

JAMES A. VERDERESE. Technical Assistance for Small Quantity Generators of Hazardous Wastes: Building the Local Government's Role (Under the direction of ALVIS G. TURNER).

Small quantity generators of hazardous waste are primarily small businesses with little previous exposure to hazardous waste regulations. In order for these businesses to comply with the Hazardous and Solid Waste Amendments of 1984 they will require technical assistance. It is in the best interest of local governments to be involved with supplying this assistance. Eight model technical assistance programs were identified. Based upon these model programs, four essential elements of a technical assistance program (TAP) were derived. These mechanisms include: information transfer, on-site evaluation, referral, and continuing education. In designing a TAP, a local government needs to evaluate its needs and its abilities and then balance the four mechanisms so the local government provides a useful and efficient program that is well received by its constituents. Resources available to local governments for a TAP will vary. Five potential resources were discussed. In designing and maintaining a local TAP it is important to bear in mind the limits and constraints upon local governments and to foster an attitude of cooperation and interdependence with other relevant federal, state, local, and private programs.

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CHAPTER I

INTRODUCTION

The Resource Conservation and Recovery Act (RCRA) of 1976 requires the safe management of hazardous waste. The U.S. Environmental Protection Agency was directed by Congress to promulgate regulations to ensure this objective. However, it was not until 1980, when EPA issued regulations, that businesses and industries were able to appreciate the implications of RCRA.

One of several exemptions contained in the 1980 regulations was a "small quantity" exemption. This exemption excluded businesses that generated less than 1,000 kg per month of hazardous waste (less than 1 kg per month of acutely hazardous waste) from the majority of the generator regulations. EPA estimated that more than 95 percent of all the hazardous waste generated was produced by large generators (i.e., generators of more than 1,000 kg per month). Focusing only on large generators would allow RCRA implementation and enforcement mechanisms to be put in place and refined without the burden of having to regulate thousands of small quantity generators. This rationale was sound. In 1985, EPA estimated that there were almost 380,000 small quantity generators (Ruder, Wells, Battaglia, Anderson, 1985). Because the number of small quantity generators was so large, EPA decided that after the regulatory program was implemented satisfactorily for large quantity generators (LQGs), they would then lower the exemption threshold and incorporate the more numerous small quantity generators (SQGs) into the regulatory system. Therefore, as the LQGs were learning to accept, understand and apply the RCRA standards, the SQGs remained largely unaware of them.

In November 1984, Congress reauthorized and amended the Resource Conservation and Recovery Act. These amendments lowered the hazardous waste generation threshold for exemption from 1,000 kg to 100 kg per month. As this lowered threshold became effective, many previously unregulated businesses became regulated under RCRA. The largest of these businesses include (Ruder, Walls, Battaglia, Anderson, 1985):

- vehicle maintenance facilities (60 percent of all SQGs and 71 percent of SQG waste);
- metal manufacturing facilities (10 percent of all SQGs and 11 percent of SQG waste);
- printing and ceramics facilities (7 percent of all SQGs and 3 percent of SQG waste);
- photographic facilities (2 percent of all SQGs and 3 percent of SQG waste); and
- laundry facilities (4 percent of all SQGs and 2 percent of SQG waste).

These businesses, and many others as well, will be seeking technical and economic alternatives for managing their hazardous wastes.

Local governments have been actively involved in recruiting, assisting, and permitting small businesses and industries for many years. It is reasonable to expect that businessmen will seek waste management help from their local officials. One approach that local governments might use to meet this need is a technical assistance program (TAP). This research identified eight technical assistance programs which have been established in the United States to deal with small quantity hazardous waste generators. These programs were analyzed as possible models for a technical assistance program to be operated by local governments.

