory changes.

Part 4 will summarize the state's hazardous waste capacity needs for the 20-year CAP reporting period and plans for addressing capacity. Most states (including Texas) do not have adequate capacity in place today to handle all hazardous waste expected to be generated for the next 20 years, and thus will have to document their ability to develop new capacity.

Part 5 will address the state's laws and procedures for creating capacity when the need arises. If any capacity shortfalls are perceived in future projections,

the TWC must defend the state's ability to deal with these shortfalls. Such a defense must be grounded in Texas' current facility siting process and procedures for processing applications for new facilities or the expansion of existing ones.

In evaluating a state's ability to create capacity, EPA will focus on items that might indicate a flawed siting program, such as the following:

- the lack of clearly defined steps and procedures in the siting process, the lack of sufficient opportunity for public review and comment, and the absence of clear time lines between permit review, comment, and approval or denial;

- a siting process that is subject to local preemption powers, if those powers are not strongly grounded in environmental, health and safety concerns; and

- a situation of great demand for new hazardous waste capacity, accompanied by repeated siting effort failures.

Some reservations have been expressed about Texas' ability to ensure a successful capacity certification. The concerns are based on diverse factors which have led to a virtual standstill in the state's permitting process. Many of these contributing factors were discussed by Task Force witnesses who expressed dissatisfaction with existing capacity and permitting.

Many complaints focused on new regulatory criteria. The more stringent standards and requirements mandated by HSWA were viewed as forcing Texas industries to close many of the facilities that have been used to dispose of wastes. For example, 99% of all hazardous waste in 1986 was disposed of on-site at industrial facilities. The newly required retrofitting of land disposal facilities to conform to the Minimum Technological Requirements (MTRs) and the phased ban on land disposal of specified wastes seem to erode continued reliance on on-site disposal practices. TWC statistics show that only 55 of the 200 land disposal facilities in existence in 1984 are seeking to continue operation after November 1988, when the MTRs become effective.

HSWA land bans also will affect injection wells, which currently are used to dispose of approximately 85% of Texas' hazardous waste. This suggests the loss of even more capacity, since hazardous wastes currently going to injection wells will soon require treatment to a specified level or disposal by an alternative method. Unless generation of hazardous waste can be substantially reduced, demand for commercial hazardous waste facilities which can meet the regulatory requirements will exceed availability.

Witnesses addressing this issue were divided into two camps. Some argued that phasing out outmoded facilities due to new requirements makes the permitting of new facilities even more imperative. Others argued that the capacity situation should be seen as an incentive for reduction and minimization practices. The latter is reflected in legislation proposed in Alabama. A bill pending in that state would bar further construction of hazardous waste treatment or disposal facilities, on the basis that additional commercial capacity is a disincentive to hazardous waste generators to reduce waste volumes.

There was general agreement that another factor contributing to the suppression of Texas' permitting process is public distrust. Two suggestions were made for improving the public's perception of the state's permitting system. One urged the Legislature to study the possibility of establishing an Office of Public Counsel to incorporate the Public Utility Counsel and the Public Interest Advocate of the TWC. This was suggested as a way to improve representation of the public interest in TWC hearings on hazardous waste and other facility permit applications. It also might provide citizens a more objective source of information, advice and assistance than may be possible under the present situation. Currently, the Public Interest Advocate is an office within the TWC and the Public Utility Counsel is domiciled with the Public Utility Commission of Texas.

A related recommendation suggested the Legislature study the possibility of pooling all hearings officers for regulatory agencies in a general Office of Hearings Examiners. Adoption of this approach, advocates argued, would make hearings examiners more independent of the agencies with whom they work. Pooling the hearings officers was encouraged as a means of improving public confidence in the objectivity of permit proceedings.

An attorney familiar with the permit hearing process, in a briefing of the subcommittee, said some of the delay in processing permit applications can be attributed to rapidly changing statutory and regulatory requirements. In addition, he observed that much of the delay is due to strong opposition efforts by local legislators or individual citizens. A third cause is the absence of a clear legislative mandate to the permitting agencies that the permitting of safe new waste management facilities is a priority goal.

The rapidly approaching capacity certification deadline requires prompt action by the state.

Recommendations considered by the subcommittee included the addition of a policy statement in the Texas Solid Waste Disposal Act, statutory clarification of permit standards, and the issuance of a clear directive to the permitting agencies. The first and third of these have been adopted by the Task Force as Recommendations 6 and 7. In addition, the task force adopted Recommendations 29 and 30, urging the Legislature to study the possibility of establishing an independent Office of Public Counsel, and of pooling all hearings examiners for regulatory agencies.

L. SHIFT FROM LAND DISPOSAL

> *We talk the talk, but can we walk the walk? The goal should be to eliminate all land disposal practices that could contaminate our environment, while also reducing the volume of waste generated in the first place. As we move toward that goal, land disposal should be allowed only after all the best alternatives have been exhausted and only if proper sites can be selected.*
>
> - State official, commenting on Texas' waste management practices -

Land disposal, primarily landfilling and deep-well injection, has been the most frequently used method for managing hazardous wastes. For many years, land disposal was seen as the easiest and cheapest option available. Now, however, land disposal's hidden costs, both environmental and economic, have become more apparent. These long-term costs led to a change in direction which first was incorporated in federal legislation, and shortly afterward in state statutes. Today, federal and state policy declares land disposal to be the least preferred method for managing hazardous waste.

Before 1984, Congressional efforts in the RCRA program were directed toward upgrading land disposal techniques, rather than promoting alternatives for hazardous waste management. The HSWA amendments in 1984 shifted the focus of RCRA to an emphasis on minimization and treatment practices to reduce the volume and toxicity of hazardous waste. HSWA specified strict minimum technological requirements (MTRs) for hazardous waste land disposal facilities. MTRs will apply to existing land disposal facilities, possibly requiring retrofitting or closure to prevent groundwater contamination, and to permits for new or expanding facilities. The retrofitting requirement took effect in November 1988. HSWA also requires hazardous waste to be banned from land disposal unless it can be demonstrated, within a reasonable degree of certainty, that there will be no migration of hazardous waste constituents from the disposal unit or injection zone for whatever period the waste remains hazardous. The EPA is required to establish treatment standards for all land disposed wastes.

At the state level, 1984 saw the beginning of a trend in legislative activity that questioned land disposal and associated technologies. Three interim studies focused on hazardous waste and were followed by the Legislature's 1985 enactment of HB 2358 and HB 2359 altering Texas' hazardous waste management policy and fee structure. Most notable was a new state policy assigning preference to waste management practices in the following order: waste reduction, reuse or recycling, treatment to destroy or reduce hazardous characteristics, and finally land disposal including underground injection.

The Subcommittee on Hazardous and Industrial Waste studied the degree to which the state's policy commitment has been implemented since 1985. The subcommittee's inquiry included public testimony, briefings by state agencies, and a review of how other states are proceeding.

According to the TWC, the state has made considerable progress in implementing the policy. The TWC credits this progress to two factors. One is the Texas hazardous waste fee system established by HB 2359. The other is the TWC's adoption of the stringent HSWA requirements for land disposal facilities. The TWC also intends to develop land disposal treatment standards equivalent to the federal requirements. Both of these agency actions are required by federal law in order for the TWC to maintain state authority to administer RCRA.

According to other witnesses, however, the state has made little progress toward actually implementing the policy since it was adopted. Testimony submitted to the subcommittee indicates some people feel the state's efforts to promote a shift from land disposal have been inadequate. Several witnesses, citing concerns that have not yet been addressed, urged the Task Force to consider specific solutions being attempted by other states.

A review of how other states are proceeding reveals two assumptions about the roles assigned to the state and federal levels of government in promoting a shift from land disposal. Various approaches being taken by other states fall somewhere between the two options

allowable under RCRA (i.e., state-administered RCRA programs may be either equivalent to or more stringent than the federal program).

One approach is a reactive perspective, suggesting a state program that is directed by or equivalent to federal requirements. From this point of view, the shift away from land disposal is accomplished simply by means of state compliance with federal statutes. Basically, the state is reacting to mandates imposed by federal action.

Another approach is a proactive perspective based on state mandates. Actions are initiated at the state level which exceed federal requirements. Task Force testimony included comments from advocates of both perspectives, as well as witnesses whose views fall somewhere between the two perspectives discussed here.

A witness at the Texas City public hearing encouraged the state to follow the federal lead, but only to the extent required. His suggestion was to stabilize the permitting regulations. This would allow for implementation and evaluation of past changes before making any new changes to the process. The witness discouraged any nonrequired state regulatory efforts to promote alternatives to land disposal. The rationale behind this, and similar suggestions, is that any further delays in the permitting of hazardous waste facilities could jeopardize the state's ability to meet the capacity certification deadline of October 1989. Since future federal Superfund funding for Texas depends on the assurance of adequate capacity, efforts to expedite the permitting of needed facilities must take priority over efforts to promote alternatives to land disposal. A few other witnesses made similar recommendations which, largely due to the combination of the capacity crisis and siting conflicts, also discouraged any extra state-initiated promotion of the shift from land disposal at this time.

There was an expression of opinion that state compliance with federal mandates produces adequate requirements for promoting a shift from land disposal. From this viewpoint, additional revision of state statutes is seen as a needless duplication of federal legislation and rules at the state level. The TWC's progress report on the state's efforts to promote alternatives also reflected support for this view, focusing primarily on implementation efforts equivalent to federal requirements. The report included mention of the agency's voluntary waste minimization program, and suggested that agency rules make waste minimization a priority for hazardous waste generators by requiring a manifest certification. The efficacy of this certification requirement was questioned by witnesses who preferred a different approach.

Specifically, those witnesses advocated a more proactive role for Texas in the state-federal interaction under RCRA. Their testimony often included suggestions for statutory changes intended to strengthen the state's authority. A presentation from the Texas Department of Agriculture (TDA), whose interest in the matter is rural groundwater protection, typified this viewpoint. The TDA natural resources director urged that the land disposal ban required by HSWA be rigorously enforced by the state, despite EPA's proposal to delay land disposal restrictions on some wastes. He criticized the EPA's plan for implementing the HSWA mandate as "unacceptably weak." This echoes concerns voiced by other critics who question the EPA's commitment to Congressional intent and to environmentally protective waste management.

In arguing the need for additional state restrictions on hazardous waste streams, the TDA official recommended legislation modeled on a recently adopted Illinois law, which makes the state requirement more stringent than the HSWA land disposal ban.

Other witnesses urged the Task Force to encourage use of the state's option, under Section 3009 of RCRA, to go beyond the federal law in imposing environmental regulations designed to further the use of preferred technologies. Several witnesses recommended that the TWC increase the state's regulatory requirements for the generator's manifest certification. The federal requirement, which has been adopted in Texas, stipulates only that hazardous waste generators must certify that a reduction program is in place "to the degree determined by the generator to be economically practicable." A relevant question here is the appropriateness of the generator being the sole determiner of what is economically feasible. One advocate of a stricter state certification requirement criticized the RCRA version, which does not mandate any kind of agency check, as being essentially unenforceable.

