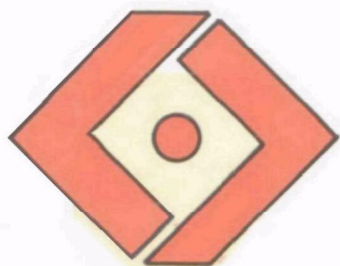


DESCRIPTION OF THE WASTE MANAGEMENT
DATA BASE SYSTEM



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DESCRIPTION OF THE WASTE MANAGEMENT DATA BASE SYSTEM

I. INTRODUCTION

This document presents an overview of the Waste Management Data Base System (WMDBS) and provides the reader with a general introduction to this system. As such, the discussion is of a nontechnical nature, concentrating on the conceptual/design aspects of WMDBS as well as on the user's interface with the system.

This document has three major sections in addition to this introduction. The first section describes WMDBS and includes a discussion of (1) the background and purpose of WMDBS, (2) the implementation of WMDBS, (3) the development of WMDBS's data base, and (4) the data access design. Additionally, example screens are included as well as a listing of data which will be available.

The second major section outlines the progress on WMDBS to date and discusses what still needs to be completed. The final section discusses additional items and options which could be considered for addition to WMDBS in the future.

II. GENERAL DESCRIPTION OF WMDBS

WMDBS may be conceptualized as consisting of three major parts: a data base, a series of menus which allow the user to interface with this data base and group of programs which run the menus and retrieve the data requested by the user. This description will address the first two parts of the system only, since a discussion of the third would of necessity be

more technical than most readers of this document might desire. The description begins with a discussion of the background and purpose of WMDBS. This is followed by a brief, non-technical description of how the system will be implemented and what the advantages and disadvantages are of this method of implementation. The next section deals with WMDBS's data base and its development. This description ends with a discussion of the menus which will be used to allow the user to interface with this system. This final subsection will include example screens illustrating how a user might obtain information on landfills.

A. Background and Purpose

During the past seven years, numerous RCRA treatment, storage, and disposal regulations have been researched, analyzed, proposed and promulgated. As a result of these efforts, surveys (e.g., Mail, Site Visit, Burner) have been conducted, statistics analyzed, costs have been estimated, and many reports have been prepared. Unfortunately, the information from this vast and growing data on hazardous waste facilities and the costs to regulate them has not been available in a consolidated, up-to-date data base. Instead, this information has often remained within the original reports which are scattered throughout EPA and contractor files. Analysts, needing to assemble data from these reports, must go back to the original documents, printouts, and worksheets to extract the desired information on a case-by-case basis. Analysts must also determine which of the informational sources are the most applicable to their needs, and then try to locate the desired reports, printouts or worksheets.

The intent of WMDBS is to provide a mechanism by which these data on hazardous waste facilities can be conveniently stored and retrieved without the inconvenience and possible confusion described in the preceding paragraph. Thus, to construct the data base portion of WMDBS, recent (i.e., within the last four years) reports and surveys on hazardous waste facilities have been reviewed and relevant information extracted. These

data have or will be entered into the WMDBS data base. This information can be conveniently retrieved in a form useable to the Economic Analysis Branch (EAB) for the analysis and development of policies and regulations. Additionally, WMDBS is designed so that as new regulations are proposed and new technologies develop, this information can be easily added to the system.

B. System Implementation

WMDBS will be implemented on an IBM AT microcomputer using dBASE III. The AT will provide adequate space to store the system's data base as well as provide adequate speed for handling requests made by system users. dBASE III is a sophisticated data base management system for microcomputers and will provide the software necessary to store, retrieve, manipulate and display information in a manner which will meet the needs of EAB.

WMDBS will be implemented as a menu-driven system providing a user friendly interface with the system and the machine. The advantage of such an interface is that the menus act as intermediaries between the user and data base, thus, relieving the user from the burden of learning the data retrieval language and understanding the structure of the data base. The user simply has to respond to questions which define the type and amount of information desired. The computer will then respond by executing the steps necessary to retrieve and present the information requested. The menu programs are written to respond to only those options specified on the screen. This restriction of system response prevents new users from accidentally entering a key or function which could damage the program or data base, and keeps more familiar users from performing operations prohibited for reasons of system security or integrity.

With a menu-driven system the user is limited to a predefined set of operations, since only those options specified in the menu can be selected. dBASE III, however, provides enough flexibility so that changes to the

system can be easily integrated with already functioning operations. Thus, most user perceived limitations of the menu system can be easily remedied, allowing the system to grow as the use and demands of the system change. Finally, a knowledgeable user can go around the menu system.

The WMDBS program is made up of several sub-programs called modules. Each module performs a specific function within the overall system. At this time, there are seven such modules: CONTROL, TECHNOLOGY, PROFILE1, PROFILE2, COST1, COST2, and COST3.

Except for CONTROL, each module is designed to only work when the user chooses to look at one technology. Additional modules will have to be added to handle the multiple technology comparison option. The specific functions for the presently developed modules are as follows:

- CONTROL is the main controlling module of the program. Initially it asks the user to enter the type of comparison that is to be performed.
- TECHNOLOGY presents the technology choices on the screen and prompts the user to select the technology to be worked with.
- PROFILE1 presents a list of all of the profile information from which the user can select.
- PROFILE2 controls the presentation of profile information selected in PROFILE1.
- COST1 displays the available cost information on the screen and prompts the user to select what cost information they would like to see.

- COST2 prompts the user to select the display format for the cost information.
- COST3 displays the cost information in a spreadsheet format allows the user to perform some manipulations on the data.