CHAPTER II

TECHNICAL ASSISTANCE IN HAZARDOUS WASTE MANAGEMENT

Audience for a Technical Assistance Program

As defined in the November 1984 Amendments to the Resource Conservation and Recovery Act (RCRA), a small quantity generator of hazardous waste is a business generating between 100 and 1,000 kg of hazardous waste per month (Breckling, 1985). A nationwide EPA survey (Ruder, Wells, Battaglia, Anderson, 1985) found that nearly 85 percent of the small quantity generators are in non-manufacturing industries, with vehicle maintenance shops (auto and truck) and construction establishments being the largest categories covered (50 percent and 10 percent, respectively). Other categories include dry cleaners and laundries, photographic processors, equipment repair shops, and clinical and school laboratories. EPA estimates that there are approximately 175,000 small quantity generators who produce 800,000 metric tons of hazardous waste annually. Eighty-five percent of this hazardous waste consists of lead-acid batteries, solvents, and other acidic or alkaline wastes. The lead-acid batteries result primarily from vehicle maintenance, and account for more than 60 percent of SQG waste. An additional 18 percent of SQG waste consists of solvents from metal manufacturing, vehicle maintenance, equipment repair, printing, and construction. It is estimated that in North Carolina in 1983 there were more than 35,000 small quantity generators. Camden County was estimated to have the fewest small quantity generators (23) and Mecklenburg the most (3,437). The average number of small quantity generators in North Carolina counties was estimated to be 357 (Andrews, Burby, Turner, 1985).

There are several major differences between the SQG and the LQG. These differences include:

Regulatory history and implementation has been LQG oriented and has excluded the SQG. Until the November 1984 RCRA Amendments were passed, the SQG was exempt from virtually all of the Part 262 Standards Applicable to Generators of Hazardous Waste. Under the 1980 RCRA regulations, as long as the generator met the definition of a SQG (defined in Section 261.5) the most stringent requirement was that these generators dispose of hazardous waste in a permitted disposal facility which was licensed, or registered to manage municipal or industrial solid waste (40 CFR 261.5(d)(3)). The SQG did not need to be familiar with the complex permitting procedure, the specific standards, and the record-keeping requirements of RCRA. the LQG, on the other hand, had to comply with all of the extensive requirements under the regulations.

Since the SQGs were almost totally absolved of regulatory accountability prior to the new amendments, many may not even be aware that they generate hazardous waste. Even today as the 1984 RCRA Amendments are being implemented, some SQGs may not be fully aware of their responsibility as hazardous waste generators.

"Economies of scale" favor LQGs. The second major difference between the SQG and the LQG is that the cost of manifesting, transporting and treating hazardous waste is proportionately larger for the SQG. For example, the SQG often has less than a full truckload of waste requiring transportation. Nevertheless, he often must pay for a full load. The SQG is likely to find it difficult to find affordable transportation for the small quantities of waste

that he produces. For this reason, the SQG is unable to take advantage of "economies of scale" in managing hazardous waste. The EPA Small Business Ombudsman, Marc Jones, reported that the reporting and disposal costs of hazardous waste for LQGs was \$100 to \$300 per ton, for SQGs however, the costs more closely approximated \$3,000 per ton (Jones, 1984). Clearly, such high disposal costs do not encourage the SQG to proceed in an environmentally sound manner.

Small non-manufacturing generators are less informed about hazardous waste management due to an economic inability to hire professional advisors.

The third major difference between SQGs and LQGs concerns the resources available for planning, selecting options, and analyzing costs associated with various management strategies. The LQG can usually employ professionals to assist him with hazardous waste management. The SQG, on the other hand, often does not have the economic resources to enlist the assistance of lawyers, engineers, and chemists to guide him through the regulatory system (Jones, 1984). Typically, the small quantity generator is a small non-manufacturing business. Examples of such businesses include those identified by the EPA survey described above: vehicle maintenance, construction, dry cleaners, laundries, photographic processors, equipment repair shops, and clinical and school laboratories. These businesses are often operating with limited profit margins in highly competitive markets. The SQG is, therefore, generally less able than the LQG to make considered and informed decisions about hazardous waste management.

For each these reasons, the SQG often has the greatest need for inexpensive technical assistance. Assisting the SQG to find effective and

economical technical assistance should facilitate the SQGs' entry into the regulatory system.

