

CHAPTER 2. COLLECTING INSTALLATION SOLID WASTE INFORMATION -- STEP I

2.1 INTRODUCTION. This chapter discusses on solid waste information sources, waste characterization, present and future operating management procedures, and education and awareness efforts. Obtaining accurate solid waste data is a complex procedure due to the diversity of sources as shown below.

2.2 SOLID WASTE INFORMATION SOURCES. Accurate records on the solid waste types, as defined in Appendix C, is vital. This information is obtained from a combination of government (in-house) sources or outside (contractor) sources. A procedure for gathering, keeping, and maintaining accurate records of all the solid waste generated will enhance the usefulness of the data collected. Appendix D lists Engineering Field Division and claimant points of contact.

Table 2-1 shows the various in-house and non-installation information sources with a brief narrative given below:

2.2.1 In-House Activity Information Sources. In-house activity information sources include:

2.2.1.1 Public Works Department. Are most likely to perform or monitor solid waste collection and disposal contracts. Several departments within Public Works perform various tasks and maintain records such as:

! **Grounds and Roads Maintenance.** Responsible for green waste from golf courses, ballparks and housing areas, road maintenance debris (concrete, asphalt), and possibly inert waste recycled as road bed material.

! **Transportation.** Responsible for purchase, placement, and movements of dumpsters, route planning with full or partial pickup and disposal, transfer station operations, solid wastes resulting from maintenance and operations of vehicles, the transportation system, and all the associated record keeping.

! **Contracts.** Responsible for solid waste contracts, specifications, performance requirements, cost data basis (weight tickets), record keeping, and modifications.

! **Environmental.** Responsible for the record keeping of Notice of Violations (NOVs), solid waste annual reports (SWAR), regulations, compliance documents, current and future regulations, instructions, legislative laws, and local restrictions.

2.2.1.2 Morale Welfare and Recreation (MWR). Is a potential manager unit for a recyclable materials sales program. It should be noted that the Commanding Officer makes the decision as to which activity will be the manager unit. MWR's potential participation is:

! **Qualified Recycling Program (QRP).** A QRP is a prerequisite for the accumulation of any proceeds from sales of recyclable materials sold through Defense Reutilization and Marketing Office (DRMO). The QRP process is discussed in great detail in Qualified Recycling Program (QRP) Development Guide, NEESA 5-010A of April 1991.

! **QRP Management.** The Commanding Officer shall designate the manager of the QRP. Potential managing organizations are Morale, Welfare, and Recreation Department, Environmental Department, Public Works Department, etc.

Table 2-1. Solid Waste Information Sources

IN-HOUSE INFORMATION SOURCES	NON-INSTALLATION INFORMATION SOURCES
PUBLIC WORKS DEPARTMENT ! Roads & Grounds (landscape) ! Transportation ! Contracts ! Environmental ! Janitorial Services	PRIVATE CONTRACTOR/MUNICIPALITY ! Contractor Specialty ! Type of Waste ! Weight Tickets ! Local Regulations
MORALE WELFARE & RECREATION ! Qualified Recycling Program ! Sales of Recyclables ! Revenues From Sales ! Accounting Records	LANDFILL ! Type & Specialty ! Operations/Restrictions ! Capacity & Life-Span ! Local Regulations
DRMO ! Sales of Recyclables with Revenues to QRP/MWR ! Sales of Excess Materials with Revenues, Going to the U.S. Treasury ! Revenue Accounting ! Amount of Recyclables	RECYCLING CENTER ! Recyclable Specialty ! Commodity Prices ! Quality of Recyclables ! Restrictions ! Local Regulations ! Recyclable Amounts ! List of Recycling Centers
GOVERNMENT CONTRACTS OFFICE ! Contract Documents ! Requirements ! Specifications ! Weight Tickets ! Costs/Amount Data ! Modifications	
ENVIRONMENTAL DEPARTMENT ! Compliance Records ! Notice of Violations ! Federal/State/Local Regulations ! Solid Waste Annual Reports	

! **Sales.** The QRP manager will be responsible for all funds received and disbursed, and reviews all projects funded with recycling sales proceeds.