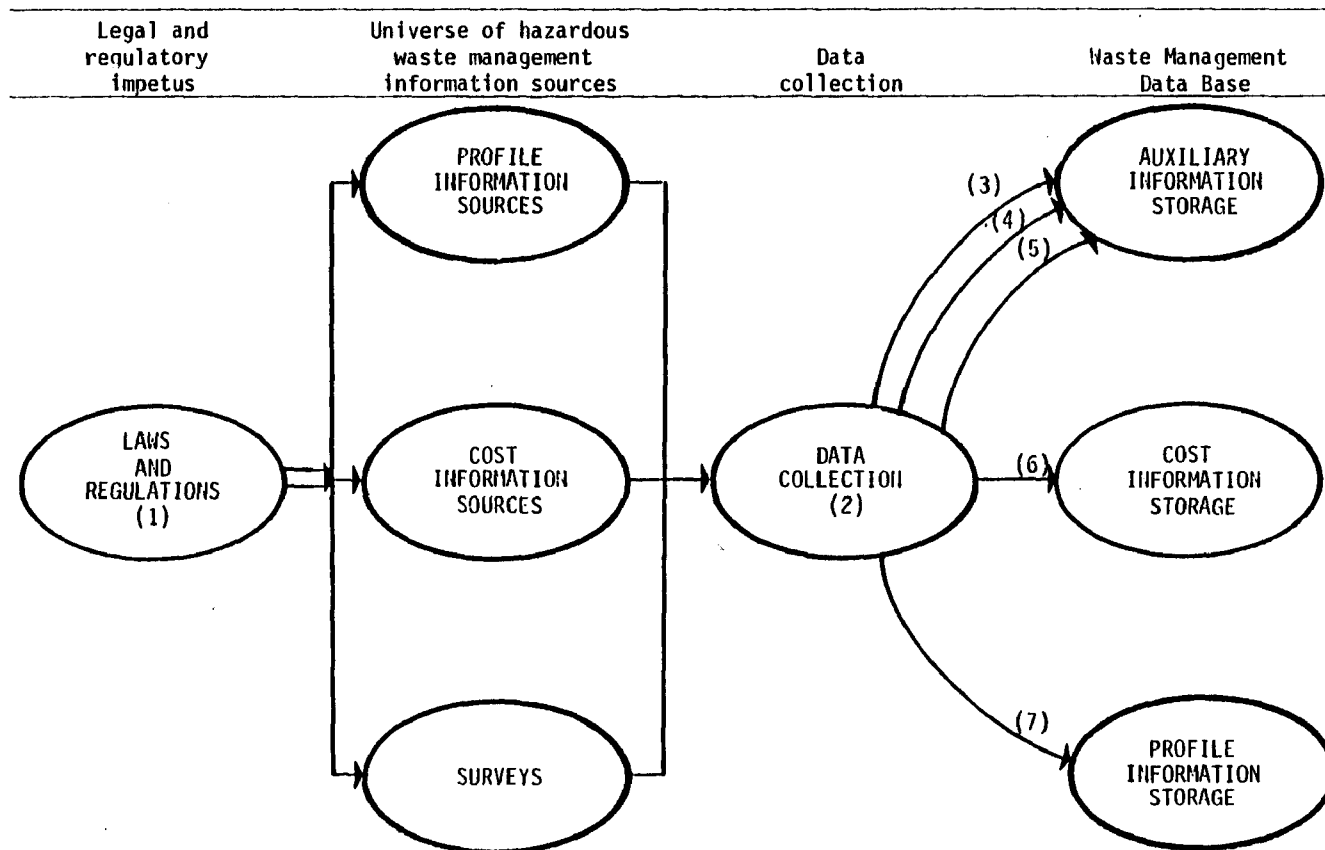
C. Development of the WMDBS Data Base

Figure 2-1 illustrates the process of information extraction and storage used for WMDBS. Hazardous waste laws and regulations are developed whose effects must be assessed. Surveys and studies are in turn generated during this assessment. These studies and surveys are examined and reviewed, and relevant information is taken from them and entered into the data base portion of WMDBS. We anticipate that as new reports and surveys are conducted, new information will be added to the system and old information will be updated or replaced.

There are three types of data in the data base portion of WMDBS -- profile, cost and auxiliary. Profile information includes data which serves to describe hazardous waste facilities and technologies such as number of units by technology, size distributions for each technology, facility capacities, and waste quantities. A listing of the profile information which has been collected to date is presented in Table 2-1. This listing is organized by technology and the sources for these data are noted.

The cost information portion of the data base will contain cost estimates for managing (i.e., storage, treatment and disposal) hazardous waste under RCRA. The majority of these data can be organized by technology, within technology by design type (e.g., unlined, double synthetic liner) and within design type by size. Originally, these costs were going to be taken directly from the cost/impact reports which have been written for each of the technologies and for the treatment and storage of hazardous waste. However, we found, for example, that for each of the four major land

Figure 2-1. Data collection and storage schematic for Waste Management Data Base System



- (1) Proposed and promulgated pertinent laws and regulations.
- (2) Profile and cost data deemed appropriate are extracted and collected from sources.
- (3) Source title and other bibliographic data.
- (4) Regulatory authority for creation of source information.
- (5) Assumptions used in source.
- (6) Cost information.
- (7) Profile information.