Objectives of a Technical Assistance Program

The objectives of a SQG TAP include:

- Helping the SQG to become aware of his responsibilities under new and existing federal, state and local regulations;
- Providing sufficient information to comply with the regulations;
- Encouraging the SQG to modify operations resulting in hazardous waste generation;
- Promoting hazardous waste reuse and recycling; and
- Promoting safer and more appropriate waste disposal.

Often the SQG is unaware of his role in hazardous waste production. Not until he becomes aware that he is a hazardous waste generator can he be motivated to improve hazardous waste management. Without this awareness, hazardous waste regulations appear to him as having little relevancy. Mere awareness, however, is not in and of itself sufficient to ameliorate poor hazardous waste management practices and regulatory noncompliance. To be effective, a TAP must instill both an awareness and a concern within the regulated community.

As indicated previously, the SQG often has very limited access to technical and legal resources. Also, he is often responsible for managing all aspects of his business and has limited time to spend specifically on hazardous waste management. For these reasons, it is quite likely that many

SQGs will be poorly informed about hazardous waste issues and regulation. CONSAD Research Corporation (cited in Jones, Berkey, 1984) reports that 69 percent of small businesses use general media for information on environmental regulatory issues. It is important that all SQGs, including those that do not belong to trade associations, be provided with a reliable and timely source of information. General media should not be counted on for this purpose.

By modifying business practices that generate hazardous waste, some SQGs may be able to produce a waste stream that is less toxic. This approach has substantial benefits, both economically and environmentally. It is significantly more efficient to prevent the generation of a hazardous waste rather than to manage it after it has been produced. A number of examples of such modifications are available. Examples in North Carolina cited by Kohl, Moses, and Triplett (1984) include:

- the Farrington Company, which changed its process for cleaning bearing components;
- the Environmental Inks and Coatings Corporation, which now produces water-based non-hazardous inks instead of ink with a solvent-base containing chromium and molybdenum; and
- Kemp Furniture Industries, which replaced its solvent-based ink printing line with a water-based ink line.

These are just a few examples of process modification. Many SQGs may make modifications with similar results.

The volume of hazardous waste may be minimized by either of two approaches: (1) reducing the volume of hazardous wastes produced in the first

place, or (2) after the waste has been produced, concentrating the hazardous wastes prior to disposal by removing nonhazardous components. An example of the former would be recycling cleaning solvents. An example of the latter would be dewatering of a sludge prior to disposal. Several benefits may be realized from volume minimization. They include: (1) reduced costs as a result of less waste to be handled, transported, and disposed; and (2) less chance of mishap or environmental contamination, thereby reducing the generator's potential for liability.

Several approaches to recycling are currently available to the hazardous waste generator. One approach includes in-house recycling. This approach eliminates transportation costs as well as any liability that might be incurred for off-site mishandling. According to Kohl, Moses, and Triplett (1984), this approach is becoming more and more popular with printers who are installing stills to recycle their spent solvents. Other approaches to recycling include off-site commercial recycling such as commercial solvent recovery or oil refining operations, and use of waste exchanges. Currently there are approximately 25 waste exchanges operating in the United States (McDaniel, 1984), one of which is the Piedmont Waste Exchange (PWE) located in Charlotte, North Carolina. This exchange handled 653,020 gallons (or gallon equivalents) of waste with a replacement value of \$634,961 from 1 July 1983 to 30 June 1984 (McDaniel, 1984). The two most obvious advantages of recycling include conservation of resources and a reduced amount of hazardous waste requiring disposal. Encouraging the SQG to make maximum use of his recycling potential would be a positive step in the safe management of hazardous waste.

Even if the hazardous waste generator modifies his processes, reduces the volume of wastes, and recycles as much as possible, there will be some residual waste which will not be amenable to any of these approaches. Furthermore, some of these management strategies may themselves result in the production of hazardous wastes (e.g., still bottoms, hazardous residues). The SQG must have appropriate options for managing these wastes.

Technical assistance will be most effective if it helps the SQG to find the information he needs to minimize the amount of waste to be disposed of and encourages safe and appropriate disposal practices of whatever hazardous waste remains.