! **Records.** The QRP manager will be responsible for maintaining fiscal accountability for all QRP funds and maintenance of records for the recycled quantity and type of materials sold.

2.2.1.3 Defense Reutilization and Marketing Office (DRMO). Sale of Government procured material is DRMO's responsibility. Reference (1) is the qualified recycling program development guide. The two types of sale revenues for record keeping purposes are:

! **Sales of QRP Materials and Products.** This is the revenue from damaged or scrap materials with the proceeds given to the QRP effort.

! **Sales of Excess Materials.** This is the revenue from non-damaged or slightly damaged materials with proceeds given to the U. S. Treasury's general fund.

2.2.1.4 Government Contract's Office. Certain activities utilize the services of the Government contract's office, separate from the public work's contract office, for solid waste services contracts. Responsibilities and information are:

! **Collection and Disposal Contracts.** Contract specifications detailing collection, disposal, cost, weight tickets, and other record keeping requirements.

! **Multiple Contractors.** More than one contractor could be involved due to specialty solid waste hauling for recycling purposes or restrictions.

! **Solid Waste Data.** The type, volume or weight, and associated costs of solid waste as per contract requirements.

2.2.1.5 Environmental Department. Many activities have an environmental group separate from public works whose function is to administer compliance with environmental actions.

2.2.2 Non-Installation Information Sources. Non-installation information sources include:

2.2.2.1 Private Contractor. One or more contractors could be involved with collecting and disposing of various types of solid waste, such as: garbage, trash, green waste, debris, etc. A private contractor can be a municipality operating under local regulations and awareness policies.

2.2.2.2 Landfill. Landfill information includes: type and specialty, weight tickets, pricing, operations records, capacity, daily tonnage, waste type restrictions, life span, recycling facilities, and future plans.

2.2.2.3 Recycling Center. Specialized recycling centers exist and are a source of information for commodities price listings, restrictions, quality of recyclables, records receipts, and regulations.

2.3 SOLID WASTE CHARACTERIZATION. Characterization of collected solid waste is a crucial step in the development of a SWMP. Solid waste types and quantities provide the solid waste manager with credible options for compliance with OPNAVINST 5090.1A requirements for waste source reduction, segregation, recycling, waste treatment, and finally, landfill disposal. A characterization study should provide: seasonal, geographic, and demographic variations as well as unique military installation's generated waste. This section will provide two approaches for waste characterizations and

typical results.

The first approach characterizes solid waste by using one of three types of field surveys: basic, general, and detailed. Only the detailed survey will reflect the most accurate data for the waste stream constituents. The second approach uses indirect or alternate methods to identify solid waste characterization.

2.3.1 Field Survey Types. Three types of surveys are available depending on the degree of accuracy and amount of solid waste reduction desired. Field surveys provide the most reliable data for solid waste characterization. The three survey types are:

2.3.1.1 Basic Survey. The simplest field survey is a basic survey that focuses on the larger categories, by percentage of the solid waste stream. The Franklin study, a national municipal solid waste characterization study used by EPA, can be used as a general guideline. The study shows percentages by weight and volume, of the waste stream constituents. For example, the paper category comprises 34.1 percent of the solid waste stream by volume and 40 percent by weight, while yard waste 10.3 by volume and 7.6 percent by weight. Figures of this nature serve as a guideline to specify areas to concentrate on. So, for a 10 percent reduction or less of the waste stream, instituting a good program to recycle paper and/or instituting composting program may suffice.

2.3.1.2 General Survey. This is an intermediate survey that will suffice for solid waste reductions of up to 25 percent. A general survey is recommended for a facility to begin implementing a program of source reduction, reuse, and recycling, but does not result in an accurate portrayal of all the solid waste stream constituents. The steps for a general survey include: determining who should be surveyed and the categories to be surveyed, sampling the waste stream, and projecting the results for the entire base. The accuracy of the results depend on the extent of the categories surveyed. A general guideline for selecting categories to be surveyed is to double the amount of reduction desired, and then select one or more categories that add up to, or exceed, this amount.