Enforcement was the subject of other testimony expressing dissatisfaction with the state's inspection and surveillance practices. One recommendation was to require more rigorous test requirements for the waste in municipal solid waste (MSW) landfills and for the waste going to these landfills. This received serious consideration by the Subcommittee on Hazardous and Industrial Waste because of the increased risk of contamination if hazardous waste is allowed into landfills designed only according to MSW requirements. Household hazardous waste (HHW) was the subject of several subcommittee discussions since HHW is not regulated as hazardous waste under federal or state statutes, and can therefore be disposed of in MSW landfills.

Small quantity generators (SQGs) of hazardous waste were another concern since they have been included in the regulated community only since the passage in 1984 of HSWA. Testimony submitted in Corpus Christi and elsewhere encouraged the state to place greater emphasis on developing an adequate waste management program to serve the needs of SQGs and ensure their compliance with hazardous waste requirements now applicable to them.

Testimony also indicated support for increased promotion of waste reduction, resource recovery, recycling and waste treatment. Incineration, resource reclamation and bacteriological treatment were encouraged as preferred alternatives to land disposal. Due to tighter regulatory restrictions and the cost of meeting those restrictions, these alternatives are getting more attention from other state legislatures. Michigan, for example, recently amended its waste management act tc require that by 2005, only residuals from incineration will be landfilled. In Texas, asbestos and soils contaminated with metals are candidates for land disposal as is incinerator ash.

Incineration practices are increasing in Texas, especially for certain organic waste streams which are particularly unsuited for landfills and impoundments. A Task Force resource person cautioned against allowing waste management to focus exclusive attention on incineration as a panacea. Policy and practice must instead focus on maximizing the benefits of all of preferred reduction and treatment practices.

Resource reclamation includes recycling, reduction and modification of waste. Recycling of commercially valuable materials from hazardous wastes is considered, from the standpoints of safety and conservation, to be an ideal management method. Nationwide in 1988, recycling and reclamation methods are expected to be used on about six million tons of hazardous waste. The Task Force at its Austin public hearing heard testimony encouraging legislative incentives to increase recycling and waste exchange efforts. Legislative measures of this kind are on the rise in other states.

Upon consideration of this focus issue's concerns and recommendations, the subcommittee adopted Recommendation 16 to further the state's efforts in promoting the use of alternatives to land disposal. The waste collection and management needs of HHW generators and SQGs are included as agenda topics for Recommendation 15. Recommendation 13 focuses on enforcement and inspection practices.

M. SITING CRITERIA FOR INCINERATORS

I've lived in East Texas all my life, and I can't ever remember an issue that stirred the emotions and stimulated the intellects of the people of this area like this one has.

- East Texas resident, on a proposed incinerator -

This report concludes that the operation of both land and sea based hazardous waste incinerators has produced no adverse consequences to the public health or the environment. Considerable uncertainty surrounds the data that lead to this conclusion, however.

- Science Advisory Board to the EPA -

Progress made in Texas in shifting from land disposal has been encouraged by new and better technology and more carefully formulated waste management practices. Of all the "terminal" treatment technologies currently available, properly designed incineration systems are capable of the highest overall degree of destruction and control for the broadest range of hazardous waste streams. Consequently, significant growth is anticipated in the use of incineration and other thermal destruction methods. In order for increased demand for incineration to be met, solutions must be found for the problems related to siting such facilities.

A national study focusing specifically on opposition to hazardous incinerators was conducted in 1987. The findings indicated considerable public opposition to the siting and permitting of these facilities is such that permits require three years, on the average, to finalize. This adds significantly to the cost.

The TWC, in response to petitions by local governments and citizens, recently evaluated the appropriateness of the agency's rules which govern the siting of hazardous waste incinerators. The Subcommittee on Hazardous and Industrial Waste monitored the TWC's efforts.

Under the Texas Solid Waste Disposal Act, the TWC is directed to adopt rules defining characteristics which make areas unsuitable for a hazardous waste

management facility. The TWC first adopted rules for siting in 1984, identifying features which may make sites unsuitable. Those rules addressed soil conditions, aquifer recharge areas, flooding and wetlands.

Legislative amendments in 1985, enacted as part of HB 2358, added new considerations for TWC rule making, including active geologic processes, coastal high hazard areas, potential drainage into public drinking water supplies, and critical habitat of an endangered species. On October 13, 1987, in response to the Legislature's directive, the TWC proposed rules amendments addressing these considerations in the siting of hazardous waste management facilities and published them for public comment. The proposed rules did not address hazardous waste incinerators specifically in the original submission.

Another provision from HB 2358 granted specific authority to local governments to petition the TWC for the establishment of other siting criteria for waste management facilities. Under this provision 25 local governments in Northeast Texas petitioned the TWC in 1987 to establish rules restricting or prohibiting the siting of hazardous waste incinerators in areas with specified characteristics. The petitions suggested four provisions to be addressed in the new rules.

TWC Rule Making

Upon receiving the petitions, TWC commission members directed the TWC staff to investigate and hold public hearings on the appropriateness of incinerator siting rules. The staff conducted four hearings around the state, and consulted with the Texas Air Control Board (TACB) and the EPA about the need for additional rules for incinerators.

The East Texas petitions differed from the TWC's rules on the following issues:

1) Areas of direct drainage

EAST TEXAS PROPOSAL: Prohibit the siting of a new hazardous waste incineration facility or an areal expansion of an existing hazardous waste incineration facility in locations which constitute an area of direct or indirect drainage within 10 miles of a lake used to supply public drinking water.

TWC RULE: Prohibits the location of storage, treatment, or disposal facilities in areas of direct drainage within one mile of a lake at its maximum conservation pool level, if the lake is used to supply public drinking water through a public water system.

2) Critical habitat of endangered species

EAST TEXAS PROPOSAL: Prohibit the siting of a new hazardous waste incineration facility or and areal expansion of an existing hazardous waste incineration facility in locations which constitute an area of critical habitat for endangered species.

TWC RULE: Prohibits the location of any hazardous waste storage, processing or disposal facility in any area designated as a critical habitat of an endangered species.

3) Groundwater considerations

EAST TEXAS PROPOSAL: Prohibit the siting of a new hazardous waste incineration facility or an areal expansion of an existing hazardous waste incineration facility in locations which constitute an area of discharge from or recharge to a groundwater aquifer.

TWC RULE: Prohibits the location of storage, processing, or disposal facilities on the recharge zone of a sole-source aquifer or overlying a regional aquifer, unless stringent design standards are applied.

4) Prohibition with no exception

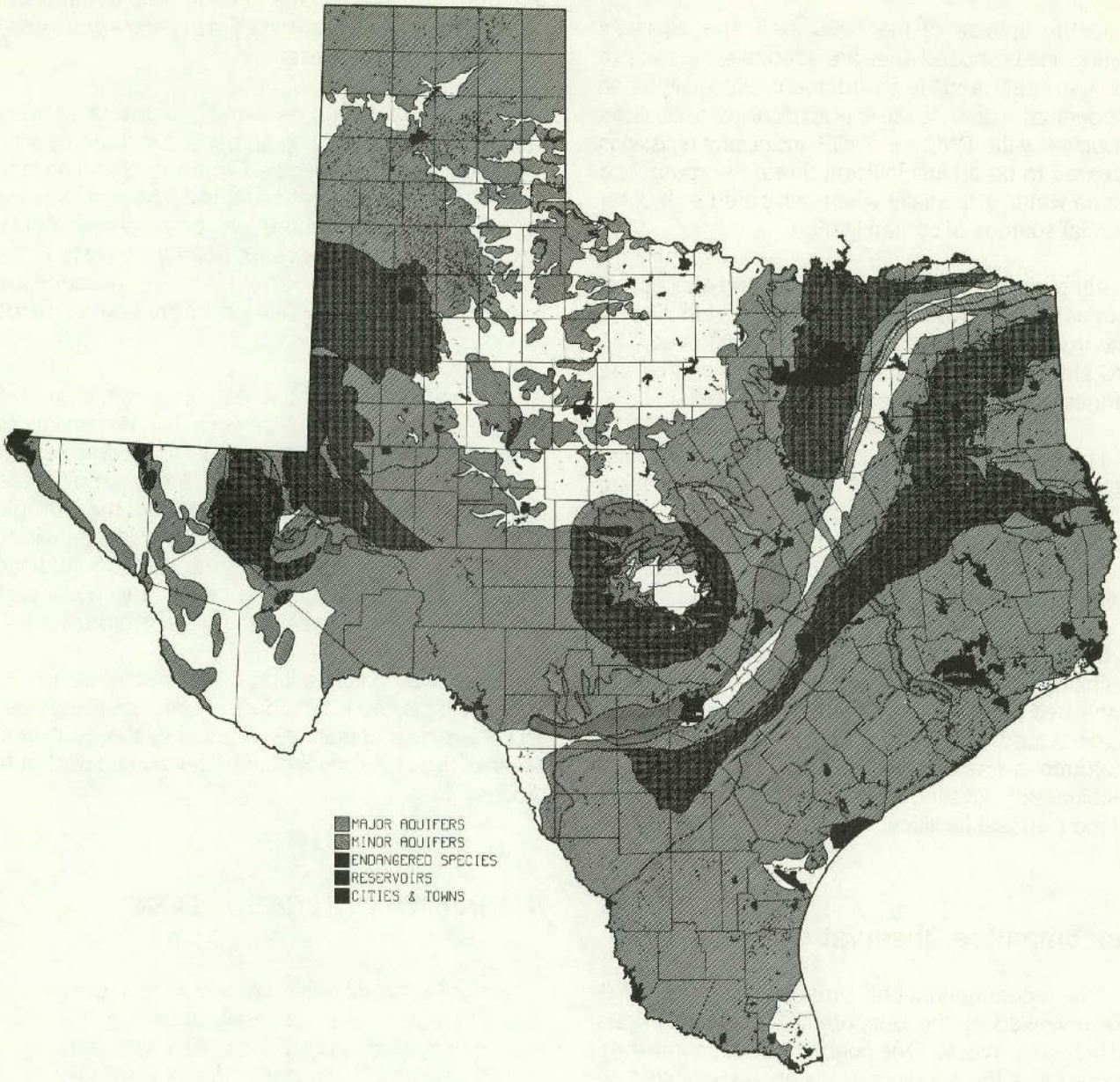
EAST TEXAS PROPOSAL: Promulgation of such a rule restricting hazardous waste incinerators would have no exceptions to the prohibitions specified.

TWC RULE: An exemption to the prohibitions is allowable if it can be demonstrated that the design, construction, and operational features of the facility will prevent the occurrence of adverse effects.

The TWC staff summarized the major comments received during the four public hearings. Comments in support of the East Texas proposals addressed the issue of environmental deterioration. Since the natural resources to be protected are too valuable to be placed at risk, advocates said, TWC rules should not allow variances to siting prohibitions based upon design, construction or operational features of a facility. More studies are needed before incineration should be permitted in certain locations because health risks to neighboring communities are largely unknown. Concerns were expressed about the proximity of incinerators to residences, schools and other institutions because such proximity could reduce response time available for evacuation in the event of an accident.