The Elements of a Technical Assistance Program

A TAP may be functionally dichotomized into information dissemination, and on-site assistance. In practice these components may overlap each other.

Information dissemination is designed to help the generator find whatever information he may reasonably require to properly manage his hazardous wastes. It may include:

- Baseline information. Includes basic knowledge of regulatory requirements, treatment and disposal options, liability, and financial assistance. This information should be designed to ease the SQG into the regulated universe.
- Engineering information. Involves specific engineering information to help the SQG evaluate his business operations generating hazardous waste. Examples of engineering information include process modification, use of different raw materials, and product alterations.
- Technology transfer information. Information regarding new or modified technologies used by other business producing the same or similar services. Even within the

same industrial classification, information concerning new equipment, techniques and materials often is not shared. The TAP can be useful in facilitating the transfer of this information.

- Research and development information. SQGs often do not have access to the technical and scientific literature. Summaries of recent R&D efforts would be very useful to the SQG. These summaries could include information concerning the adverse health effects associated with the use and disposal of toxic chemicals and hazardous wastes. Advising a machine shop operator of the potential health effects and alternatives to various degreasing solvents is one example.

Information can be disseminated through one or more channels. One approach would be to use outreach programs such as workshops, seminars, and news bulletins. Another approach would be to establish a resource center where SQGs could visit or telephone for information.

In addition to information dissemination, on-site assistance is another tool that can be used in a TAP. On-site assistance may not be practical for many technical assistance programs operated by local governments. However, if resources are available and the need is sufficient, this approach should be considered.

A visit to a SQG by TAP personnel should include much more than information transfer. Such visits are perhaps the best means available to establish rapport and two-way communication with a SQG. It is important to note, however, that businessmen are often cautious about trusting government representatives, particularly "regulators" (Jones, Berkey, 1984). The tone of the visit and the attitude of the TAP representative should be one which reinforces the non-obligatory and non-regulatory nature of the visit. It has been the experience of New York's Environmental Facilities Corporation that

even a limited investment of time spent on rendering minor services to a client often dispels any feelings of distrust that the client might have (IMRA, 1984).

By using the on-site visit effectively, the fears of the businessman may be relieved and his confidence may be gained. An on-site visit may be the easiest way to establish credibility, trust, and two-way communication. A visit may be used to assure the businessman that the TAP's role is advisory and for his benefit and that it is not regulatory and will not result in enforcement action.

By visiting the SQG's place of business information can be gathered to answer the following questions:

- How much, if any, hazardous waste is being generated?
- What kinds of technologies and processes are being used?
- How may those technologies and processes be modified to produce less hazardous waste?
- How may the volume of the hazardous waste generated be reduced?
- What is the potential for recycling hazardous waste?
- How can the wastes be most efficiently transported?

Visiting the business premises, examining the work operations, and discussing the problem in depth with the owner enhances the probability of the TAP being able to assist the owner in developing a successful hazardous waste management plan.

CHAPTER III

MODEL TECHNICAL ASSISTANCE PROGRAMS

There are still only a handful of hazardous waste technical assistance programs across the nation. A sampling of eight programs have been identified and are described here.

State Technical Assistance Programs

Florida: As a result of the Water Quality Assurance Act of 1983, the Department of Environmental Resources (DER) has implemented a state-wide program to encourage proper hazardous waste management by small quantity generators. They have prepared a guidance document, "Guidelines to Conduct County and Regional Hazardous Waste Assessments." These assessments are used to identify SQGs, types and quantities of waste produced, and management practices. The DER uses this information to determine the types of off-site facilities required by generators. The hazardous waste assessment in Florida goes further than simple data collection. It also provides a mechanism for informing SQGs of their responsibilities as hazardous waste generators and of waste management alternatives available to them (Hill, Jones, Berkey, 1984).

Florida has made it unlawful for any citizen to improperly dispose of even small amounts of toxic wastes or chemicals (Minnesota Waste Management Board, March 1985). In an effort to ensure the success of this requirement, an "Amnesty Days" program was implemented.