2.3.1.3 Detailed Survey. A waste characterization study, by definition, identifies the constituent materials that compose the solid waste generated. It should be statistically representative including seasonal variations. The constituent materials should be identified by volume, weight percentage, material type, and source of generation such as: residential, commercial, industrial, governmental, etc. Currently, the state of the art method for a detailed waste characterization study is the ASTM Method No. 34.01-016R6.

2.3.2 Alternate Methods. Alternate methods for gathering solid waste characterization data are derived from existing generic surveys and other available records, such as:

- ! **The Franklin Study.** This is a municipal solid waste characterization study for national averages performed by Franklin and Associates under contract for the Environmental Protection Agency (EPA). The Franklin Study is also used as part of the basic survey.
- ! **Comparable Activity.** Surveys performed at one activity might apply for a similar activity with weighting factors used for size differential. For example, a training facility's solid waste characterization data could be compared to another training facility's data of the same size.
- ! **Contractor's and/or Municipal Records.** Local contractors and municipalities might maintain solid

waste characterization records for their jurisdiction. Such data should include the Activity's, if the collection and disposal of its solid waste is performed by the contractor or municipality. However, the Navy's waste stream will most likely be different in certain respects.

- ! **Institutional Records.** Any type of waste characterization performed at private institutions, such as universities or private shipyards, might be applicable to a Navy training facilities or shipyards.
- ! **Solid Waste Management - NAVFAC MO-213.** Appendix F of NAVFAC MO-213 provides estimation techniques for solid waste survey plans. It consists of solid waste quantity emission factors, generation rate models, and composition by weight percentages at military facilities.

2.3.3 Typical Results. Table 2-2 is an average composition of solid waste from various Navy installation sources. Figure 2-1 is a pie chart showing a 1984 Navy survey for total Navy solid waste constituents. Figure 2-2 is a 1988 municipal average data of solid waste generated as characterized by the Franklin Study. This figure clearly shows the relative generation of the various waste categories. Figure 2-3 is also a 1988 municipal average data showing recycled percentages of the various waste categories as characterized by the Franklin Study. These two figures show a distinct need for the recycling of paper, yard trimmings, plastic, glass, and food. Figures 2-2 and 2-3 provide the type of data required to implement the solid waste management options.

2.4 PRESENT SOLID WASTE COLLECTION, TRANSPORTATION, AND DISPOSAL PROCEDURES AND PRACTICES. Understanding current solid waste collection, transportation, disposal, and recycling procedures is a prerequisite for SWMP development. Table 2-1 lists various service groups that are interrelated in solid waste management operations. The success of the program is based on a successful management and interdependence of each of the supporting organizations. Solid waste functions requiring organizational identification and identified responsibility include:

TABLE 2-2
Sample Composition of Solid Waste From Various Navy Installation Sources

Solid Waste Component	Source of Solid Waste (Percent by Weight)								
	Transmission Building/Laundry Facilities	Exchanges & Commissaries	Ordnance Manufacture & Assembly	Offices, Training Rooms, Dispensaries, & Quarters	Food Service (Cafeteria, Mess, Galley, Canteen, Club)	Shops, Berthing Piers, & Wharves	Storehouses & Warehouses	Ways-Drydocks, Marine Railway, Motor Pool	Golf Courses & Housing
Paper	84	84	74	72	87	88	64	47	13
Garbage	<1	<1	<1	<1	5	<1	<1	<1	15
Metal	3	2	<1	5	5	7	3	8	
Textiles	<1	<1	<1	<1	<1	5	<1	4	
Plastic	7	9	4	12	14	<1	11	7	5
Leather	NO	NO	<1	NO	NO	<1	NO	NO	
Rubber	<1	NO	<1	<1	NO	<1	NO	2	
Vegetation	3	<1	<1	3	<1	<1	<1	NO	2
Inerts	2	<1	<1	<1	<1	1	1	2	
Wood	NO	4	6	2	3	5	15	29	
Glass, Ceramics	NO	<1	NO	<1	4	<1	<1	<1	
Golf/Yard Waste	NO	NO	NO	NO	NO	NO	NO	NO	65
Miscellaneous*	NO	<1	11	2	<1	5	2	<1	
Total	100	100	100	100	100	100	100	100	100

*Includes fluorescent bulbs, fibrous barrels, and carpet trimmings.