Comments in opposition to the East Texas proposals included the argument that the broad array of areas identified by the proposal would prohibit facilities from being sited close to the sources of waste generation.

Figure 16.—Areas Affected by East Texas Siting Proposal



Source: Texas Water Commission

That action, in turn, would increase transportation costs and risk of spills. Promulgation of rules consistent with the East Texas proposal also could result in facility capacity shortfalls, which might negatively impact the state's ability to certify adequate capacity as required by federal mandate, leading to a loss of federal assistance to remediate Texas Superfund sites.

Rules suggested for East Texas also would hinder economic development and eliminate a preferred disposal method in major portions of the state. Figure 16 illustrates areas affected by the petition's proposed incinerator siting restrictions. The petitioners, moreover, did not provide technical justification to support the need for the proposed rules. Promulgation of siting rules not clearly based on environmental or human health protection could jeopardize the state's federal RCRA program authorization. Finally, according to this argument, the petitioners' rules were not consistent with existing statutory language.

The TWC staff, in developing recommendations based on the information presented, did not embrace the East Texas petition's approach. They noted that witnesses expressing support for the proposed rules presented no technical support information. Reports

from the EPA and TACB, reviewed by TWC staff, likewise yielded no information in support.

In the opinion of the TWC staff, the agency's existing and proposed rules are adequately protective of human health and the environment, especially when consideration is given to site specific technical evaluations conducted by the TWC and TACB. Incinerator emissions appeared to be an insignificant threat to ground and surface water, especially when compared with other potential sources of contamination.

Although the staff did not recommend adoption of the rules proposed by the petitions, they did identify two areas in which the TWC's rules could be improved. The TWC staff recommended to the Commission that two changes be made to the existing agency rules:

1) The public does not clearly understand that hazardous waste incineration facilities are processing facilities under existing rules, hence are subject to the existing location standards in TWC rules. To clarify this, the TWC staff recommends that the rules be amended to address incinerators specifically.

2) The TWC staff recommended a new rule prohibiting siting of incinerators within 1,000 feet of an established residence, school, church or public park. This distance allows for effective emergency response to hazardous waste spills or operational accidents of an incinerator. Existing rules contain such a distance for land disposal facilities.

Subcommittee Observations

The recommendations presented by the TWC were reviewed by the Subcommittee on Hazardous and Industrial Waste. One concern the subcommittee explored was the measure of distance suggested by agency staff to provide an adequate buffer zone. The allotment of a 1,000 foot perimeter to serve as geographical insulation for nearby inhabitants in the event of an operational accident might be a bit too marginal, some subcommittee members said. Members also questioned whether the agency's new rule would affect existing facilities seeking areal expansion.

One incinerator siting concern expressed several times during the Task Force hearings was the recommendation that the TWC should require a certificate of need and public necessity so that any proposed incinerators may be evaluated in terms of capacity availability. The rationale, as stated by one Task Force resource panelist, focused on its economic advisability. The administrative costs of permitting, enforcement, monitoring and closure necessary to protect the public health and environment make it a financial imperative that the state evaluate the need for any treatment or disposal facility as a preliminary step before proceeding to the permitting process.

The subcommittee reviewed and evaluated every recommendation on siting proposed by public hearing witnesses. Members decided against separating land use issues from technical issues in the hearing process but urged close scrutiny in both areas. While acknowledging the proposal's potential validity in the area of municipal solid waste, members indicated it is neither possible nor advisable in the area of hazardous waste.

A significant amount of testimony concerned the pre-application local review process. Recommendations ranged from its elimination as a failure to its reinforcement by making it mandatory. More moderate recommendations expressed support for the principle of early and effective public participation in the permitting process, while acknowledging the need to continue fine-tuning specific aspects such as disclosure communication and access to relevant information.

The Task Force adopted Recommendation 31 addressing the need for incinerator-specific siting criteria, and Recommendation 28 supporting the continued development of the pre-application review and disclosure process.

N. MINIMIZATION/REDUCTION

> *Until quite lately, we had all been used to believing that, generally speaking, it is easier to destroy things than to create them. It no longer holds true for a steadily increasing number of our material artifacts. The pollutants that are currently endangering the environment have taught us that in many cases it can be much harder to destroy something than to create it.*
>
> *- The New Yorker -*

National and state waste policies expressly promote reduction and minimization of hazardous waste, advocating it as a top priority of government and industry.

Bridging the gap between policy and practice requires a progression of step-by-step accomplishments. The Task Force targeted waste reduction as a central

focus issue, and the Subcommittee on Hazardous and Industrial Waste initially identified its principal focus issue as waste minimization. Subsequent investigation of the topic revealed significant distinctions between waste minimization and waste reduction. Since each term was preferred by at least one member, the subcommittee agreed to use both.

Analyses of incentive programs indicate that industrial waste management decisions are motivated by regulatory mandates and economic pressures. Incentives for waste reduction and minimization are most successful when they include a combination of both. Regulatory mandates by themselves have been the least effective incentive type, as was perceived to be the case in the following example.

A Texas regulatory mandate in the area of waste minimization (based on section 3002(b) of RCRA) requires that a large quantity generator must certify that a program is in place to reduce the volume and toxicity of waste. The generator's manifest certification was criticized by a Task Force resource panelist who stated that "self-certifying" generators could not be relied upon for unbiased reporting. Similar problems are reported by other states, and are sometimes compounded by the fact that agency regulators do not emphasize the certification process and the generators are aware of this. Another witness, testifying in Fort Worth, proposed a recommendation by which the problem might be resolved. The testimony included several ideas for a state waste reduction program, one of which proposed waste audits at plants subject to the certification requirement to determine if generators are making accurate waste minimization certifications.

Waste reduction and minimization are fundamental components of waste management planning. As such, they are two of many parts that make up an integrated system. Task Force testimony about current conditions in the other issue areas indicates a positive climate in which to develop waste reduction and minimization programs. The combination of constraints on the waste management industry—CERCLA regulatory requirements, skyrocketing waste management costs, capacity shortages and opposition to siting+advance waste reduction as an increasingly attractive alternative. Waste reduction is becoming more important in the waste management policy debate, as indicated by the recent publication of four national reports on the topic. Growing recognition of the relationship between waste reduction and facility siting has contributed to the development of waste reduction programs. These programs often are intended to narrow the public confidence gap that is perceived by many to be hindering the siting process to an unreasonable extent.

State governments frequently have been more active than the federal government in promoting waste reduction and minimization. A study conducted in 1986 found that 10 states had waste reduction programs. These accounted for at least one-half of the $4 million spent that year by states and the federal government on waste reduction and minimization. Most state programs use a nonregulatory approach and focus on both waste reduction and waste minimization in their efforts to counter citizen groups' resistance to the siting of hazardous waste facilities. Two state programs (North Carolina and Massachusetts) recognize that successful promotion of waste reduction at the source requires attention and action separate from that directed to waste minimization efforts after the waste has been generated. This parallels the concerns expressed by subcommittee members when the decision was made to identify the issue using both terms.

Task Force testimony included a suggestion that Texas adopt an approach for preventing and controlling hazardous waste that would include other environmental issues. This same suggestion was reiterated to the subcommittee during informational briefings by representatives of three agencies and organizations. Reduction programs in most other states concentrate on RCRA-regulated hazardous waste. One state program, however, is set up to address toxic materials, water and air quality, and hazardous and solid waste.

Several witnesses said the state should provide services and resources related to reduction and minimization of hazardous waste. One witness proposed a tax or fee be levied on all waste incinerated in Texas, with the proceeds used for technical assistance and statewide public education programs. Another witness favored creation of an Office of Waste Reduction to maintain a library and provide information and materials about waste reduction practices. An additional function proposed for that office was the preparation of capacity needs assessments for Texas, with due consideration given to the potential of waste reduction.

Witness requests for emphasis on research and development were frequent. The two witnesses referenced in the preceding paragraph also urged increased research—one encouraged grants to universities and the other targeted research and development efforts to create new markets for waste materials in the state. Three other witnesses, two in Houston and one at the Corpus Christi hearing, encouraged more research and risk analyses. Research in the area of health risks, and the public's perception of them, received strong support during subcommittee discussion. Additional written testimony advocated the development of research centers that combine the

efforts of industry and academia to develop new technologies for controlling hazardous waste.

Task Force members were urged to promote financial incentives for waste reduction and minimization (e.g., tax policies that provide benefits for purchasing and installing waste reduction equipment and for constructing facilities for recycling, resource recovery and waste reduction). A similar tax break was encouraged by a subcommittee member who recommended a reduction in or exemption from the ad valorem tax for the installation of capital equipment to reduce hazardous waste generation.

Additional concerns addressed by witnesses included the need for adequate funding for reduction efforts, for legislative incentives to encourage industry to reduce the amount of hazardous waste generated, and for increased recycling and/or waste exchange efforts.

Recommendation 14 suggests the establishment of a waste reduction and minimization section within the TWC. Recommendation 15 suggests a Waste Reduction Advisory Committee be established and outlines an agenda of topics for that committee to address. Recommendation 16 encourages local governments to consider a reduction in or exemption from the ad valorem tax based on minimization and/or reduction efforts. Recommendation 27 encourages state agencies to work with the federal government and private organizations in developing risk communications programs.

O. STATE SUPERFUND CLEANUP AND FUNDING NEEDS

On a fundamental level, hazardous waste dumps reflect irresponsible and destructive behavior that threatens widely held societal values of order and equity. Dumps are a reminder that in the breathless pursuit of a better life through advanced technology, our society has been conceited, careless, greedy and blind. We have tried to enjoy the benefits of technology without paying for the disposal of its by-products, and have not bothered to think about the consequences until recently. (Abandoned hazardous waste) dumps betray the image we pursue of ourselves as wise stewards of the earth. It is threatening to realize how false our self-image is or how readily we abandon our values. It is even more threatening to consider the consequences of continuing to fail our image and values.

- Associate Professor of
Environment, Technology, and Society -

In 1980, the EPA described some of America's past hazardous waste disposal practices as "the most grievous error in judgement we as a nation have ever made," and referred to the resulting outcome as "one of the most serious problems this country has ever faced, a ticking time bomb ready to go off." RCRA and HSWA established a federal framework to manage newly generated hazardous waste. It was decided, however, that a separate federal program was needed to clean up abandoned, mismanaged hazardous waste sites. Congress responded by establishing the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980, and the Superfund Amendments and Reauthorization Act (SARA) in 1986. (These Acts are summarized in Appendix 2).

Better known as the Superfund program, CERCLA was designed to address the problems caused by past, present or potential releases of hazardous substances into the environment. CERCLA directed the EPA to formulate a National Priorities List (NPL) consisting of hazardous waste sites in the nation eligible for federal cleanup assistance. The map in Figure 17 shows the distribution of these NPL sites. To pay the federal portion of the cleanup projects, CERCLA set up a five-year Superfund to be financed from taxes on chemical and petroleum feedstocks and some federal appropriations.

In 1986, SARA set new cleanup standards, instituted a mandatory schedule of future cleanup activity, expanded the Superfund budget from $1.6 billion to $8.5 billion, and commanded the capacity certification assurances that all states must make by 1989 in order to receive federal Superfund financing after that date. Although the federal government retains the primary role in implementing Superfund, the SARA reauthorization increased states' rights and responsibilities regarding Superfund remedial actions.