The Amnesty Days program sets aside certain days for public collection of small quantities of residential and commercial hazardous waste. A professional waste management firm was hired to collect the waste at selected

community sites and dispose of it. During the amnesty days no one was penalized for bringing in toxic chemicals or hazardous wastes.

The Amnesty Days program was conceived because DER recognized that there were few economically feasible disposal options available to SQGs. The program facilitated an immediate reduction in the amount of hazardous wastes in the hands of the public. Also, the program helped to sensitize small generators and the public to the fact that they indeed do generate hazardous wastes and they have a responsibility to manage their own hazardous waste properly. The Amnesty Days program has been supported with state funding.

Georgia: The U.S. Environmental Protection Agency and the State of Georgia have jointly funded the Georgia Institute of Technology's Hazardous and Industrial Waste management Program to provide non-regulatory, confidential, on-site consultation for small businesses.

This consultation service involves a one-time, on-site audit to review and identify any existing or potential hazardous waste problems. Audits are performed by the extension staff at Georgia Tech at the request of businesses in the state. Implementation of recommendations made during an audit is voluntary ("Mid-Year Evaluation," 1984).

Before an auditor will visit the site, the business must supply information, by mail, which is used to make a preliminary assessment of their waste stream. The auditor then visits the business site and meets the owner(s), discusses the preliminary information that was previously provided, and discusses the services provided by the TAP. Also, the site visit includes a tour of the establishment. Finally, a confidential report is provided to

the firm which discusses recommendations for achieving compliance with hazardous waste regulations. Also, this report includes other useful information such as treatment or sampling procedures, and a list of laboratory facilities, treatment facilities, hazardous waste management firms, recyclers, and consultants (Hill, Jones, Berkey, 1984).

The Georgia Tech program uses periodic seminars conducted throughout the state to complement the on-site evaluation process. These seminars are intended specifically for the SQG. Besides using these seminars to disseminate hazardous waste management information, they are used to help publicize and promote the on-site consultation program.

Minnesota: The State of Minnesota has developed a technical assistance program, MnTAP, which is being implemented by the University of Minnesota's Department of Environmental Health in Minneapolis. The purpose of MnTAP is to promote and encourage hazardous waste reduction and alternatives to land-disposal. MnTAP also identifies opportunities for firms to recycle, detoxify, or incinerate hazardous wastes, and provides referrals for handling the paperwork associated with hazardous waste regulations. MnTAP seeks to provide education and raise generator awareness by participating in industry and trade association meetings and is considering conducting special issue seminars (Minnesota Waste Management Board, April 1985).

Initially, MnTAP communicated with potential clients by telephone. Recently, however, MnTAP representatives have begun to visit firms in order to better identify areas in which waste reduction may be possible. MnTAP has gone beyond the constraints of a short term on-site evaluation by developing a

program that places an engineering intern at the facility to provide "rigorous attention" for an extended period. Such an internship will provide the continuity and supervision necessary to implement a waste reduction project (Minnesota Waste Management Board, April, 1985). The MnTAP program has been supported by an appropriation from the state legislature.

New York: The New York Environmental Facilities Corporation (EFC) was established in 1977 by the Industrial Materials Recycling Act (IMRA). The EFC is a non-regulatory agency that is empowered to "plan, design, construct, and operate solid waste, hazardous waste, resource recovery, and pollution control facilities, and carry out inactive hazardous waste disposal site remediation programs. EFC also provides industry with professional management services in the areas of industrial and hazardous waste management, resource recovery, financing, waste exchange, regulatory analysis, laboratory services, technical assistance, and information retrieval" (IMRA, 1984).

The technical assistance offered by EFC is available to all companies. However, small and medium size companies are the most frequent clients of the EFC. the technical assistance offered by EFC is available in a variety of forms, including: recommending source reduction options, energy recovery options, treatment and disposal alternatives, operating waste exchanges, providing regulatory assistance, researching potential markets for wastes, evaluating technology, performing technical feasibility studies, doing process analysis, and assisting with consultant selection (IMRA, 1984).