**NO = None Observed.

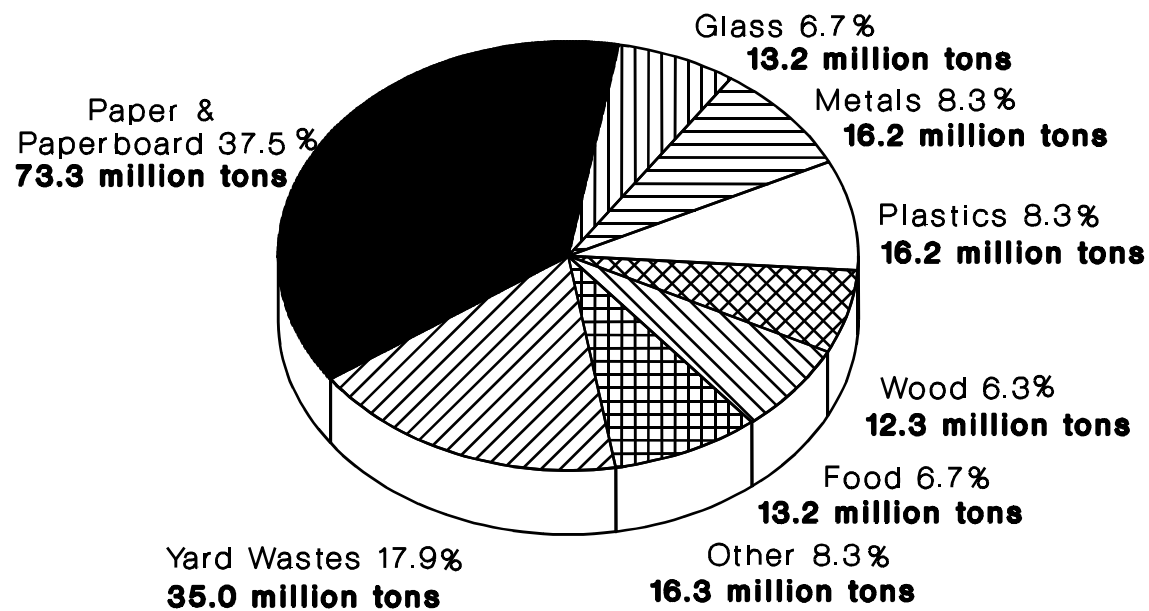


Figure 2-1 Sample Solid Waste Constituents.