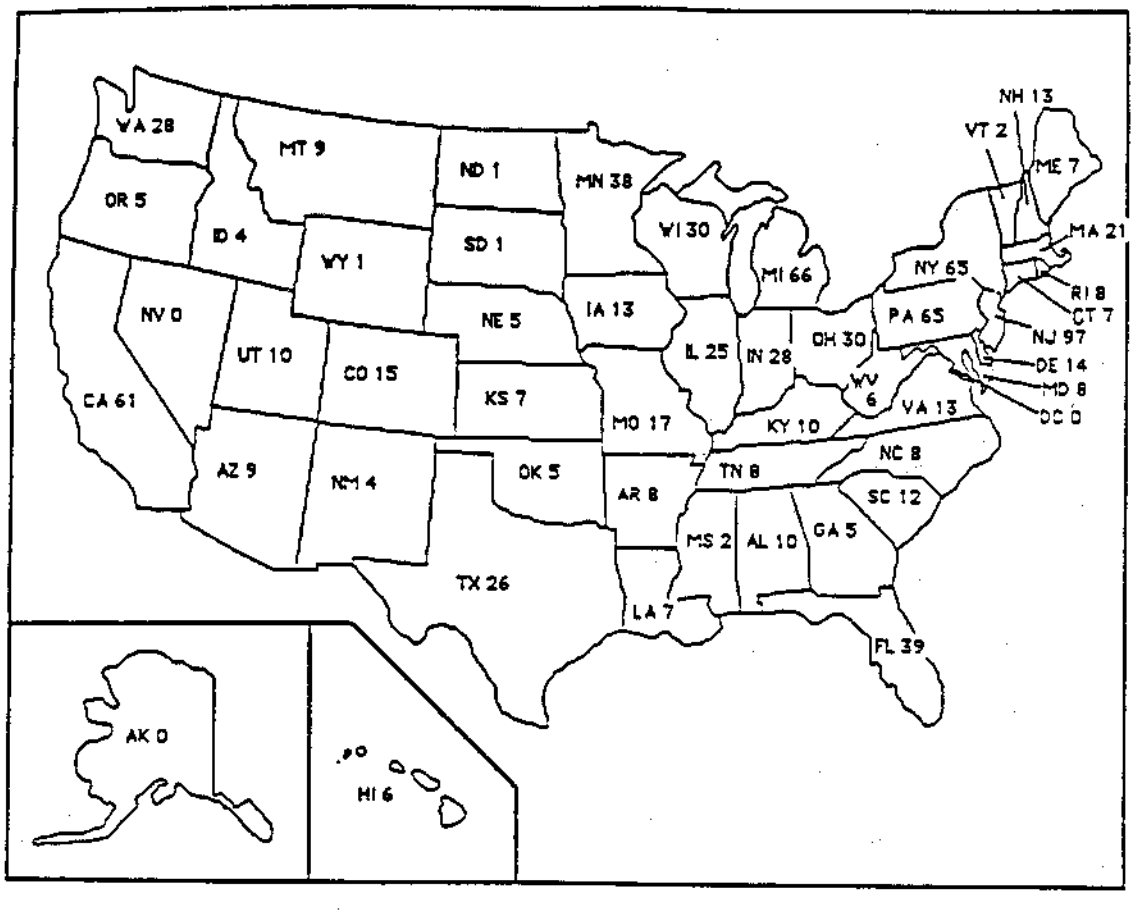
An assessment of Superfund sites in Texas and other states indicates the scope of the nation's abandoned waste site problem. Texas has 26 sites identified for NPL cleanup. The number of NPL sites found in some of the other states, however, dwarfs those located in Texas. New Jersey has the largest number with 97, followed by Michigan with 66, and New York and Pennsylvania with 65 each.

In addition to the 26 sites currently listed in Texas, the state also has about 1,500 hazardous waste sites that are being considered by federal and state agencies for inclusion on the NPL. Of particular concern to Texans is the possibility of groundwater contamination, an especially sensitive consideration because of the state's heavy dependence on its aquifers for drinking water and irrigation. An estimated 60% of all the water used in Texas is groundwater.

The TWC administers the state Superfund program as part of the agency's jurisdiction over industrial hazardous waste being produced by manufacturing, mining and agricultural activities. In 1979, while Congress was developing the federal Superfund to clean up toxic dumps and spills, the 66th Legislature considered a bill (SB 499) to establish a perpetual care fund for previously closed industrial waste disposal sites. The bill failed to pass, but was advocated by standing committees in both the House of Representatives and the Senate. During the 67th Legislature in 1981 (following the Congressional passage of CERCLA in 1980), Texas passed SB 758, establishing a state Disposal Facility Response Fund (Fund 550) to provide state matching money for federal Superfund cleanup projects. The Legislature appropriated an initial $5.6 million to the fund.

The 1984 Governor's Task Force on Hazardous Waste Management recommended the state expedite the identification of potential cleanup sites not covered by the NPL. The 1984 task force did not recommend a state funding source for cleanup of these "orphan" sites, but did propose the creation from general revenue of a $1 million Abandoned Site Contingency Fund, primarily for planning purposes as an initial step toward later cleanup. The group also recommended that the Legislature ensure sufficient matching appropriations within the state's budget to obtain maximum federal Superfund money for Texas. Several of these recommendations were incorporated into HB 2358, the hazardous waste omnibus bill, and HB 2359 enacted by the 69th Legislature.

Figure 17.—Location of National Priorities List Sites



Source:
U.S. Environmental Protection Agency (1986). NATIONAL PRIORITIES LIST FACT BOOK. Washington: U.S. Environmental Protection Agency.

HB 2359, the hazardous waste fees statute, assessed three types of fees related to hazardous waste. The first two were annual fees to be paid by waste generators and by waste processing, storage and disposal facilities. The third type of fee, a disposal fee, was assessed on a per-ton basis and applied uniformly to injection wells, landfills and land disposal in general, except that waste originating from Superfund or other cleanup operations was exempt. The measure directed the TWC to monitor collections from the disposal fee and to adjust the rate as necessary to collect approximately $10-$12 million for the biennium, or more if needed for Superfund matching purposes. Revenue from the disposal fee goes to Fund 550 for Superfund and other site cleanup.

The TWC also was authorized to use up to $1 million of the money during the 1986-1987 biennium to conduct studies and develop a registry of sites within the state where hazardous waste may pose environmental or public health dangers, but which do not qualify for federally funded cleanup. The omnibus bill directed the preparation and periodic update of this State Registry, identifying hazardous waste sites needing cleanup.

The Subcommittee on Hazardous and Industrial Waste approached the issue of cleanup and funding needs from two perspectives. Initially the subcommittee requested briefings from the TWC Superfund Program staff concerning the program's current status. Next, the subcommittee established a Special Working Group on Superfund Funding Needs. This consisted of a core group of subcommittee members and resource people with previous experience in the area. The Superfund working group met regularly to study different options for meeting the state program's funding needs, reported on their progress at each full subcommittee meeting, and drafted recommendations on the topic for the subcommittee to consider.

The TWC's Superfund Program consists of two elements, the Federal Program and the State Program. The federal element is responsible for the management of activities associated with hazardous waste sites that pose a significant enough threat to be listed on the NPL. The EPA uses a complicated numeric scoring system (the Hazard Ranking System, or HRS) to rank relative site hazards associated with air, surface water, and ground water pathways of human exposure. Sites with a score greater than 28.5 are eligible for inclusion on the NPL. Federal funds for site remediation are available only for NPL listed sites.

At some sites, responsible parties have been identified and are providing the financial resources to evaluate and clean up the sites. At sites where potentially responsible parties (PRPs) cannot be located, the federal Superfund trust fund is utilized. The TWC negotiates with the EPA regarding which agency will take the lead role for the remediation of these sites. Typically, the TWC has agreed to assume a lead role for sites not subject to enforcement/ cost recovery.

The remediation of sites consists of four phases: investigation (a Remedial Investigation/Feasibility Study, or RI/FS), design, construction, and operation and maintenance (O&M). The first two phases, investigation and design, are 100% federally funded. The construction phase is funded with 90% federal funds and 10% state-match monies. In the O&M phase, the federal government pays 90% for the first year. The remaining 29 years of mandatory O&M are funded entirely with state money. An exception to the required state match for O&M (provided by SARA) stipulates that for projects involving ground water treatment, EPA participates up to 10 years in the O&M cost at the 90% level.

Fourteen of Texas' 26 sites on the NPL are state-led and will require expenditure of state-match monies. State match requirements are projected to be $1,614,662 for FY1988, $1,895,275 for FY1989, $5,083,632 for FY1990, and $4,615,927 for FY1991. Four Texas sites on the NPL have been remediated, two of which were state-led. By the end of FY1993, construction activity for the Federal Program component should be complete except for two sites.

The State Program component, funded by the hazardous waste disposal fees, was created in order to have a means to deal with Texas sites scoring less than 28.5 but still posing a human health hazard. Fund 550 is the only source of money for the 10% state-match funds for NPL site cleanups, and also is the only funding source for the State Program. Before spending money from Fund 550 for the remediation of sites on the State Registry, the TWC first attempts to have the responsible parties pay for the cleanup. As with the Federal Program, a state-funded cleanup will be initiated only if the potentially responsible parties cannot be identified or if they are unable and/or unwilling to remediate the site. PRPs can be held jointly and severally liable for the cleanup, and those unwilling to participate can be sued to recover government expenditures.

In response to a request from the Superfund working group, TWC staff developed five possible funding options to help Fund 550 support state matching, O&M, and State Program activities. In presenting their data, however, the staff emphasized the limited usefulness of the funding options. Much of the information

needed to assess the financial burden of cleaning up the state funded sites is not developed or not available at this time. The major unknowns at state Superfund sites are:

- the horizontal and vertical extent of contamination at the site;
- the identification of all the hazardous wastes at the site;
- the concentration of the hazardous wastes at the site;
- the degree to which groundwater remediation is required at the site;
- the best treatment technology appropriate to the site; and
- accurate cost figures for the site remediation.

The Superfund working group began its examination of the State Program's funding needs with a study of a bonding mechanism that might supplement hazardous waste disposal fees that currently support Fund 550. The group determined, however, that a bond proposal may not be needed. Based upon revenues being received in Fund 550 and projected revenues and expenditures through 1991, there appears to be adequate money through the next biennium to finance the State Program.