Table 2-1. Profile information which has been collected for WMDBS

Technology	Data available	Source
CONTAINERS	Number of facilities using technology, 1981	Mail Survey
	Number of storage facilities using technology, 1981	Mail Survey
	Number of TSD facilities using technology, 1981	Mail Survey
	Total quantity of hazardous waste stored using technology, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Average quantity of HW stored/facility, during 1981:	
	Bil gal	Mail Survey
	Thous MT	Mail Survey
	Average storage time (hours)	Mail Survey
	Average total gallons of HW stored/facility in containers on any day, 1981	Mail Survey
	Average maximum gallons of HW stored/facility in containers on any day, 1981	Mail Survey
DISPOSAL SURFACE IMPOUNDMENTS	Number of facilities using technology, 1981	Mail Survey
	Number of disposal facilities using technology, 1981	Mail Survey
	Number of TSD using technology, 1981	Mail Survey
	Total quantity of HW disposed of in technology, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Average quantity of HW disposed of per facility using technology, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Total gallons of waste disposed of using technology, 1981	Mail Survey
GENERATORS	Total capacity, 1981	Mail Survey
	Estimated expansion capacity, 1981	Mail Survey
	Total number of units	Mail Survey
	Number of HW generators	Mail Survey
	Number of generators by 2-digit SIC	Mail Survey
	Number of generators by 3-digit SIC	Mail Survey
	Number of generators by waste type	Mail Survey
	Number of generators by EPA region	Mail Survey
	Total gallons of HW generated, 1981	Mail Survey
	Amount of total generated HW which was recycled off-site by another firm, 1981	Mail Survey
	Amount of total HW which is recycled on-site, 1981	Mail Survey
	Amount of total HW which is recycled off-site by same firm	Mail Survey
	Total gallons of HW shipped off-site in 1981	Mail Survey
	Percent of total HW shipped off-site which is sent to firms owned by others	Mail Survey
	Average total gallons of HW at a generation facility in 1981	Mail Survey
	Average optimum size of a waste shipment (gal)	Mail Survey
	Amount of HW accumulated in tanks	Mail Survey
	Amount of HW accumulated in containers	Mail Survey
	Amount of HW accumulated in other types of storage	Mail Survey
	Number of facilities	Biennial Report, 1985
	Number of facilities by EPA Region	Biennial Report, 1985
	Total quantity of waste generated	Biennial Report, 1985
	Number of facilities exceeding storage criteria	Waste Oil, 1984
	Number of facilities subject to volume based regulatory criteria	Waste Oil, 1984
	Quantity of industrial used oil generated in 1983 by SIC (million gallons)	Waste Oil, 1984
	Number of facilities exceeding capacity requirements by SIC	Waste Oil, 1984

Continued . . .

Technology	Data available	Source
INCINERATORS	Number of facilities with technology, 1981	Mail Survey
	Number of treatment facilities using technology, 1981	Mail Survey
	Number of TSD using technology, 1981	Mail Survey
	Total quantity of HW treated using technology, 1981:	
	Bil gal	Mail Survey
	Mil MT	Mail Survey
	Average quantity of HW processed/facility using technology, 1981:	
	Bil gal	Mail Survey
	Mil MT	Mail Survey
	Median facility capacity (thous. MT/yr)	Booz Allen, 1980
	No. of commercial facilities with technology by EPA Region	Booz Allen, 1980
	Total no. of commercial facility with technology, 1980	Booz Allen, 1980
	Vol. of HW processed by comm. off-site facilities using technology by EPA Region	Booz Allen, 1980
	Total volume of HW processed by commercial off-site facility using technology, 1980	Booz Allen, 1980
	Engineering & construction time requirements for a median facility	Booz Allen, 1980
	Total quantity of all wastes burned, 1981	Booz Allen, 1980
	Avg. heat value of HW burned in 1981 (Btu/T)	Booz Allen, 1980
	Avg. hourly feed rate of HW to incinerator (lbs/hr)	Booz Allen, 1980
	Avg. total gal. of HW residual produced/facility, 1981	Booz Allen, 1980
	Avg. % of HW residuals shipped off-site/facility	Booz Allen, 1980
	Avg. day/year incinerator operated (8 hrs/day)	Booz Allen, 1980
	Avg. normal min. & max. combustion chamber temp.	Booz Allen, 1980
	Avg. normal min. & max. combustion chamber residence time	Booz Allen, 1980
INJECTION WELLS	Number of facilities using technology, 1981	Mail Survey
	Number disposal facilities using technology, 1981	Mail Survey
	Number of TSD using technology, 1981	Mail Survey
	Total quantity of HW disposed of in technology, 1981:	
	Bil gal	Mail Survey
	Mil MT	Mail Survey
	Avg. quantity/facility of HW disposed of in technology, 1981:	
	Bil gal	Mail Survey
	Mil MT	Mail Survey
	Total number of units	Mail Survey
LANDFILLS	Total gal. of waste disposed of in technology, 1981	Mail Survey
	Total capacity, 1981	Mail Survey
	Number of facilities using technology, 1981	Mail Survey
	Number of disposal facility using technology, 1981	Mail Survey
	Number of TSD facility using technology, 1981	Mail Survey
	Total quantity of HW disposed of using technology, 1981:	
	Bil gal	Mail Survey
	Mil MT	Mail Survey
	Avg. amount HW disposed per facility using technology, 1981:	
	Bil gal	Mail Survey
	Mil MT	Mail Survey
	Number of units by size group	DPRA & EPA, 1984
	No. of units affected, by the regulation, by design type	DPRA, 1984
	Number of unites affected by the regulation	EPA, 1982
	Number of units needing counter pumping	EPA, 1982
	Total number of units in U.S.	EPA, 1982
	No. of commercial facilities with this technology by EPA region	Booz Allen, 1980
	Total number of commercial facilities with this technology in the U.S., 1980	Booz Allen, 1980