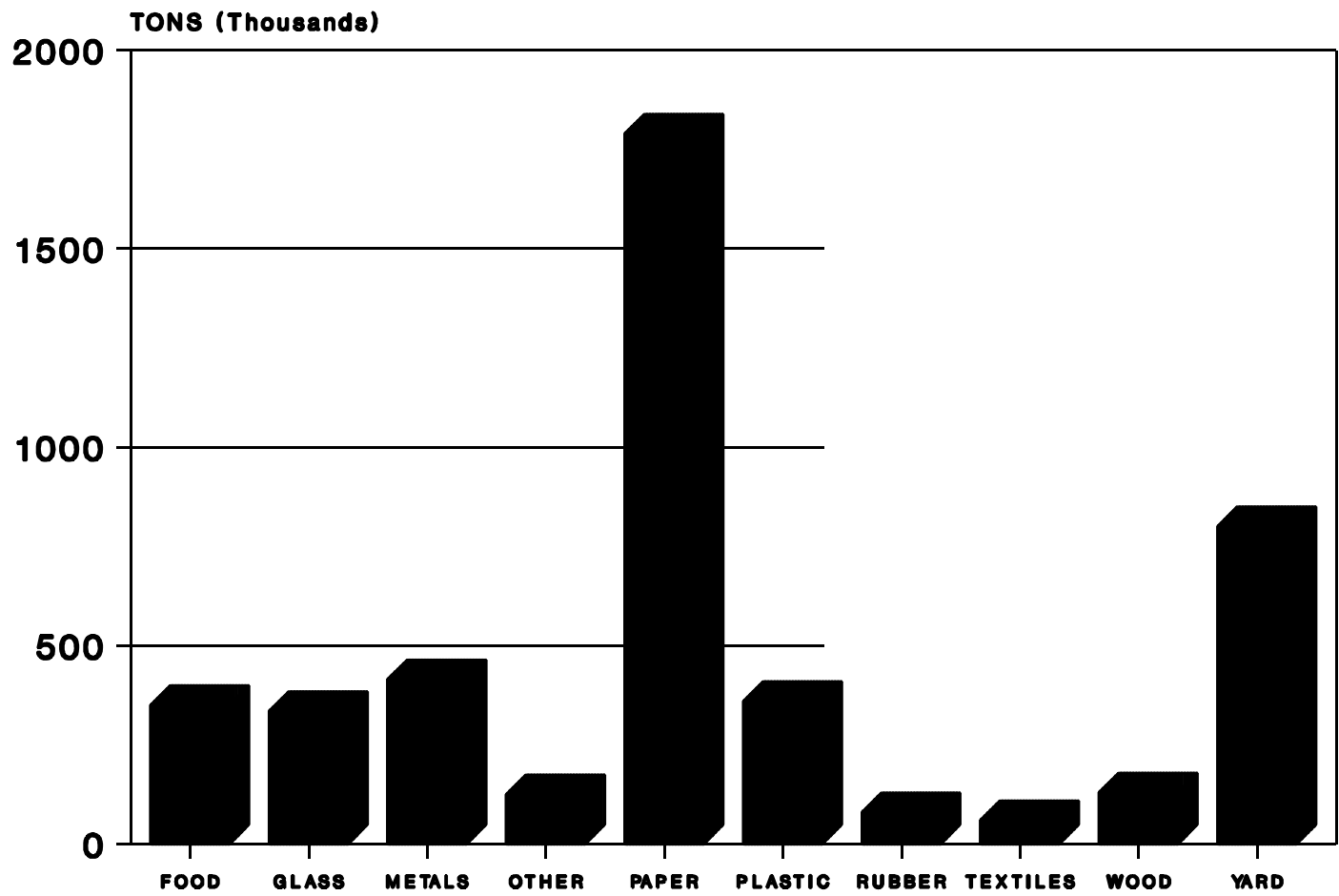


Figure 2-2. Sample data of solid waste generated.