After reaching this decision, the working group identified several State Superfund legislative issues, including but not limited to the following:

- Clarification is needed of TWC authorization to waive RCRA requirements for on-site Superfund remedial actions and to waive permit requirements for State Superfund remedial actions. The Texas Solid Waste Disposal Act charges the TWC to secure the cleanup of facilities or areas which may constitute an imminent and substantial endangerment to public health or the environment by using state funds when private party or federal funds are not available. The Act leaves the selection of the appropriate remedial action to the discretion of the agency as long as the remedial alternative is cost-effective. However, the Act does not address whether permits are necessary for any such remedial action;
- Clarification is needed of the TWC's authority to use financial capability determinations to proceed with state funded cleanup without the issuance of an administrative order. At the present time, the Act instructs the TWC to seek remedial action at State Registry sites in order of priority from potentially responsible parties, independent third parties, federal funds, and lastly, state funds. The Act states that liable parties, pursuant to Section 8(g)(1), should be notified of an opportunity to participate in a voluntary cleanup. The TWC staff has interpreted this to mean that the TWC must, in all cases, issue either an administrative order or a court order to liable parties prior to spending state funds;
- By limiting the State Superfund program to addressing only hazardous waste facilities, the Act may omit many hazardous substance sites from consideration for cleanup;
- The statutory language relating to the recovery of the state's expenses for State Superfund remedial actions needs amendment to protect the state's interests. Clarification is needed of TWC's authority to assess enhanced penalties in cost recovery actions since Section 13(g)(7) of the Act authorizes the TWC to recover its costs for remedial actions only through a lien on the real properties subject to state-funded cleanup. Such properties, however, are unlikely to have enough value to adequately replenish Fund 550;
- Clarification is needed of TWC's authorities to enter into enforcement agreements with EPA and PRPs to expand the TWC's involvement in CERCLA activities;
- Amendment of the definition of innocent landowner under Section 8(g)(6) of the Act is needed to correct a significant grammatical error;
- Changes are needed to the administrative order appeals process. Section 9 of the Act, the appeals section, provides PRPs with a very strong disincentive to comply with administrative orders. By appealing to district court, PRPs can delay the cleanup of a site for months or years and reduce the probability of a voluntary or negotiated cleanup;
- The Disposal Facility Response Fund (Fund 550), will not provide the financial resources to enable adequate funds to perform site remediation at sites on the State Registry. The level of funding/activity of the State Superfund Program needs to be established, and funding

appropriated, for TWC Superfund Program staff increases. In addition, it is suggested that interest be collected on monies deposited in Fund 550 and that this earned income be deposited in the fund. A proposal for a more equitable means of funding the cleanup of State Superfund sites should be developed, prior to the 1991 legislative session, recognizing the broader sources and causes of the contamination and recognizing the hierarchy of preferred waste management techniques forth in Section 3(e)(1) of the Act;

- Consideration needs to be given to encouragement of voluntary action by responsible parties by not listing sites on the State Registry; and

- Clarification is needed of the TWC's authority to proceed with mixed funding for the cleanup of State sites when the full number of PRPs has not been identified so that the work can be initiated and completed.

  (Note: Several of these issues are also being considered by the TWC for proposed legislation during the 1989 Session.)

The working group drafted recommendations addressing the state's Superfund funding needs for the subcommittee's consideration. These were discussed by the subcommittee and, with some revision, were adopted by the Task Force as Recommendations 11 and 12.

APPENDIX 1

SOLID AND HAZARDOUS WASTE POLICY STUDIES IN TEXAS

Appendix 1

Issuer (Date)	LRL Call Number	Scope: Hazardous	Scope: Solid	Scope: Both	Topics
Committee for the Study of Land Use and Environmental Control (January 1969)	L1836.60 L229		X		Solid waste capacity issues.
Committee for the Study of Land Use and Environmental Control (January 1971)	L1836.61 L229			X	Waste treatment capacity; underground injection; ocean dumping.
Texas Department of Health (1971)	H855.8 So44		X		First state solid waste plan.
Senate Interim Committee on Environmental Affairs (1973)	L1836.62 En89			X	Regional planning; public education.
House Committee on Environmental Affairs (November 1976)	L1836.64 En89		X		Recycling.
Texas Advisory Commission on Intergovernmental Relations (September 1977)	I1150.8 So44			X	Implementation of RCRA.
House Committee on Environmental Affairs (October 1980)	L1836.66 En89	X			Siting; agency organization; Superfund coordination; environmental health research.
Texas Department of Health (January 1981)	H853.8 M925 1981		X		Revised state solid waste plan.
Texas Department of Water Resources (January 1981)	W1125.7 L229 137	X			State industrial waste plan.
Senate Committee on Natural Resources (March 1981)	L1836.66 N219	X			Site suitability; site cleanup.
LBJ School of Public Affairs (1982)	Z UA320.7 P758 53	X			Siting; liability insurance; waste exchange encouragement; identification of high-priority wastes.
House Committee on Environmental Affairs (November 1982)	L1836.67 En89			X	Hazardous waste: siting criteria; local performance review; funding of and enforcement; public education. Solid waste: incineration; proposed legislation leading to HB 1719, 68th Legislature.
Senate Subcommittee on Consumer Affairs (January 1983)	L1836.67 C765t	X			Right-to-know legislation.
Comptroller of Public Accounts (November 1983)	C2600.8 H336	X			Taxation of hazardous waste disposal.
Comptroller of Public Accounts (December 1983)	C2600.8 H336f	X			Hazardous waste taxation in other states.

Appendix 1—Continued

Issuer (Date)	LRL Call Number	Scope: Hazardous	Scope: Solid	Scope: Both	Topics
House Study Group (February 1984)*	L1801.9 St94 68-100	X			Landfills; underground injection; taxation; Superfund and cleanup; administrative penalties; manifesting practices.
Governor's Task Force on Hazardous Waste Management (September 1984)*	G1003.9 R299	X			Broad study: waste reduction and minimization; taxation and tax incentives; enforcement; Keystone process; site cleanup; small quantity generators.
House-Senate Joint Study Committee on Hazardous Waste Disposal (December 1984)*	L1836.68 H336	X			Waste reduction and minimization; landfills and underground injection; siting criteria review; taxation; small quantity generators; research.
Lieutenant Governor/ Comptroller of Public Accounts (January 1985)	L1836.68 F52h	X			Specific hazardous waste fee proposals.
Texas Department of Agriculture (1985)	A900.8 Ag831	X			Groundwater contamination; injection.
Texas Water Commission (June 1986)	W505.8 Su76	X			Superfund status.
House Committee on Insurance (September 1986)	L1836.69 In7	X			Liability and insurability of site cleanup companies.
Texas Department of Agriculture (December 1986)*	A900.8 H336	X			Land disposal restrictions; alternative management initiatives; small quantity generators.
House Committee on Transportation/ House Committee on Science and Technology (December 1986)	L1836.69 T687	X			Transportation of hazardous materials (including hazardous waste).
Senate Committee on Natural Resources (January 1987)	L1836.69 N219s	X			Land disposal; alternatives; capacity; siting; offshore incineration.
Texas Water Commission (January 1987)	W505.3 H336 1984/6	X			Annual inspection report required by HB 2358, 69th Legislature.
Texas Water Commission (January 1987)*	W505.8 H336	X			Implementation of HB 2358 and HB 2359, 69th Legislature.
LBJ School of Public Affairs (1987)	Z UA320.7 P758 82	X			Transportation of hazardous materials (including hazardous waste).
Texas Department of Agriculture (Spring 1987)	A900.8 P948gr	X			Groundwater protection; staffing for inspection and monitoring; small quantity generators.

Appendix 1—Continued

Issuer (Date)	LRL Call Number	Scope			Topics
		Hazardous	Solid	Both	
Texas Water Commission (October 1987)*	W505.8 Sm18	X			Handbook for small quantity generators.
Texas Water Commission (January 1988)*	W505.3 H336 1986/7	X			Annual inspection report required by HB 2358, 69th Legislature.
Texas Water Commission (April 1988)*	W505.8 Su76 1988	X			Superfund status update.
State Auditor (December 1988)*	A2700.8 H339	X			Permitting procedures.

* = Also referenced in the Selected Bibliography of this report.
LRL = Legislative Reference Library, Capitol second floor, north wing.

APPENDIX 2

FEDERAL REGULATORY FRAMEWORK FOR HAZARDOUS WASTE

FEDERAL REGULATORY FRAMEWORK FOR HAZARDOUS WASTE

• SDWA

The federal Safe Drinking Water Act (SDWA), enacted in 1974 and amended in 1977, requires the EPA to set national drinking water standards to protect public water supplies. It assigns primary enforcement responsibility to the states. In addition, the SDWA seeks to protect groundwater by establishing an underground injection control (UIC) program.

• RCRA

In 1976, Congress passed the first federal legislation specifically aimed at controlling the disposal of hazardous waste, the Resource Conservation and Recovery Act (RCRA). RCRA created a system to provide "cradle-to-grave" regulation for the generation, transportation, storage and disposal of newly generated hazardous waste. The statute set forth broad goals and deadlines for the EPA. Key provisions required that agency to develop standards for facilities handling hazardous wastes, to establish a system of permits for such facilities, and to determine appropriate disposal technologies for particular wastes.

• HSWA

As the EPA worked to carry out its enormous task, new information emerged, revealing that many areas of concern were still not being addressed. Eight years after its enactment, RCRA was strengthened significantly by the Hazardous and Solid Waste Amendments of 1984 (HSWA): The new act promoted a shift from land disposal to alternative treatment and disposal technologies, and specifically prohibited the land disposal of highly toxic and mobile types of waste (e.g., free liquids, dioxins, solvents, cyanide and metal liquids). The EPA was charged also to review all regulated wastes in terms of their appropriateness for future land disposal. Anticipated land bans were to be implemented in 1988, 1989 and 1990. In addition, HSWA called upon the EPA to develop performance standards for new underground storage tanks and to develop criteria within two years by which to regulate all organic toxic materials. The coverage of regulated waste was further expanded by lowering the exemption level for "small quantity generators" (SQGs). As a result, SQGs became subject to regulation whenever they produced more than 100 kilograms of hazardous waste per month, as opposed to the previous threshold of 1000 kilograms per month. This change subjected a brand new population of small businesses (e.g., dry cleaners and photographic laboratories) to federal and state regulation. RCRA AND HSWA allow for transfer of administration to the states if they can demonstrate that their state programs are substantially the same as or more stringent than the federal program. Texas and 38 other made the necessary demonstrations under the original RCRA program, but only Georgia has received full authority under HSWA.

• CERCLA

While RCRA and HSWA deal with the regulation of current hazardous waste disposal sites, two parallel federal laws focus on the cleanup of older leaking sites. These laws are the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

CERCLA, better known as the Superfund program, confronts the cleanup of past, present or potential releases of hazardous substances in the environment. Administered by the EPA in conjunction with the states, CERCLA provides for the formulation of a National Priorities List (NPL) consisting of the hazardous waste sites in the nation eligible for federal cleanup. States nominate their worst sites for cleanup, the EPA prioritizes them using its Hazard Ranking System (HRS) model, and the worst are placed on the NPL. The EPA and the states then reach agreement on the cleanup, under which states pay 10% for private sites and 50% for public sites. Federal funds make up the difference. To pay thus federal portion, CERCLA established a five-year Superfund to be financed from taxes on chemical and petroleum feedstocks along with federal appropriations. In addition, CERCLA set up a monitoring system for checking the effectiveness of the Superfund program and established flexible procedures for EPA and its contractors to respond to and clean up toxic spills.