The EFC employs a part-time technical field representative to initiate contact with prospective clients, to maintain relationships with professional

and trade organizations, and to visit individual companies. Any necessary follow-up work for a client is referred to the EFC central office staff. The central office staff is very diverse in background and experience and is thus frequently able to avoid the use and concurrent expense of outside consultants. EFC is currently seeking funding that will permit them to provide public information, educational programs, and visual aids. EFC does not charge a fee for the service provided to clients. EFC is constituted under the New York Public Authorities Law and is therefore supported by state funds.

Pennsylvania: In 1981 the Office of Hazardous and Toxic Waste Management (OHTWM) was created within the Institute for Research on Land and Water Resources at the Pennsylvania State University. This office manages a statewide program incorporating ten universities. Any Pennsylvania organization may make use of the service provided by the OHTWM program.

This program has two objectives: (1) to provide information on hazardous substances and alternative means of recycling, as well as reusing or safely disposing of these substances; and (2) to stimulate new solutions through research (Thompson, Benjamin, and Marple, 1984).

To accomplish the first objective, the program depends upon resources both inside and outside of the University. To accomplish the second objective the program provides funding for research studies related to hazardous materials.

Beyond its primary objective, OHTWM has initiated a program for preparing state-of-the-art assessment reports for smaller industries (e.g., ferrous

metals, electroplating, inorganic chemicals, plastics, and paint and allied products). The University's Extension Service is being utilized to involve citizens, government, and industry in a forum for developing an improved understanding of mutual hazardous waste management problems. The program often assists firms in the determination of the nature of their hazardous wastes and provides guidance in the selection of an appropriate waste management facility.

The experience of OHTWM has led its managers to two fundamental principles of technical assistance: One is that every effort should be made to avoid the establishment of new organizations. They brought together existing, functioning units that could contribute to the overall goal. The second principle is that close coordination of the TAP with its complementary regulatory agency(ies) is vital to the success of the program (Thompson, Benjamin, Marple, 1984). The program is funded by state legislative appropriations that supplement University support. Other sources of funding include matching grants and contracts for special projects.

Local Technical Assistance Programs

Dade County, Florida: Dade County is underlain by the Biscayne Aquifer, which has been designated by EPA as a "sole source aquifer." As such, Dade County must take extraordinary measures to protect the aquifer from contamination. The County believes that proper management of hazardous wastes is one factor which can contribute to the protection of this aquifer. Dade's hazardous waste management program is implemented through the County Department of Environmental Resource Management (DERM).

Prior to establishing a hazardous waste management program, the County endeavored to create a fundamental capability in each of the following areas (Brant, 1985):

- Public support - The public needed to understand the need for, and provide support for a hazardous waste management program.
- Funding - The County chose not to support its regulatory activity with general revenue tax dollars. It used other funding sources such as user fees, permit fees, trust funds, and grants.
- Legal capability - Effective enforcement often requires recourse to legal proceedings. DERM, therefore, obtained unencumbered access to county and local courts.

Having established these capabilities, DERM proceeded to develop the support services necessary to operate a hazardous waste management program. These services included laboratory analytical capability, inspection and sampling capability, and a legal staff.

The Dade County program has been involved in the following activities (Brant, 1985):

- The first county-sponsored cleanup in the country of a National Priority List hazardous waste disposal site.
- The first underground storage tank monitoring program in Florida.
- The first waste oil collection program to be sponsored by a local government in Florida.
- An instrumental role in the formation and activities of the only association of industries formed especially to resolve chemical waste disposal problems in Florida.

- The only local government trust fund in Florida created specifically to provide hazardous waste response, handling, transportation, and disposal capabilities.
- The first county in Florida to enact a land-use ordinance to control construction within wellfield recharge areas that would require use or storage of hazardous materials.
- A systematic inspection program of SQGs that has indicated a decline in the practice of draining radiator fluid, steam cleaning drippings, and transmission fluids into the ground.

Officials of Dade County, while strongly advocating the local role in hazardous waste management, believe that local efforts can not stand alone without state and federal support. Specifically, state and federal support is called for in the areas of research on practicable means for small businesses to reduce, recycle, or destroy their own wastes; and for the construction of hazardous waste management facilities (Brant, 1985).