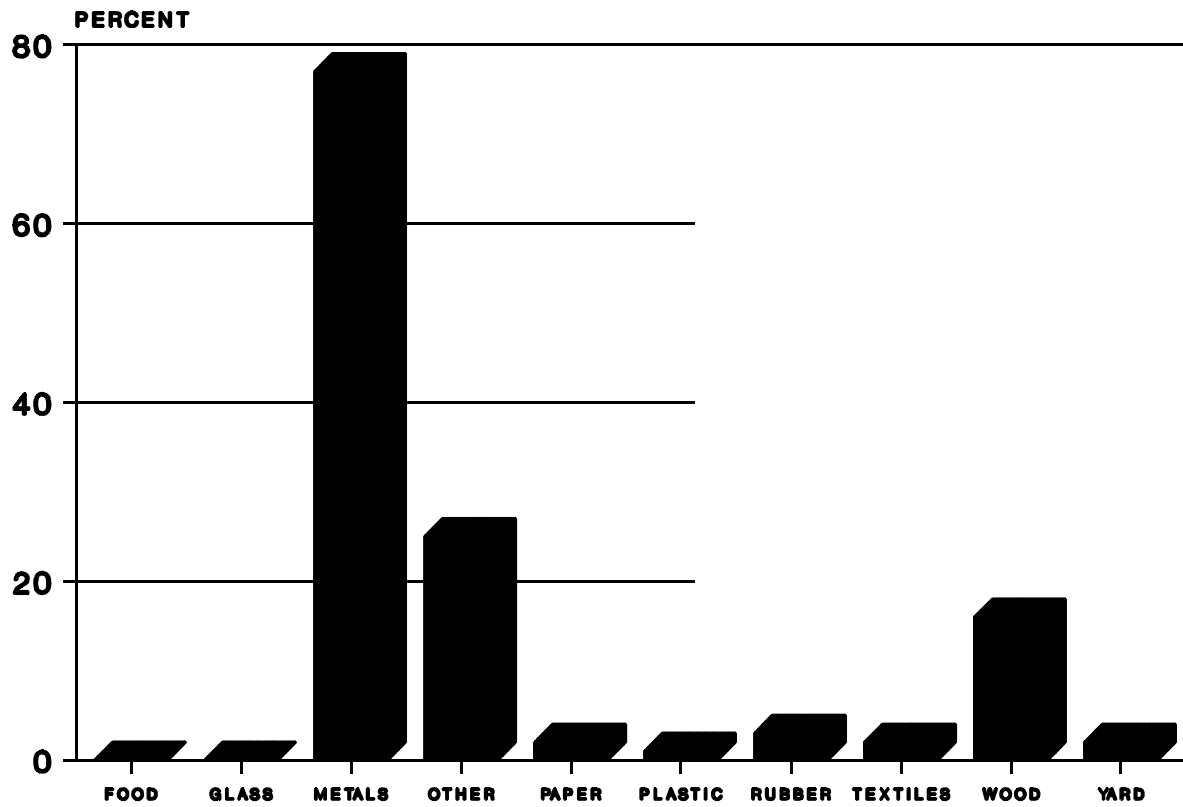


Figure 2-3. Sample data of solid waste percentage recycled.

- ! **Contract(s).** Administering and monitoring of solid waste contract(s) as applicable.
- ! **Collection Procedures.** Collecting solid waste and recyclables within the complex.
- ! **Disposal Procedures.** Hauling solid waste and recyclables on and off-base.
- ! **Costs.** Cost accounting for solid waste and recyclables.
- ! **Recycling Program.** Managing the recycling program or QRP.
- ! **Marketing Updates.** Maintaining and updating current commodity pricing for recyclables.
- ! **Regulation Updates.** Maintaining and updating federal, state, and local regulations.
- ! **SWARs.** Preparing the fiscal year (FY)-based Solid Waste Annual Report, a requirement beginning with FY90.
- ! **Record Keeping.** Recording maintenance of all aspects of solid waste, recyclables, amounts, cost and revenue records, permits, etc.
- ! **Future Planning.** Future planning for solid waste management.

2.5 FUTURE SOLID WASTE MANAGEMENT. The solid waste manager should anticipate future solid waste management regulations and objectives for minimization, diversion, projected landfill closures, and economic feasibility. Factors affecting future solid waste management include:

2.5.1 Regulations and Requirements for Reduction Goals. Restrictions and solid waste diversion goals are prime targets for local and state governments. For example, California Assembly Bill (AB) 939 requires counties to divert 25 percent and 50 percent of their solid waste from the landfill by 1995 and 2000 respectively. Therefore, it is imperative that solid waste managers stay current on all future state and municipal requirements. A California shipyard recommends to read and understand the state and local regulations carefully to see what is credited and not credited toward a recycling goal. In their case, scrap metals tonnage was not credited toward the recycling goal but the Solid Waste Annual Report does count scrap metal as recycling.

2.5.2 Procurement of Recyclable Goods. Procurement of recyclable goods encourages recycling and stimulates the recycling market. The recycling program needs to be economically feasible as well as environmentally acceptable. Buying of recycled products justifies and perpetuates the selling of your recyclable materials.

2.5.3 Recyclable Materials Markets. Promising new treatments and processing techniques transform certain solid waste types into marketable products. Reference 2 cites the following examples:

- ! Waste newspapers and vegetable fiber containing no synthetic binders are made into recyclable panels that could serve as carpet underlayment, light partitions, false ceilings, subroofs, and thermal insulations.