• SARA

As was the case with RCRA, several years experience with CERCLA indicated that the scope of the nation's waste waste site problem had been seriously underestimated. In 1986, CERCLA was amended with the passage of SARA. The new legislation instituted strict waste site cleanup standards which favor perma-

nent cleanup remedies, increased state and public involvement in the decision making process, and a mandatory schedule of future cleanup activity. The budget of the Superfund was expanded from $1.6 billion to $8.5 billion.

New programs initiated by SARA included Title III, which mandated reporting obligations for companies using hazardous materials. Another new provision set up the capacity certification assurances that all states must make by 1989 in order to receive federal Superfund financing after that date. Although the federal government retained the primary role in implementation, SARA significantly increased the states' rights and responsibilities regarding Superfund remedial actions.

GLOSSARY

GLOSSARY

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IV. Types of Sites and Facilities—Continued

I. Types and Characteristics of Waste

1. ACUTE TOXICITY - any poisonous effect that is produced by a single short-term exposure and that results in severe biological harm or death.

2. ANIMAL WASTE - includes the following contaminated items which have been intentionally exposed to pathogens: a) animal carcasses, b) animal body parts, c) animal bedding, and d) animal blood and blood products, serum plasma, and other blood components.

3. BIOACCUMULATION OF WASTE - another route of exposure to hazardous wastes resulting from improper disposal. Plants may take up toxic substances from contaminated soil sediments, passing the toxins up the food chain to grazing animals and human beings. Contamination of the terrestrial food chain is a special hazard associated with the "landfarming" techniques of hazardous waste disposal, where wastes are spread on agricultural or other lands to accelerate their breakdown by microorganisms and sunlight. The aquatic foodweb, including fish and shellfish, may be contaminated and sensitive ecological balances disturbed when pollutants reach water. Ocean dumping of hazardous wastes can threaten marine ecosystems and contaminate food chains.

4. BIODEGRADABLE - the capacity to be broken down into component substances by natural action over a relatively short time.

5. BLOOD AND BLOOD PRODUCTS - all waste human blood, serum, plasma, and other blood components.

6. BOTTOM ASH - ash that remains in an incinerator after the fuel is burned.

7. CHRONIC TOXICITY - a poisonous effect resulting from long-term exposure to low dosages of toxic substances. Changes are usually subtle.

8. CLASS I INDUSTRIAL SOLID WASTE - any single or combined solid waste which is toxic, corrosive, flammable, a strong sensitizer or irritant, a generator of sudden pressure by decomposition, heat, or other means and may pose a substantial present or potential danger to human health or the environment when improperly managed, including hazardous industrial waste.

9. CLASS II INDUSTRIAL SOLID WASTE - any kind of or combination of industrial solid wastes which cannot be categorized as Class I or Class III.

10. CLASS III INDUSTRIAL SOLID WASTE - inert and essentially insoluble industrial solid waste, including materials such as rock, brick, glass, dirt, and certain plastics and rubber, etc., that are not readily decomposible.

11. CONDITIONALLY EXEMPT SMALL QUANTITY GENERATORS - (CESQG) generate no more than 100 kilograms of hazardous waste and no more than 1 kilogram of acutely hazardous waste in any calendar month.

Hazardous waste laws require that CESQG's a) identify all hazardous waste generated, b) send this waste to a hazardous waste facility approved by the state for industrial or municipal wastes, and c) never accumulate more than 1000 kg of hazardous waste on their property.

12. CORROSIVE WASTES - eat away materials and living tissue by chemical action. They are of particular concern to persons involved in waste hauling and disposal because they can corrode containers and leak out. Examples include alkaline cleaners, acid liquids used in etching, and wastes from battery production.

13. EP TOX TEST - the current EPA toxicity test for incinerator ash, which is the subject of criticism.

14. GARBAGE - solid, putrescible waste consisting of animal and vegetable materials resulting from the preparation and consumption of foods, including the waste from markets, storage facilities, and handling and sale of food products.

15. FLY ASH - ash that escapes from the incinerator into the atmosphere (or into pollution control equipment); often contains heavy concentrations of furans and dioxins.

16. GENERATOR OF HAZARDOUS WASTE - any entity whose actions or processes either produces hazardous waste, or first causes a hazardous waste to become subject to regulation by the Texas Water Commission.

17. HAZARDOUS WASTE - Under RCRA, "a solid waste, or combination of solid wastes, which because of its quantity, concentration or physical, chemical or infectious characteristics may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or future hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." - in lay terms, substances that are not intended for use or reuse, and

that threaten living organisms as a result of being flammable, explosive, corrosive, radioactive, or biologically viral.

18. IGNITABLE WASTE - presents a fire hazard because it tends to undergo spontaneous combustion at relatively low temperatures. When fires occur during the transportation of waste materials or at storage and disposal sites, there is not only the immediate danger of heat and smoke, but also the risk of explosion and the threat that toxic particulates and gases will spread to the surrounding environment. Examples include discarded organic solvents such as toluene and benzene, oils, plasticizers, some pesticides, and paint and varnish removers.

19. INFECTIOUS WASTE - means a solid waste capable of producing an infectious disease and includes: a) animal waste, b) blood and blood products, c) microbiological waste, d) pathological waste, and e) sharps.

20. INDUSTRIAL SOLID WASTE - solid waste resulting from, or incidental to, any process of industry or manufacturing, mining, or agricultural operations.

21. LARGE QUANTITY GENERATORS - (LQG) - generate 1000 kilograms or more of hazardous waste, or more than 1 kilogram of acutely hazardous waste in any calendar month. Hazardous waste laws require that these comply with all applicable hazardous waste management rules.

22. LEACHATE - a liquid containing decomposed waste, bacteria and other noxious and potentially harmful materials which drains from landfills and must be collected and treated so as not to contaminate water supplies.

23. MICROBIOLOGICAL WASTE - includes: a) cultures and stocks of infectious agents and associated biologicals, b) cultures of specimens from medical, pathological, pharmaceutical, research, clinical, and commercial and industrial laboratories, c) discarded live and attenuated vaccines, d) disposable culture dishes, and e) devices used to transfer, inoculate, and mix cultures.

24. MIXED LOW-LEVEL RADIOACTIVE AND HAZARDOUS WASTES - (LLW) - certain low-level radioactive wastes which contain nonradiological chemical and other constituents that would be classified as hazardous under the RCRA. It should be noted that hazardous wastes may not be purposefully mixed with LLW to circumvent compliance with either NRC's (Nuclear Regulatory Commission) or EPA's (Environmental Protection Agency) requirements for the management of LLW or hazardous waste, respectively. Both the Texas Water Commission and the Texas Department of Health regulate the management of Mixed LLW in Texas.

25. MUNICIPAL HAZARDOUS WASTE - any municipal solid waste, or mixture of such wastes, which has been identified or listed as a hazardous waste by the EPA.

26. MUNICIPAL SOLID WASTE - solid waste resulting from community, municipal, commercial, institutional, and recreational activities, including garbage, rubbish, street cleanings, dead animals, abandoned cars, and all other solid waste other than industrial solid waste.

27. PATHOLOGICAL WASTES - includes but is not limited to a) dead human bodies, b) the following human materials removed during surgery, autopsy or biopsy: i) body parts, ii) tissues, including fetuses, iii) organs, and iv) blood and body fluids; and c) products of spontaneous abortions.

28. PUTRESCIBLE WASTE - organic waste (i.e. garbage, grease trap waste, wastewater treatment plant sludge) that can be decomposed by microorganisms quickly enough to cause odors or gases or can provide food for or attract birds, animals, or disease vectors (disease-transmitting organisms, i.e. insects).

29. RUBBISH - non-putrescible solid waste (excluding ashes), including both combustible (e.g. paper, rags, cartons, plastics, wood, leaves, etc.) and noncombustible (e.g. glass, metal cans or furniture, crockery, etc.) waste materials.

30. SHARPS - materials including, but not limited to the following materials when contaminated: a) hypodermic needles, b) hypodermic syringes, c) scalpel blades, d) pasteur pipettes, and e) broken glass.

31. SLUDGE - any solid, semisolid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, or air pollution control facility exclusive of the treated waste from a wastewater treatment plant.

32. SMALL QUANTITY GENERATORS - (SQG) - generate more than 100 kilograms and less than 1000 kilograms of hazardous waste and no more than 1 kilogram of acutely hazardous waste in any calendar month.

Texas has thousands of small quantity generators. They include, for example, pesticide applicators, gas stations, dry cleaners, print shops, painting contrac-

tors, hospitals, veterinarians, laboratories, commercial metal platers, photographic processors, furniture and automobile refinishers, building contractors, and military installations. The Governor's Task Force on Hazardous Waste Management in 1984, recommended that "the state of Texas should require local governments to establish ordinances requiring that hazardous waste collection and disposal services be provided for small quantity generators".

33. SOLID WASTE - according to the Solid Waste Disposal Act, since the delegation of RCRA authority to the Railroad Commission of Texas, a) any garbage, rubbish, or sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and b) solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, agricultural, community, and institutional activities.

Solid waste does *not* include: a) domestic sewage or materials in irrigation return flows; b) natural or human-made inert solid materials (i.e. sand, dirt, rock, soil, etc.) used to fill land in order to prepare for surface construction; or c) waste material as a result of the exploration, development, or production of oil or gas or geothermal resources, or any other substance regulated by the Railroad Commission of Texas pursuant to Sec. 91.101 of the Natural Resources Code.

34. SPECIAL WASTE - any solid waste or combination of solid wastes that because of its quantity, concentration, physical or chemical characteristics, or biological properties require special care and disposal to protect human health or the environment. Special wastes include, but are not limited to: a) hazardous waste from small quantity generators; b) Class I industrial nonhazardous waste not routinely collected with municipal solid waste; c) infectious and pathological wastes from health care facilities, veterinary hospitals or labs; d) some municipal wastewater treatment plant sludges that are not covered by other federal regulations; e) septic tank pumpings; f) grease and grit trap wastes; g) wastes from commercial or industrial wastewater treatment plants, air pollution control facilities, and any containers used for materials that have been listed as hazardous but have not been listed as a commercial chemical product; h) slaughterhouse animals; i) dead animals; j) drugs, contaminated food or drink products other than those found in normal household waste; k) pesticide containers; and l) discarded materials containing asbestos.

35. TOXIC WASTE - material that will produce injury or disease upon exposure, ingestion, or inhalation.

36. VECTOR - an agent, such as an insect, snake or rodent capable of transferring disease from one organism to another.

37. WHITE GOODS - inoperative and discarded refrigerators, ranges, water heaters, freezers, and other similar domestic and commercial large appliances.

II. Policies and Legislation

38. AVOIDED COST - the cost of the next increment of a utility's electric power capacity, which, because of purchasing power instead from a cogenerator or small power producer, is no longer necessary or can be avoided.

39. CLEAN AIR ACT - (CAA) - regulates the discharge of certain hazardous air pollutants. Dischargers of pollutants such as vinyl chloride and beryllium must demonstrate that emissions of these substances will not lead to ambient levels in excess of those set forth by the EPA.