Technology	Data available	Source
LANDFILLS (Con'd)	Plume size (acres/unit) for units needing counterpumping	EPA, 1982
	Average size (acres/unit) for units needing counterpumping	EPA, 1982
	Engineering & construction time requirements for a secure landfill (years)	Booz Allen, 1980
	Vol. of HW processed by offsite commercial facility in 1980 by EPA Region (TMT)	Booz Allen, 1980
	Total volume of HW processed at off-site commercial facilities using this technology, 1980	Booz Allen, 1980
	Number of units	Mail Survey
	Average size/unit (avg. overall units in U.S.)	EPA, 1982
LAND TREATMENT	Number of facilities using technology, 1981	Mail Survey
	Number of disposal facilities using technology, 1981	Mail Survey
	Number of TSD using technology, 1981	Mail Survey
	Total quantity HW disposed of using technology, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Avg. quantity of HW disposed of/ unit using technology, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Number of units by size	EPA, 1982
	Number of units needing corrective action	EPA, 1982
	Number of units affected by regulation	EPA, 1982
	Number of commercial facilities offering this HW service by EPA region	EPA, 1982
	Total number of commercial facilities offering this HW service in the U.S., 1980	Booz Allen, 1980
	Number of land treatment units	EPA, 1982 & Mail Survey
	Engineering & construction time requirements	Booz Allen, 1980
	Average acreage of units needing counterpumping	EPA, 1982
	Average plume size of units needing counterpumping	EPA, 1982
	Total volume of HW processed by commercial facilities (off-site) using this technology, 1980	Booz Allen, 1980
	Volume of hazardous waste processed by commercial facilities (off-site) by EPA region	Booz Allen, 1980
	Total capacity for treatment, 1981	Mail Survey
OTHER DISPOSAL METHODS	Number of facilities with this technology, 1981	Mail Survey
	Number of disposal using this technology, 1981	Mail Survey
	Number of TSD using this technology, 1981	Mail Survey
	Total quantity of HW disposed of in this technology, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Average quantity of HW disposed of/facility using this technology, 1981:	
	Mil gal	Mail Survey
	MMT	Mail Survey
OTHER STORAGE METHODS	Number of facilities using technology, 1981	Mail Survey
	Number of storage facilities using technology, 1981	Mail Survey
	Number of TSD using technology, 1981	Mail Survey
	Total quantity of HW stored in technology, 1981:	
	Stored	Mail Survey
	Bil gal	Mail Survey
	MMT	Mail Survey
	Avg. quantity of HW stored/facility stored in technology, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey

Technology	Data available	Source
OTHER TREATMENT METHODS	Number of facilities using process, 1981	Mail Survey
	Number of TRT facilities using process, 1981	Mail Survey
	Number of TSD facilities using process, 1981	Mail Survey
	Total quantity of HW processed:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Average quantity assessed per facility:	
	Bil gal	Mail Survey
	MMT	Mail Survey
STORAGE SURFACE IMPOUNDMENTS	Number of facilities with technology, 1981	Mail Survey
	Number of storage facilities using technology, 1981	Mail Survey
	Number of TSD facilities using technology, 1981	Mail Survey
	Total quantity HW handled by technology, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Average quantity HW handled by technology/facility:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Total gallons of waste handled by technology, 1981	Mail Survey
	Total capacity for technology, 1981 (gal)	Mail Survey
	Total expansion capacity, 1981 (gal)	Mail Survey
	Total number of units, 1981	Mail Survey
STORAGE TANKS	Number of facilities using technology, 1981	Mail Survey
	Number of storage facilities using technology, 1981	Mail Survey
	Number of TSD facilities using technology, 1981	Mail Survey
	Total quantity of hazardous waste stored using technology, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Average quantity of HW stored/facility, 1981:	
	Bil gal	Mail Survey
	Thous MT	Mail Survey
	Average number of HW storage tanks/facility, 1981	Mail Survey
	Total gallons of hazardous waste stored in, 1981	Mail Survey
	Average storage time (hours)	Mail Survey
	Average number of lined tanks/facility	Mail Survey
SURFACE IMPOUNDMENTS	Number units by size group	DPRA & EPA, 1984
	Number of affected units	DPRA & EPA, 1984
	Number of units	EPA, 1984
	Average size	EPA, 1984
	Number of units needing corrective action	EPA, 1984
	Avg. acreage of unit needing corrective action	EPA, 1984
	Plume size for unit needing corrective action	EPA, 1984
TANKS	Number of facilities by types and sizes of tanks	ICF, 1985
TREATMENT SURFACE IMPOUNDMENTS	Number of facilities with this technology, 1981	Mail Survey
	Number of facilities using technology, 1981	Mail Survey
	Number TSD using technology, 1981	Mail Survey
	Total quantity of HW processed, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Avg. quantity of HW processed/facility, 1981:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Estimated total gallons of waste processed, 1981	Mail Survey

Continued . . .