- ! Rubber trimmings of such items as tires, basketballs, and tennis shoes are made into a non-skid granular paving material that adheres to almost any surface and can be grouted, color-coated, and imprinted with patterns.
- ! Polystyrene cups, plates, and meat trays are made into insulation boards with an insulation value of R-5 per inch.
- ! A new packaging material made from recycled newspaper is itself recyclable. The new material cushions cargo as effectively as polystyrene.

2.5.4 End Use Technologies. Incineration, composting, and pyrolysis (the chemical decomposition of a material in the absence of oxygen), are end use technologies that enhance the utility of solid waste as a useful product. Consideration of these technologies for use will assist you in meeting future diversion goals requirements, as well as providing energy.

2.5.5 Landfill Outlook. Landfill life expectancies vary with the recycling diversion rate. The current overall recycling rate for Navy and Marine Corps installations is 25.7 percent. FY91 SWAR data analysis indicates a 14 year average life expectancy for current landfills. As the recycling rate reaches 25 percent and 50 percent, landfill life expectancy should increase.

2.5.6 Solid Waste Generation Sources. Accurate solid waste data is a crucial step for developing a SWMP. Table 2-3 provides a probable point source generation for the various waste categories.

2.6 EDUCATION AND AWARENESS. Education and awareness are vital for a successful solid waste management program. Without the proper information, base personnel will not know how they can participate in a solid waste management program. Appendix E is a sample package of fliers, posters, and newspaper articles. Increased awareness, with assistance from the Public Affairs Office, is achieved through:

2.6.1 Base Instructions, Letters, Flyers. Department heads should be informed in writing, by the base Commanding Officer, of a solid waste collection policy which includes: materials to be collected, collection route and schedule, and where to place recycling containers. This information should then be conveyed to the employees during staff meetings.

2.6.2 Newspaper Articles. Submit feature articles on solid waste to the base newspaper. Include the activity on the mailing list of the "Morale, Welfare, and Recreation Bulletin" (Write to: MWR Training Unit, Bldg. 1489, NAS Patuxent River, MD 20670-5489) and the NEESA "Minimizer" call: (805) 982-4893 (DSN 551-4893) or (805) 982-6514 (DSN 551-6514) so the base can share solid waste ideas and technology with other Naval installations in the form of news articles. Submit articles to local newspapers about the activity's progress in solid waste management as well as other activities progress. Recycling news articles should be forwarded to BUPERS (Pers-651F2) for inclusion in the quarterly Recycling Network News.

TABLE 2-3
Probable Solid Waste Generation Sources

Facility Type	Paper Category					Plastics Category			
	Cardboard	Mixed	Newspaper	Hi-Grade	Non-Recycle	HDPE	PETE	LDPE (film)	Other Plastics
Admin/Office	x	x	x			x			
Comp Lab				x					
Commissary	x	x			x	x	x	x	x
Exchange	x							x	
Rec/Gym/Bowl	x					x	x	x	
Golf/Baseball	x	x			x	x			
Supply/Warehouse	x								
Servmart	x								
Shipping	x								
Housing		x	x		x	x	x	x	
BOQ/BEQ		x	x		x	x	x	x	
Machine Shops									
Carpenter Shops		x							
Hobby Shop									x
Auto Shop	x	x							x
IWTP/Sewage									
Hospital/Dispensary	x	x	x			x			x
Dental	x	x							

TABLE 2-3
Probable Solid Waste Generation Sources (Continued)

Facility Type	Glass Category		Other Waste Categories				
	Recyclable	Non-Recyclable	Inert Solids	Household Hazard	Sewage Sludge	Special Wastes	Infectious
Admin/Office	x						
Comp Lab							
Commissary	x	x					
Exchange							
Rec/Gym/Bowl	x	x					
Golf/Baseball	x	x					
Supply/Warehouse							
Servmart							
Shipping							
Housing	x	x					
BOQ/BEQ	x	x					
Machine Shops							
Carpenter Shops							
Hobby Shop				x			
Auto Shop				x			
IWTP/Sewage					x		
Hospital/Dispensary						x	x
Dental						x	x