40. CLEAN WATER ACT - (CWA) - alternate name for the 1977 amendments to the Federal Water Pollution Control Act Amendments of 1972. The discharge of hazardous materials into the waters of the United States is subject to discharge standards set by the EPA. The CWA identified so-called "priority pollutants" for which EPA was to establish discharge standards. These standards are implemented through the National Pollutant Discharge Elimination System and represent binding limitations upon waste-water dischargers. Additionally, certain stream segments may have many sources of potentially hazardous materials, and dischargers along these segments may face standards which are more stringent than those applicable nationwide.

41. COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 - (CERCLA) - commonly known as the "Superfund" law, this act was passed to provide the needed general authority for regulation of hazardous waste by-products and to establish a trust fund for Federal and State governments to respond directly to any problems at uncontrolled hazardous waste disposal sites.

42. DISPOSAL FACILITY RESPONSE FUND - was established in 1981 (via Senate Bill 758 of the 67th Legislature) and allowed Texas to become a managing partner with the Federal government in the Superfund

program. In 1982 the Governor of Texas designated the Texas Water Commission (then known as the Texas Department of Water Resources) as the agency to develop and manage the Superfund program in Texas.

43. FLOW CONTROL - the ability of a unit of government to require that solid waste be delivered to a recycling or resource recovery system.

44. GOOD SAMARITAN LAWS - have been passed by some states to address the problem of liability involved in assisting emergency hazardous waste cleanup efforts. These laws generally provide companies and individuals with immunity from civil liability for acts or omissions that result in injury to persons or property in the good faith rendering of emergency care, assistance, or advice unless the acts or omissions constitute gross negligence or willful or wanton misconduct. Texas' Good Samaritan law covers only emergency medical care.

45. HAMMER - in the context of environmental policy, a set of statutory standards specified by Congress, usually more restrictive than what the EPA is expected to adopt, which takes effect if (as is often the case) the EPA fails to meet a Congressionally imposed deadline for itself in setting standards; applicable currently to pending Congressional legislation requiring numerical air emission standards for municipal solid waste incinerators.

46. HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984 - (HSWA) - amendments to RCRA intended to expand the scope and effectiveness of hazardous waste management. These amendments provide a comprehensive set of requirements that states must adopt in order to maintain complete control of hazardous waste management within their borders.

47. HAZARDOUS MATERIALS TRANSPORTATION ACT - (HMTA) - vests the Department of Transportation (DOT) with the authority to protect the nation against the risk of transporting hazardous materials. Under this act, the DOT has the authority to pass regulations regarding the transport of hazardous materials, the establishment of criteria for handling hazardous materials, and the registration of hazardous materials. Included in this authority is the ability to specify packaging requirements. This act provides the major authority to regulate hazardous materials which are transported from one site to another.

48. MANIFEST SYSTEM - is the system used for identifying the quantity, composition, origin, routing and destination of hazardous waste during its transportation from its generation point to disposal, treatment or storage facilities.

49. MINIMUM TECHNOLOGY REQUIREMENTS - a set of new standards established by HSWA for surface impoundments and land disposal facilities. These new requirements apply to any new units that first receive waste after November 8, 1984. Any facilities in existence before November 8, 1984 must be retrofitted to the standards of minimum technology requirements by November 8, 1988 or be prohibited from receiving hazardous waste.

50. NATIONAL PRIORITIES LIST - (NPL) -EPA's list of hazardous waste sites eligible for cleanup under Superfund. States nominate their worst sites for cleanup, EPA prioritizes them using its Hazard Ranking System model, and the worst go onto the NPL. EPA and the states then reach agreements on cleanup, under which states pay 10% for private sites and 50% for public sites and Superfund pays the rest.

51. NATIONAL CONTINGENCY PLAN - (NCP) - this part of the Federal water pollution control program was first published in 1968, and served as the blueprint for the Superfund program.

52. PERMIT OR LICENSE - the formal written approval issued to the applicant for a solid waste disposal site by the appropriate regulatory body. In accordance with Articles 4477-7 and 4477-8 in Vernon's, permit means approval by the Texas Water Commission or the Texas Department of Health, and license means approval by a county.

53. RESOURCE CONSERVATION AND RECOVERY ACT - (RCRA) - RCRA is the most comprehensive of the statutes regulating solid and hazardous waste disposal. Passed in 1976, RCRA created a permit program regulating disposal facilities for hazardous wastes and also created a manifest system to follow the path of wastes that are removed from the production facility. This eliminated a major loophole in the prior regulation of hazardous materials, whereby generators of hazardous wastes had been able to dispose of these by-products by on-site disposal in pits or dumps or by contracting with an outside firm to remove the wastes from the premises. RCRA was designed to provide "cradle-to-grave" regulation of waste to eliminate injurious disposal practices.

RCRA (1976) addresses the proper management of current hazardous waste, and CERCLA (1980) addresses the problems of past abuses and cleanup. The HSWA (1984) amendments consolidate the two programs, closes loopholes previously available, and

provides the EPA and the states with new tools to regulate treatment of historic and continuing hazardous waste releases. These amendments pose a significant challenge to the community that generates and manages hazardous waste.

54. RCRA INTEGRATED TRAINING AND TECHNICAL ASSISTANCE PROGRAM - (RITTA) - a new financial assistance program offered by EPA. The RITTA initiative is a grant (cooperative agreement program) designed to allow a limited number of states to plan and implement hazardous waste training and technical assistance activities in support of the State's RCRA program.

The State program activities funded and required under the RITTA program will include three components: 1)Development of a long-term plan for training and technical assistance activities; 2) delivery of RCRA program training activities for State environmental regulators; and 3) implementation of an initial pilot technical assistance project in waste minimization for the industrial/regulated community.

In order to be eligible to participate in the open competition for RITTA grants a State environmental agency must: 1) Currently be receiving State program grants under section 3011 of RCRA; 2) Submit a Letter of Intent to participate, signed by the State Environmental Agency Commissioner or Secretary, to EPA's Office of Solid Waste and Emergency Response (OSWER) by March 15, 1988; and 3) Submit a complete grant application package to EPA OSWER by May 15, 1988.

55. SAFE DRINKING WATER ACT - (SDWA) - a major aspect of the SDWA was the regulation of the use of underground injection wells for the disposal of hazardous materials. The major thrust of this regulatory program was to insure that wastes disposed through such wells do not contaminate underground sources of drinking water. The SDWA created a permit requirement to regulate the use of such wells.

56. STRICT LIABILITY - civil liability for an act or omission in which fault is irrelevant; if the defendants' conduct resulted in harm, they are liable regardless of whether they are negligent. Under common law, strict liability is applied for "ultrahazardous activities." CERCLA establishes this same standard of liability for releases of hazardous substances.

57. SUPERFUND AND REAUTHORIZATION AMENDMENTS of 1986 - (SARA) - amendments to CERCLA which provided additional funding and authority for site remediation.

58. TEXAS CLEAN AIR ACT - (TCAA) - provides for the establishment of emission standards for toxic substances by the Texas Air Control Board.

59. TEXAS CLEAN WATER ACT - (TCWA) - provides for the establishment by the Texas Department of Water Resources (predecessor agency of the Texas Water Commission) of discharge standards for toxic substances into natural waters. Enforcement of these standards is carried out by the Texas Water Commission, the Texas Department of Health, and the various county health districts.

60. TEXAS SOLID WASTE DISPOSAL ACT - (TSWDA) - Texas's counterpart of RCRA, this act regulates the storage, transportation, and disposal of hazardous waste. Municipal wastes (not including municipal hazardous wastes) are regulated by the Texas Department of Health. Industrial wastes and municipal hazardous wastes are regulated by the Texas Water Commission. The act establishes a permitting system for storage and disposal.

61. TOXIC SUBSTANCES CONTROL ACT - (TSCA) - regulates the production of materials defined as "toxic." The primary philosophy of this act is to prevent the production and dissemination of dangerous materials. TSCA requires that analyses be conducted and submitted to the EPA prior to the production of new products, and requires detailed analyses of certain existing products. Depending upon the results of these analyses, the EPA determines whether the product may be produced.

62. UNIVERSAL PRECAUTIONS - a system of handling all patients and their bodily substances in the same precautionary manner, based on the assumption that each and every patient is a diagnosed infectious disease. Replaces previous "isolation" procedures that singled out specific patients already diagnosed as infectious.

63. WASTE MINIMIZATION - see discussion at glossary entry #85, headed Waste Reduction/Minimization.

III. Waste Management Technologies

64. ATTENUATION OF WASTE - the process of reducing a contaminant level through dilution, sorption, or chemical or biological action.

65. CHEMICAL TREATMENT - detoxified by simple chemical treatment of wastes that cannot be recycled. Depending on the materials and industrial processes

involved, the specific treatments include neutralization, precipitation, oxidation and reduction, ion exchange, and fixation.

66. CO-DISPOSAL - refers to the disposal of MSW incineration ash along with normal MSW in the same landfill; considered appropriate only for ash that is tested for toxicity and found harmless; ash found hazardous should go to an ash monofill or to a hazardous waste landfill.

67. COMPOSTING - the controlled biological decomposition of organic solid waste under aerobic conditions.

68. CO-COMPOSTING - composting together both MSW and wastewater treatment sludge.

69. CONTROLLED BURNING - is synonymous with incineration in an incinerator, i.e. the combustion of solid waste with control of combustion air to maintain adequate temperature for efficient combustion: containment of the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion; and control of the emission of the combustion products.

70. DEEP-WELL INJECTION OF LIQUID WASTE - injection of fluids into deep permeable rocks far below fresh water aquifers. This usually involves deep, saline (or otherwise unusable) ground waters that are isolated from fresh water supplies. Any leaking from the deep-well injections could, therefore, endanger usable fresh-water supplies.

Ground water refers to the water existing in the soil and rocks, below the land surface. Surface water refers to lakes, streams, and rivers. Ground water percolates downward until it saturates all the pores in the soil and rock. The upper edge of this saturated zone is the water table.

71. DISPOSAL - the discharge, deposit, injection, dumping, spilling, leaking or placing of any solid or hazardous waste (whether containerized or uncontainerized) into or on any land or water in a way that any part of such waste might enter the environment via land, air or water, including groundwaters.

72. ENERGY/MATERIAL RECOVERY - a phrase used interchangeably with "waste recycling." One of the EPA's primary goals is to encourage hazardous waste recycling in the hopes that this could reduce the hazardous waste stream by as much as 20% or more. According to the Rensselaer Polytechnical Institute, the greatest potential for recovery lies in the following areas: recovery of energy from concentrated organic liquid waste; recovery of materials from concentrated organic liquid waste; and recovery of metals from industrial sludges and metal plating wastes.

73. ESSENTIALLY INSOLUBLE - any material which, if representatively sampled and placed in static or dynamic contact with deionized water at ambient temperature for seven days, will not leach any quantity of any constituent of the material into the water in excess of current U.S. Public Health Service or EPA. limits for drinking water as published in the *Federal Register.*

74. EXPERIMENTAL PROJECT - any new proposed method of managing municipal waste, including resource and recovery projects, which has enough merit to warrant approval by the Texas Department of Health.