Erie County, New York: An Industrial Assistance Program was established in Erie County to help existing firms solve environmental problems that pose technical or financial burdens. The firms are also given assistance with locating environmental expertise or pollution control financing.

Specifically, the assistance to SQGs includes: waste identification, preparation of permit applications and manifests, explanations of regulations, and selection, operation and maintenance of pollution control equipment (Hill, Jones, Berkey, 1984).

Also, the County has sponsored workshops open to government officials and private businesses. These workshops cover a broad range of topics ranging from environmental auditing to hazardous waste regulations. Each attendee is

provided with reference materials. The workshops have been supported by such diverse groups as the Chamber of Commerce, Professional Engineers' Society, New York Industrial Development Agency, accounting firms, and small business organizations. Referrals to the program have come from several sources, including: regulatory inspectors, state agencies and personnel, and calls from interested individuals and firms (Hill, Jones, Berkey, 1984). The program is jointly funded by the state and the county.

Hennepin County, Minnesota: Hennepin County uses a computerized Hazardous Waste Management Information System (MIS) as a data base for its SQG education program. In Minnesota all hazardous waste generators, regardless of generation rates, are required to obtain a license. There is no SQG exclusion. License application and manifest data are all entered into the MIS. In this way the County is able to monitor each generator's waste stream and the generators can use it to identify possible transporters or disposal facilities. The County may also use the MIS data to help facilitate waste exchanges and efficient transportation (Hill, Jones, Berkey, 1984).

In addition to the MIS, a series of monthly day-long seminars were begun in July 1983. The morning sessions have usually been dedicated to SQG concerns (e.g., interpretation of regulations, materials handling, pre-transportation labeling), and the afternoon sessions to LQs (e.g., contingency plans, emergency procedures, preparedness and prevention). Different groups of generators are addressed each month. Contacts are made through trade associations and other industry groups, as well as through license renewals. Attendance has normally been 10-20 persons per session.

More recently, the County has started contacting the Minnesota Association of Commerce and Industry, as well as some automobile dealers, informing them of the seminars and encouraging higher attendance (Hill, Jones, Berkey, 1984; Thompson, Benjamin, Marple, 1984).

The final component of the Hennepin County TAP involves assistance to generators to help them resolve questions concerning forms, shipping papers, and regulations. Copies of forms from various regulatory agencies are kept on file because the SQGs frequently require assistance in preparing them. The staff receives frequent phone calls requesting information about shipping, manifesting, DOT/EPA waste identification, and labelling (Hill, Jones, Berkey, 1984). Funding for the program has come from license fees and general county revenues.

No single TAP must model any of the TAPs described above. Likewise, no single TAP must include all of the elements described above. However, selected elements of these model programs may be used, as appropriate, by local governments in establishing their own technical assistance programs.

CHAPTER IV

LOCAL GOVERNMENT ROLE

Technical assistance (TA) may come from a number of different sources other than local governments. These sources include federal and state governments, trade associations, and private environmental professionals. With these sources available, why then should the local government be involved in providing TA?

There are six primary reasons why local governments should consider providing this type of assistance:

- No governing body is likely to know the overall composition of the local business community better than the local government;
- The local government is the first line of defense and the first responder during many emergencies;
- Often local government itself is a generator of hazardous wastes;
- In many communities the local government is the traditional provider of solid and liquid waste disposal services;
- Improper management of hazardous wastes primarily affects local citizens, resources, and facilities; and
- The local government needs to be able to provide a prompt and accurate answer to local questions and problems.

Because of both geographic and situational proximity (i.e., interactions such as routine local permitting, inspection, and community contact), it is likely that the local government will have a better knowledge of the local business community than would a higher, more remote level of government. Only at the local level is it possible that government officials may have

sufficient contact with businessmen to understand their particular role in the business community and the impact that their business has upon the community as a whole.