TABLE 2-3
Probable Solid Waste Generation Sources (Continued)

Facility Type	Metal Categories				Yard Waste	Other Organics Category			
	Aluminum Cans	Ferrous	Non-Ferrous	White Goods		Organic Comp	Organic-Non	Tires/Rubber	Wood
Admin/Office	x								
Comp Lab									
Commissary	x	x	x			x			
Exchange									x
Rec/Gym/Bowl	x	x	x						
Golf/Baseball	x				x	x			
Supply/Warehouse									x
Servmart									x
Shipping									x
Housing	x			x	x	x	x	x	
BOQ/BEQ	x					x	x		
Machine Shops		x	x						
Carpenter Shops									x
Hobby Shop								x	
Auto Shop	x	x					x	x	
IWTP/Sewage									
Hospital/Dispensary	x								
Dental									

2.6.3 Classes. Conduct a general military and civilian training class or workshop sponsored by MWR, or the solid waste management team, every 6 months. Describe the recycling program to all new recruits and civilian employees during orientation. The class should teach which materials can be recycled, where these materials can be recycled on base, how these materials are processed for recycling, and how to procure recycled products. The solid waste video titled "Solid Waste Solutions" by NEESA, could also supplement these classes.

Conduct tours of recycling centers, on or off-base, and have a representative give a brief talk on recycling at the child center.

Ensure that base personnel know where to purchase recycled products. Give the personnel responsible for purchasing, the Government Services Administration (GSA) guide that lists recycled products that can be purchased with a national stock number (NSN). For copies of this guide, call (817) 334-5215 or DSN 739-7369 and ask for the "Recycled Products Guide." Recycled products must be purchased in order for the recycling process to work.

2.6.4 Container Labeling and Placement. Clearly mark recycling and disposal containers as to their use. For example, stencil on a dumpster for cardboard boxes "CARDBOARD ONLY" on all four sides and include phone numbers to answer any recycling questions. Color code containers so their function is discernible from a distance. Have a map posted in all offices on base showing where the various items can be collected for recycling.

Label and color code all shop and office recycling bins for the four types of paper wastes, the three types of glass (green, brown, and clear/amber), the six designated types of plastics (PET, HDPE, PVC, LDPE, PP, PS, and others), and aluminum cans. Locate bins in convenient drive/walk-thru areas.

2.6.5 Advertisements. Advertise the recycling center's location and telephone using maps posted in offices, shops, major roads on base, and the activity's phone book. Post the same map and telephone numbers on all recycling and disposal bins on base. Create posters with themes for participation and involvement, highlighting the benefits of source reduction, segregation, and recycling of solid waste. Sponsor sporting or special events (Earth Day), contests, "T" shirt and coffee mug sales, etc., stressing recycling awareness.

Display a large recycling progress thermometer inside the main gate of the base. Set up permanent environmental bulletin boards and post interesting tidbits and statistics about conservation, source reduction, recycling, and composting in the central area of every office building.

2.6.6 Recommended Reading. Subscribe to a variety of solid waste and recycling publications. Current periodicals and publications on solid waste technology include:

Periodicals:

"Waste Age," 1730 Rhode Island Ave., Suite 1000, Washington DC 20036

"Recycling Times," 5615 West Cermak Road., Waste Age, Cicero, IL, 60650

"Garbage: The Practical Journal for the Environment," 2 Main St., Gloucester, MA 01930-5726.

Publications:

"The Recycling Guide," The Earth Works Group, Berkely, CA, 1990

"50 Simple Things You Can Do to Save the Earth," The Earth Works Group, Berkely, CA, 1989

"What You Should Know About Recycling," Booklet No. 48595, Channing L. Bete Co., Inc., South Deerfield, MA, 1989

"Recycling: A Viable Solution," California Waste Management Board, Solem and Associates, San Francisco, CA, 1983

See Appendix F for additional publications.