75. HAZARDOUS WASTE MANAGEMENT TECHNOLOGIES - incorporate more than just careful disposal of waste. In the past, many environmentally sound management practices were not used due to their relatively high initial costs, and because there were no legal requirements for their use. The problems associated with past hazardous waste disposal practices have caused state and federal governments to require industry to manage its waste in a more environmentally acceptable manner.

Ideally, the following management options, given in order of preference, will be utilized to their maximum potential by the private sector: waste reduction (e.g. industrial process changes); waste exchange; energy/material recovery; waste incineration/treatment; and secure ultimate disposal.

See definition number 79 in this glossary for similar hierarchy of methods established by the Texas Solid Waste Disposal Act.

76. INCINERATION - the thermal destruction treatment technology most commonly used. Incineration can destroy a broad range of wastes by exposing them to high temperatures in the presence of air, thus bringing about nearly complete oxidation of the wastes. Federal regulations specify that a hazardous waste incinerator must meet a "destruction and removal efficiency" (DRE) standard of at least 99.99%—that is, one gallon of hazardous emission would be allowed for every 10,000 gallons of waste incinerated.

The two basic types of hazardous waste incinerators currently in use are: a) *liquid injection*- a well-developed technology used to burn nearly any combustible

liquid organic waste, at temperatures ranging up to 4000 degrees F., and b) *rotary kiln*- which can handle a wider variety of wastes, including solids, sludges, and bulk containerized wastes, in addition to liquids. Rotary kilns can destroy almost any waste that does not contain a very high amount of inorganic material.

77. LAND APPLICATION OF SOLID WASTE - the disposal or use of solid waste (including but not limited to, sludge or septic tank pumpings or mixture of shredded waste and sludge) in which the solid waste is applied within one meter (three feet) of the surface of the land.

78. OPEN BURNING OF SOLID WASTE - the unauthorized combustion of solid waste without control of combustion air to maintain adequate temperature for efficient combustion; containment of the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion; and control of the emission of the combustion products.

79. PREFERRED WASTE MANAGEMENT METHODS - hierarchy of methods cited in House Bill 2358, adding new language to the state Solid Waste Disposal Act. The legislation reads, in part, "in order to protect the public health and environment, it is declared to be the public policy of this state that, in generating, treating, storing and disposing of hazardous wastes, preference shall be given to the following methods, to the maximum extent economically and technologically feasible, in the order named: a) minimization of waste production; b) reuse and/or recycling of waste; c) treatment to destroy hazardous characteristics; d) treatment to reduce hazardous characteristics; e) underground injection, and f) land disposal.

80. SALVAGING - the uncontrolled and unauthorized removal of materials at any point in the solid waste management system.

81. WASTE MANAGEMENT ALTERNATIVES - applications of technology which focus on waste reduction in the belief that if less hazardous waste is generated, less will potentially be released into the environment from land disposal facilities.

Four of the methods currently available reduce to hazardous waste generation are:

a) *source segregation or separation* - which keeps hazardous waste streams from the production process separate in the plant thereby reducing waste volume, and making by-products easier to recover and reuse. Source segregation can prevent contamination of large volumes of nonhazardous waste by separating out the hazardous constituents, which can also be the first step in a recycling process. This is the simplest and probably the least expensive method of waste reduction.

b) *recycling and reuse*-involves recovering parts of the waste stream that can be used as a raw material, through in-plant processes, commercial (off-site) recovery and recycling, or waste exchanges.

c) *process modification*- changing the design or operation of manufacturing processes in order to make them more efficient in minimizing waste. This may involve major changes, such as modifying temperature or pressure, or the composition of raw materials.

d) *end-product substitution*- replacing a waste-intensive industrial product with one that is less waste-intensive.

e) *underground injection*; and

f) *land disposal*

82. WASTE ABATEMENT - substitution of a new primary industrial process for an old process to eliminate or reduce the quantity of waste produced.

83. WASTE EXCHANGES - organizations that operate to transfer the wastes of one firm to other firms that may use such wastes as raw material. Even though only a small percentage of hazardous waste is suitable for transfer, waste exchanges can reduce the amount of waste requiring treatment or disposal.

84. WASTE RECYCLING - the reclamation of value from waste streams through the application of unit processes such as distillation.

85. WASTE REDUCTION/MINIMIZATION -although the meanings attributed to these by terms by different sources vary, basic distinctions are maintained. Several sources distinguish the terms using the analogy of reduction as pollution prevention, whereas minimization is management of pollution once it is in existence. INFORM refers to reduction as "waste reduction at source" as involving characteristics fundamentally different from minimization programs, i.e., a) it is a preventive approach, whose goal is to reduce the generation of all hazardous wastes discharged to all

environmental media, as opposed to just reducing RCRA wastes; b) it seeks industry use of plant-wide waste reduction measures that prevent the formation of wastes i the first place. These measures can include process and equipment changes, product reformulations, chemical substitutions, and improved maintenance and housekeeping practices.

The goal of minimization is generally understood to be the avoidance of land disposal of hazardous wastes regulated under RCRA. HSWA established a three-tiered waste minimization, the requirements of which are met by self-certification based on each operator's determination of what efforts are currently available and economical. Enforcement of even such limited provisions as these has to date been a very low EPA priority. Minimization programs, according to INFORM, are not only limited by their focus on RCRA wastes. They make very little effort to use waste reduction at source, relying mainly on strategies that involve management of wastes already created. The strategies entail generally more expensive engineering-oriented pollution control solutions that corporate engineers and government regulators have traditionally uses.

IV. Types of sites and facilities

86. ABANDONED SITE - an inactive hazardous waste disposal or storage facility which cannot be easily traced to a specific owner, whose owner has gone bankrupt and subsequently cannot afford the cost of cleanup, or a location where illegal dumping has taken place.

87. BURIAL PARK - a tract of land which has been dedicated to the purposes of, and is used and intended to be used, for the interment of pathological waste in graves.

88. CEMETERY - a tract of land which has been dedicated to the purposes of, and is used and intended to be used, for the permanent interment of pathological waste, and includes: a) a burial park for earth interments, b) a mausoleum for crypt or vault interments, c) a crematory or crematory and columbarium for cinerary interments, and d) a combination of one or more thereof.

89. DUMP - a land site at which wastes are disposed of in a manner which does not protect the environment, is susceptible to open burning, or is exposed to the elements, vermin, or scavengers.

90. GENERAL PURPOSE LANDFILLS - according to EPA, landfills constructed without regard to their possible effects on water resources. They are covered intermittently, or daily, but do not have provisions for monitoring, leachate treatment, or special containment of wastes.

91. LAND DISPOSAL FACILITY - as defined by hazardous waste fee provisions in the Solid Waste Disposal Act, disposal by means of landfill includes a) a landfill, b) a surface impoundment, c) a waste pile, d) a facility at which land farming or a land application process is used, and e) an injection well. Land disposal does not include the normal application of agricultural chemicals or fertilizers, nor does it include disposal of hazardous waste retrieved or created due to remediation of an inactive hazardous waste disposal facility for which no federal or state permit was issued after the effective date of the Solid Waste Disposal Act.

RCRA defines land disposal as any placement of hazardous wastes in a landfill, surface impoundment, salt pile, injection, injection well, land treatment facility, salt dome formation, salt bed formation, or underground bed or cave.

92. OFF-SITE HAZARDOUS WASTE FACILITY - involves the handling, treatment, storage or disposal of hazardous waste in one or more of the following situations: a) the hazardous waste is transported via a commercial railroad, a public road or public waters, where adjacent land is not owned by, or leased to, the producer of the waste; b) the hazardous waste is not owned by, or leased to, the producer of the waste; and c) the hazardous waste is at a site which receives hazardous waste from more than one producer.

93. ON-SITE HAZARDOUS WASTE FACILITY - involves the handling, treatment, storage or disposal of hazardous waste on land owned by, or leased to, a waste producer and which receives waste produced only by the producer. Also considered on-site are situations where the disposal site and the area where the hazardous wastes are generated are on the same or contiguous property.

94. RESOURCE RECOVERY SITE - a solid waste processing site at which solid waste is processed for the purpose of extracting, converting to energy, or otherwise separating and preparing solid waste for reuse.

95. SANITARY LANDFILLS - designed to reduce environmental hazards by spreading and compacting wastes and covering the wastes with other materials. However, they do not usually monitor or treat leachate or separate incompatible wastes.

96. SECURE LANDFILLS - designed to prevent connection with ground and surface waters and to prevent different wastes from coming into contact with each other. This is usually accomplished with liner and capping materials, separate cells for specific waste types, continuous monitoring, and leachate collection systems.

97. SURFACE IMPOUNDMENT - a facility which is a natural or artificial depression or diked area formed primarily of earthen materials, which is designed to hold wastes containing free liquids (e.g. holding pits, ponds and lagoon).

98. TYPES OF MUNICIPAL SOLID WASTE SITES IN TEXAS - solid waste sites and facilities are classified according to function and/or population equivalency served by the Texas Department of Health. A municipal solid waste landfill site may also receive mixed wastes, and with the written approval of the department may also receive special wastes, including Class I nonhazardous solid waste and hazardous waste from small quantity generators, if properly handled and safeguarded in the landfill site.

There are nine types of municipal solid waste sites in Texas.

1). Type I. A Type I site shall be considered to be the standard landfill for the disposal of municipal solid waste and is encouraged in all cases. Type I sites are required for sites serving 5,000 persons or more. All solid waste shall be compacted and covered and covered at least daily except for areas designated to receive only brush and/or construction-demolition wastes which shall be covered at least monthly.

2). Type II. The health department may authorize a Type II site, serving less than 5,000 persons, when relevant factors indicate that a frequency of less than daily compaction and cover will not result in any significant health problems. A Type II site shall not be conducted within 300 yards of a public road unless the health department conducts a site evaluation and determines that the proposed location will be acceptable. The operational standards prescribed for Type I sites shall be followed except that the frequency of compaction and cover may be extended up to seven days.

3). Type III. The health department may authorize a Type III site for a site serving less than 1500 persons. In a Type III site, the frequency of compaction and covering will be specified by the department.

4). Type IV. The health department may authorize a Type IV site for the disposal of brush, construction-demolition waste and/or rubbish that is free of other solid wastes.

5). Type V. Separate solid waste processing sites are classified as Type V. These sites shall encompass processing plants that transfer, incinerate, shred, grind, bale, compost, salvage, separate, dewater, reclaim, and/or provide other processing of solid waste.

6). Type VI. A Type VI site may be authorized by the health department for a site involving a new or unproven method of managing or utilizing municipal solid waste, including resource and energy recovery projects.

7). Type VII. The health department may authorize a Type VII site for the land treatment of sludge.

8). Type VIII. Sites for hazardous solid waste are classified as Type VIII. These sites include all contiguous land and structures, other appurtenances, and improvements on the land used for processing/treating, storing, or disposing of hazardous solid waste. A site may consist of several storage or disposal units (e.g. landfills, surface impoundment storage units, waste piles, tanks, incinerators, or combination of them).

9). Type IX. A closed disposal site or an inactive portion of a disposal site used for extracting materials for energy and material recovery or for gas recovery is classified as Type IX.

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