Technology	Data available	Source
TREATMENT SURFACE IMPOUNDMENTS (Con'd)	Total capacity, 1981 (gal)	Mail Survey
	Average capacity per facility, 1981 (gal)	Mail Survey
	Total number of units	Mail Survey
	Total expansion capacity, 1981 (gal)	Mail Survey
TREATMENT TANKS	Number of facilities with this technology, 1981	Mail Survey
	Number of treatment facilities using this technology, 1981	Mail Survey
	Number of TSD facilities using this technology, 1981	Mail Survey
	Quantity of waste handled in this manner:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Average quantity handled in this manner/facility:	
	Bil gal	Mail Survey
	MMT	Mail Survey
	Average number of units per facility	Mail Survey
	Total gallons of HW treated, 1981 (exclude wastewater treatment)	Mail Survey
	Total capacity of treatment tanks, 1981 (excluding wastewater treatment)	Mail Survey
	Average time hazardous waste is treated in tanks (hours)	Mail Survey
	Average number of lined tanks at facility	Mail Survey
TSD FACILITIES	Number of facilities	Mail Survey
	Number of facilities by SIC	Biennial Report, 1985
	Number of facilities by waste group	Mail Survey
	Number of facilities by EPA Region	Mail Survey
	Number of facilities by ownership type	Biennial Report, 1985
	Number of facilities by 3-digit SIC	Mail Survey
	Number of facilities, by groundwater contamination method	Mail Survey
	Number of facilities in seismic area	Mail Survey
	Number of facilities on a floodplain	Mail Survey
	Number of facilities by method of covering closure costs	Mail Survey
	Number of facilities by method of covering post-closure costs	Mail Survey
	Number of facilities by ownership type	Mail Survey
	Amount of total waste handled by ownership type	Mail Survey
	Amount of managed waste that was hazardous	Mail Survey
	Amount of HW that was received from off-site facilities	Mail Survey
	Amount of HW that was received from small quantity generators	Mail Survey
	Quantity of the waste handled by ownership type:	
	Mil gal	Mail Survey
	MMT	Mail Survey
	Quantity of HW received from off-site, 1981	Mail Survey
	Quantity of waste handled by waste code, 1981	Mail Survey
	Average number of up gradient wells per facility	Mail Survey
	Total quantity of waste managed in 1981 (gal.)	Mail Survey
	Total HW management capacity, 1981 (gal)	Mail Survey
WASTE PILES	Number of facilities with technology, 1981	Mail Survey
	Number of storage facilities using this technology, 1981	Mail Survey
	Number of TSD using this technology, 1981	Mail Survey

Continued . . .

Technology	Data available	Source
WASTE PILES (Con'd)	Total quantity of HW stored using this technology, 1981:	
	811 gal	DPRA, 1984
	MMT	Mail Survey
	Average quantity HW stored/facility using this	
	technology, 1981:	
	811 gal	Mail Survey
	MMT	Mail Survey
	Number of units by size	DPRA, 1984 & EPA, 1982
	Total number of units affected by design type	
	(Amended Part 265)	DPRA, 1984
	Total number of units	DPRA, 1984
	Number of units affected by regulation	EPA, 1982
	Number of units needing counterpumping	EPA, 1982
	Average acreage of a unit needing counterpumping	EPA, 1982
	Plume size for an average unit needing counterpumping	EPA, 1982
	Average total quantity stored (yd ³)/facility	Mail Survey
	Average max. quantity stored (yd ³)/facility	Mail Survey
	Average quantity removed at one time (yd ³)/facility	Mail Survey

disposal technologies, several cost/impact reports have been written and the costs from these reports are difficult to compare because of (1) changes in RCRA in the interim between reports and (2) differences in assumptions between reports. Additionally, the models used to develop the costs have become more sophisticated as the costing of RCRA regulations has become better understood, again making comparisons with previous cost estimates difficult. Consequently, cost models recently developed by Pope-Reid Associates will be used to generate most of the costs in this portion of the data base. The technologies whose costs will be generated in this fashion include landfills, surface impoundments, waste piles, and land treatment. The costs for other technologies (containers, tanks, injection wells, and incinerators) treatment and storage will be taken from reports as they are completed and then approved by EAB. Costs will be adjusted, using appropriate indices, so that they reflect the same year to allow inter-technology comparisons.

In addition to profile and cost information for the different disposal technologies, such data will also be included for special classes of waste generators and handlers, including small quantity generators and waste oil generators, handlers and recyclers. Information will also be included on hazardous waste generators as a group as well as on treatment, storage and disposal facilities (TSD's). Pope-Reid Associates is currently working on an Integrated Facility Cost Model which will allow the analyst to look at the costs at a TSD facility which uses more than a disposal unit and/or technology. Results of this model will be included in WMDBS for common TSD facility configurations generated from information in the Mail Survey.

Each piece of profile and cost information in WMDBS will be referenced so that the user will be able to find out the source of the data requested. Consequently, the auxiliary portion of WMDBS's data base will include a complete bibliographic reference for each of the sources. A regulatory summary will also be included for those reports (i.e., cost reports) needing such summaries to allow the user to conveniently obtain this

information. Additionally, when appropriate a topical listing of assumptions and corresponding page numbers will be included for certain reports.

In terms of the computer programming for the data base portion of WMDBS, programs have only been developed to date for profile and cost information. The profile information is contained in a data base called Profile, which contains seven fields:

- TITLE contains the text which is displayed on the screen.
- SOURCE contains the source of the information.
- T is used to mark a title line.
- N is the number of lines needed to display a particular profile item.
- SELECTED is used to mark the information that the user has selected to see.
- TECH is the technology for which the information applies.

A complete description of these fields is shown in Table 2-2.

The cost information is contained in a data base called Cost, which contains 17 fields:

- FORM used to identify special lines for formatting output.
- TECHNOLOGY identifies the technology.
- SIZE identifies the unit size of the technology.
- DESIGN identifies the design type.
- T1 used to identify special lines for formatting output.
- T2 used to identify special lines for formatting output.
- TITLE displays the cost information title.
- F1-F15 contains various cost information.

A complete description of these fields is shown in Table 2-3.

Table 2-2. Description of the seven fields making up the profile portion of the WMDBS data base

Field	Field name	Type	Width
1	TITLE	Character	75
2	SOURCE	Character	10
3	T	Character	1
4	N	Numeric	2
5	PAGE	Numeric	3
6	SELECTED	Character	1
7	TECH	Character	<u>2</u>
TOTAL			94

Table 2-3. Description of the seventeen fields making up the cost portion of the WMDBS data base

Field	Field name	Type	Width
1	FORM	Character	1
2	TECHNOLOGY	Character	7
3	SIZE	Character	9
4	DESIGN	Character	9
5	T1	Numeric	2
6	T2	Numeric	2
7	TITLE	Character	28
8	F1	Character	9
9	F2	Character	9
10	F3	Character	9
11	F4	Character	9
12	F5	Character	9
13	F6	Character	9
14	F7	Character	9
15	F8	Character	9
16	F9	Character	9
17	F10	Character	9
18	F11	Character	9
19	F12	Character	9
20	F13	Character	9
21	F14	Character	9
22	F15	Character	<u>9</u>
TOTAL			193

D. Data Access Design

This section describes and explains the screens which serve as the user interface with WMDBS. As previously indicated, WMDBS has been designed as a menu-driven system. Consequently, this section will walk the reader through the series of menus and screens which will be available to the user to access WMDBS.

Figure 2-2 shows the entrance screen to WMDBS. As can be seen, the user has four choices:

- (1) look at information from only one technology
- (2) compare two or more technologies
- (3) examine the information for all technologies, or
- (4) exit the system.

The user simply enters the number of the option desired. To facilitate presentation, we will assume that the user chooses to look at only one technology and we will follow the screens through under this assumption. (If the user had chosen either Option 2 or 3, the screens would be similar to those which will be shown below for one technology except that the displays will focus on a technology comparison rather than a presentation of data for only one technology.)

The screen shown in Figure 2-3 will appear after the user has chosen to examine one technology; it lists those technologies for which WMDBS has information. At this point in WMDBS's development, there are 17 choices. Some of these choices (e.g., generators, TSD's) are technically not "technologies," but rather represent facilities which may use one or more of the listed hazardous waste technologies. Later data additions for waste oil, small quantity generators, and integrated facilities may necessitate a renaming of this listing.

Once a technology has been selected, the system allows the user to choose whether profile or cost information will be examined by displaying the

Figure 2-2. The entrance screen to the Waste Management
Data Base System

Welcome to the Waste Management Data Base System

Select one of the following options:

1. One technology
2. Technology comparison
3. All technologies
4. Exit system

Enter your selection (1-4):

Figure 2-3. Screen allowing choice of technology

Waste Management Data Base System Technology Choices

Select one of the following technologies

- | | |
|----------------------------------|------------------------------------|
| 1. Containers | 10. Other treatment methods |
| 2. Disposal surface impoundments | 11. Storage surface impoundments |
| 3. Generators | 12. Storage tanks |
| 4. Incinerators | 13. Surface impoundments |
| 5. Injection well | 14. Treatment surface impoundments |
| 6. Landfills | 15. Treatment tanks |
| 7. Land treatment | 16. TSD's |
| 8. Other disposal methods | 17. Waste piles |
| 9. Other storage methods | |

Enter your selection (1-17):

following menu at the bottom of the technology screen (see Figure 2-4):
Select (C)ost or (P)rofile information. The user enters either a "C" or a "P."

Assume for purposes of illustration that the user has chosen landfills as the technology and profile information as the data type of interest. The screen shown in Figure 2-5 would next appear. The banner indicates the information type (profile) requested as well as the technology (landfills). Four types of profile information automatically appear under the banner:

- the number of facilities in the U.S. for the technology chosen
- the amount of unused capacity in 1981 for the technology
- the quantity of waste managed in 1981 by the technology, and
- the total capacity for the technology in 1981.

Beneath this information is a listing of the other profile information which is available for landfills. This same format is followed no matter which technology is chosen by the user. The only difference would be the numbers appearing for the four automatically appearing data items and the types of information which would appear in the listing of "other" available profile information.

To choose from the "other" available profile information, the user must place an "X" next to the data desired as is shown in Figure 2-6. In this case, the user has chosen to look at:

- total quantity of hazardous waste disposed of using technology, 1981, and
- average amount of hazardous waste disposed of per facility using technology, 1981.

Figure 2-7 shows the information which would then appear on the screen for this request. Once all the requested information has appeared, the main

Figure 2-4. Technology screen with Cost/Profile Information Menu shown

Waste Management Data Base System Technology Choices

Select one of the following technologies

- | | |
|----------------------------------|------------------------------------|
| 1. Containers | 10. Other treatment methods |
| 2. Disposal surface impoundments | 11. Storage surface impoundments |
| 3. Generators | 12. Storage tanks |
| 4. Incinerators | 13. Surface impoundments |
| 5. Injection well | 14. Treatment surface impoundments |
| 6. Landfills | 15. Treatment tanks |
| 7. Land treatment | 16. TSD's |
| 8. Other disposal methods | 17. Waste piles |
| 9. Other storage methods | |

Enter your selection (1-17): 6

Select (C)ost or (P)rofile Information

Figure 2-5. Example screen showing the format for selecting profile information after a technology has been chosen

Waste Management Data Base System
Profile Information
Technology: Landfill

The number of facilities, 1981: 199

Quantity of waste managed, 1981: 7,553,910 metric tons

Unused capacity, 1981: 177,015,148 metric tons

Total capacity, 1981: 251,636,566 metric tons

Source: Mail Survey

Total quantity of HW disposed of using technology, 1981
Average amount HW disposed per facility using technology, 1981
Number of units by size group
Number of units affected, by the regulation, by design type
Number of units affected by the regulation
Number of units needing counter pumping
Total number of units in U.S.
Number of commercial facilities with this technology by EPA region
Total number of commercial facilities with this tech. in the U.S., 1980
Plume size (acres/unit) for units needing counterpumping
Avg. size (acres/unit) for units needing counterpumping

Enter an 'X' by the desired information:

Figure 2-6. Example illustrating procedure
for choosing profile information

Waste Management Data Base System Profile Information Technology: Landfill
--

The number of facilities, 1981: 199

Quantity of waste managed, 1981: 7,553,910 metric tons

Unused capacity, 1981: 177,015,148 metric tons

Total capacity, 1981: 251,636,566 metric tons

Source: Mail Survey

X	Total quantity of HW disposed of using technology, 1981
X	Average amount HW disposed per facility using technology, 1981
	Number of units by size group
	Number of units affected, by the regulation, by design type
	Number of units affected by the regulation
	Number of units needing counter pumping
	Total number of units in U.S.
	Number of commercial facilities with this technology by EPA region
	Total number of commercial facilities with this tech. in the U.S., 1980
	Plume size (acres/unit) for units needing counterpumping
	Avg. size (acres/unit) for units needing counterpumping

Enter an 'X' by the desired information:

Figure 2-7. Requested profile information

Waste Management Data Base System Profile Information Technology: Landfill
--

Total quantity of HW disposed of using technology, 1981

.81 Billion Gallons, or
3 Million Metric Tons

Source: Mail Survey

Average amount HW disposed per facility using technology, 1981

15 Thousand Metric Tons
4.1 Million Gallons

Source: Mail Survey

screen (Figure 2-1) will then appear. The user can then make further selections or exit the system.

To illustrate what cost information is available to the user, we will now assume that the user has chosen to look at landfill cost information. Because cost information is available for both commercial and non-commercial facilities, the user will have to specify which landfill type is of interest. For this example, we will assume that the user has chosen noncommercial landfills. Figure 2-8 shows the screen which would appear once these decisions have been made. This screen would be the same for all technologies for which RCRA costs have been estimated. As can be seen, a series of costs are listed (first year, closure, annual, post closure). Beneath this listing is a menu which allows the user to choose those costs of interest. If the user is interested in seeing all of the listed first year, closure, annual or post closure costs, either F, A, C, or P is typed. If the user is interested in only the totals for these costs, a "T" would be typed. To obtain specific costs, an I (individual costs) would be typed in; and the user would then place an X next to those costs of interest.

Once the cost selection has been made, the user will then be asked to decide on the display format (Figure 2-9). There are two choices:

- (1) view the costs for all design types for a specified size (hereafter referred to as Display Option 1), or
- (2) view the costs for all standard sizes 1/ for a specified design type (hereafter referred to as Display Option 2).

If the user chooses to view all design types (Display Option 1), he will be asked to choose a specific size. If the alternate display is chosen, the user must choose a specific design type.

1/ These are the sizes which are commonly used in regulatory cost studies for each of the technologies.

Figure 2-8. Replica of screen if cost information
is selected by the user

Waste Management Data Base System
Profile Information
Technology: Landfill

First Year

Containment costs
G.W.M. well construction
Other capital costs
Initial G.W. testing
Initial rekeeping and adm costs
Total

Closure Costs

Closure of last cell
Other capital costs
G.W.M.
Recordkeeping
Total

F)irst Year
T)otal Costs

A)nnual Costs
I)ndividual Costs

Annual Costs

Cell cover costs
Containment system cost
O and M costs
G.W. monitoring
Record keeping
Total

Post Closure Costs

Equipment replacement
G.W. monitoring
Inspection
Recordkeeping
Total

C)losure Costs
P)ost Closure Costs

Enter Selection:

Figure 2-9. Screen allowing the user to choose the cost information display format

Waste Management Data Base System
Profile Information
Technology: Landfill

Select the Display Format

1. By design type within size
2. By size within a design type

Enter your selection (1, 2):

Figure 2-10 shows the case where first year costs are displayed according to Display Option 2. The costs for all standard sizes are shown where a single synthetic liner (SSL) is chosen as the specified design type. Figure 2-11 shows the alternate display option with 2,000 MT/year chosen as the specified size.

The overall format shown in Figures 2-10 and 2-11 will be followed no matter which technology and costs are examined. Note that a menu appears at the bottom of the screen. The options are:

- Left, Right, Up or Down -- These options allow the user to roll the screen. They are needed because the space on the screen is limited and not all of the data can be shown at once.
- Change -- This option allows the user to change the specified design type or size. Figure 2-12 shows the situation where the user has selected "Change" and now must decide on a new design type.
- By -- This option allows the display type to be changed between Display Option 1 (view the costs for all design types for a specified size) and Display Option 2 (view the costs for all standard sizes for a specified design type).
- Info -- This option allows the user to return to the screen (Figure 2-8) listing all the available cost information, so that other costs can be viewed.
- National -- This option causes national costs to be calculated for the displayed costs. Figure 2-13 shows the case where national first-year costs are calculated.
- Cost Conv. -- This option allows the cost units to be changed from thousands of dollars per year to dollars per metric ton, or vice versa.

Figure 2-10. First year costs displayed showing the costs for all standard sizes when single synthetic liner (SSL) has been chosen as the specified design type

Waste Management Data Base System					
Cost Information for Landfills					
In 84 Dollars Dollars in Thousands	Design Type: SSL				
Sizes (MT)	500	2000	6000	15000	35000
# of Facilities	N.A.*	N.A.	N.A.	N.A.	N.A.
<hr/>					
First Year					
Containment Costs	19.6	51.2	109.7	1,021.3	372.5
G.W.M. Well Construction	63.1	85.5	108.8	133.0	160.1
Other Capital Costs	176.8	315.9	500.3	734.1	1046.5
Initial G.W. Testing	5.0	5.0	5.0	5.0	5.0
Initial Rec and Adm					
Costs	12.7	12.7	12.7	12.7	12.7
Total	414.8	708.6	1113.8	1654.7	2423.6
<hr/>					
L)eft R)ight U)p D)own C)hange B)y I)nfo N)ational Z)Cost Conv					
F)unction Q)uit					
SELECT ONE					

* N.A. = Not available at this time.

Figure 2-11. First year costs displayed showing costs for all design types when 2000 MT/year has been chosen as the specified size

Waste Management Data Base System		
Cost Information for Landfills		
In 84 Dollars	Size: 2000	
Dollars/Metric Ton		
Design Type	UL	SSL
# of Facilities	8	5
First Year		
Containment Costs	4.1	25.6
G.W.M. Well Construction	0.0	42.8
Other Capital Costs	145.5	158.0
Initial G.W. Testing	0.0	2.5
Initial Rec and Adm Costs	0.0	6.4
Total	197.1	1482.8
L)eft R)ight U)p D)own C)hange B)y I)nfo N)ational Z)Cost Conv		
F)unction Q)uit		
SELECT ONE		

Figure 2-12. Screen illustrating the use of the "Change" option

Waste Management Data Base System					
Cost Information for Landfills					
Design Type: SSL					
In 84 Dollars Dollars in Thousand	500	2000	6000	15000	35000
Sizes (MT) # of Facilities	N.A.*	N.A.	N.A.	N.A.	N.A.
<hr/>					
First Year					
Containment Costs	19.6	51.2	109.7	1,021.3	372.5
G.W.M. Well Construction	63.1	85.5	108.8	133.0	160.1
Other Capital Costs	176.8	315.9	500.3	734.1	1046.5
Initial G.W. Testing	5.0	5.0	5.0	5.0	5.0
Initial Rec and Adm					
Costs	12.7	12.7	12.7	12.7	12.7
Total	414.8	708.6	1113.8	1654.7	2423.6
<hr/>					
UL	SSL	SCL	DL(S*C)	DSL*C	

SELECT DESIGN

* N.A. = Not available at this time.

Figure 2-13. Screen illustrating the use of the "National" option

Waste Management Data Base System					
Cost Information for Landfills					
Design Type: SSL					
In 84 Dollars Dollars in Thousand	500	2000	6000	15000	35000
Sizes (MT)	N.A.*	N.A.	N.A.	N.A.	N.A.
# of Facilities					
<hr/>					
First Year					
Containment Costs	19.6	51.2	109.7	1,021.3	372.5
G.W.M. Well Construction	63.1	85.5	108.8	133.0	160.1
Other Capital Costs	176.8	315.9	500.3	734.1	1046.5
Initial G.W. Testing	5.0	5.0	5.0	5.0	5.0
Initial Rec and Adm					
Costs	12.7	12.7	12.7	12.7	12.7
Total	414.8	708.6	1113.8	1654.7	2423.6
National First Year Costs	N.A.	N.A.	N.A.	N.A.	N.A.
<hr/>					
L)eft R)ight U)p D)own C)hange B)y I)nfo Q)uit N)ational					
Z)Cost Conv F)unction					
SELECT ONE					

* N.A. = Not available at this time.

- Function -- This option allows the manipulation of the shown cost information. This portion of WMDBS has as yet not been completed, but the user will be able to:
 - subtract one column of numbers from another to find the cost differential between two different sizes or design types,
 - calculate total net present value of the costs (the user will specify the discount rate and the inflation rate; a facility life of 20 years will be assumed), or
 - calculate annual revenue requirements (the user will specify the same things as for net present value, as well as the real rate of return on invested capital, excluding inflation)

- Quit -- This option allows the user to return to the main screen (Figure 2-2).

One other option which the user has which does not appear in the menu is to specify a "non-standard size," i.e., a size other than those which automatically appear in the cost displays. The user, in the case of an Option 2 display, would just roll the screen until the column after the largest standard size appears. The size heading will initially read zero. The user will cursor up to the heading and enter a size. The cost information for that size will then automatically appear on the screen.

III. PROGRESS TO DATE

To date, over 15 reports or surveys have been reviewed and data have been extracted from them. 1/ These references are listed in the Appendix. A

1/ Note some of these reports explain the models PRA will be developing and the cost generation equations; consequently, the data from these will likely not be entered directly into WMDBS.

large number of other reports and documents have been examined, but were determined inappropriate for WMDBS at this time. We anticipate that the WMDBS data base will be continuously updated and expanded as new reports and surveys appear. Some of those we hope to include in the near future are: the Commercial Facilities survey, the Subtitle D survey, the incinerator RIA reports, waste oil cost work, and the small quantity generator RIA.

Approximately half of the collected profile data have actually been entered into the data base itself. No cost information has as yet been entered, since Pope-Reid Associates (PRA) is in the process of developing cost equations which will be used to directly generate the costs for many of the technologies. Once these equations are available, they will be entered into the system. We presently have costs for the standard landfill and surface impoundment sizes, but we have opted to wait until the equations are ready to enter this information, because it is possible we may need only to use the cost equations if their calculation times are not too slow. This would save storage space. Cost information for technologies not yet covered by the PRA models will be entered as it becomes available.

Most of the screens for examining one technology have been developed. Those which have not been developed are those dealing with the function option (subtraction, NPV, ARR and annualized costs). All of the developed screens are operational and can access the data base for requested information. We will shortly develop the function screens and those screens where two or more technologies are examined.

IV. FUTURE OPTIONS

WMDBS should not be viewed as a static and fixed system. We have attempted to design it so that it can be easily updated, expanded or changed. We anticipate that as new studies and surveys are conducted, these will be added to the system. Additionally, information areas which have as yet not

been considered for the data base could be included. One of these areas is risk assessment and estimation, since information is needed in the assessment of regulatory options. Having this information readily available to the EAB staff would likely be very useful.

As the EAB staff uses WMDBS, new ways of using and combining the profile and cost information will likely become apparent. Given the flexibility of the system, it can be readily changed to perform these new uses. Additionally as EAB needs change, it is anticipated that WMDBS will be altered and expanded to meet these needs.

APPENDIX

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REFERENCES

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