Frequently when an accident or an emergency spill occurs, it is the local government that becomes the first official responder. The response may be the result of a police officer arriving on the scene, someone calling the fire department, or a health department official making an inspection. In any case, the local government is likely to be the first publicly responsible and liable party to become involved. Therefore, it is important that there be one or more individuals who are: (1) clearly identified as being the party to be contacted in such a situation; and (2) adequately prepared to respond in an appropriate and safe manner.

Besides functioning in the role of regulator of hazardous waste generators, local government is often itself a generator. Local governments generate hazardous wastes as a result of vehicle maintenance; machine shop operations; waste paints, pesticides and fertilizers; and municipal landfills and sewage treatment plants. Local governments should set an example of responsible and proper management of their hazardous wastes so that private businesses may be encouraged to do the same with theirs. It is important, therefore, that local governments promote the safe management of hazardous waste.

In many communities local governments are the traditional providers of solid and liquid waste disposal services. Because of this association between waste management and local governments, local citizens and businessmen may be inclined to turn to their local government for assistance in managing

hazardous waste. By being prepared for such inquiries, local officials may most effectively influence the behavior of hazardous waste generators.

If hazardous wastes are not handled properly, or if an unanticipated problem or accident occurs, the impact is felt the greatest at the local level. Human health or natural resources may be adversely affected; local funds or resources may have to be expended; and local facilities such as buildings, treatment plants, landfills, and water supplies may be damaged.

If the local government is involved with the cleanup of spills or waste sites, it may find itself encumbered with some share of future liability as a result of that action. Furthermore, whatever expenses the state and federal governments or private parties do not assume, the local government will have to bear. As much as the local government can ensure that the hazardous wastes in its community are being properly managed, the less adverse impact from these wastes is likely to befall the community.

Local businessmen and citizens are likely to consider their local government officials as a source of information and advice for hazardous waste management. As federal, state and local regulations change, businessmen may turn to their local officials for clarification. Furthermore, if a firm approaches a community seeking a hazardous waste facility site, it will usually present the proposal to the local government. In each of these situations local government is expected to function as a resource for information and guidance. If local government is able to provide the information and guidance in a timely and accurate manner, it may be expected that hazardous waste management throughout the community will benefit. Under

these circumstances, it is important that local government carefully consider the extent and benefit of assistance that it may provide.

Governments representing smaller municipalities may have few resources and funds to dedicate to a TAP. At the same time, they may have less need for a TAP. (The converse may, however, be true. Sometimes hazardous waste management facilities prefer isolated, small rural settings because land may be cheaper, zoning restrictions less constraining, or public opposition less organized or persuasive.) The local government needs to evaluate its needs and abilities. High budget programs such as on-site consultation and engineering assistance may not be practical for single, small, local governments. Such assistance may perhaps be most appropriately provided by larger municipalities or even state or federal providers. When evaluating its ability to provide technical assistance, it is important that local government consider the resources available to it.

CHAPTER V

TECHNICAL RESOURCES

There are a variety of resources that are available to local government to provide support for a TAP. These resources include:

- municipal employees with relevant expertise or experience;
- local businesses and schools;
- state and federal agencies;
- trade associations; and
- private consultants.

In many instances these resources may be available to local governments at little additional cost over usual governmental expenditures (with the possible exception of private consultants).

The municipal fire, police, emergency management, and public health services should all be involved in developing and supporting a TAP. The personnel providing these services may already have, by virtue of their previous training and experience, some expertise with solid and hazardous waste management and/or emergency response.

Local municipal employees often have a good sense of the nature and composition of the community. It is precisely this kind of familiarity that makes local assistance so advantageous. Even if nothing else, this familiarity is a very important factor that the local municipal employee should be able to bring to the TAP. Since the municipal employee is already on the local payroll, the added cost of using his efforts in a TAP on a part-time or an as-needed basis should not be great. If the workload of the

employee permits, the TAP may even become a part of his regular duty assignment. As discussed below, training and other resources may be available to municipal employees to increase their effectiveness.

Frequently, local businesses, colleges and universities are a very good source of technical information and training. Employees and faculty from local businesses, colleges and universities are often willing to provide technical advice to local government if they are approached in advance and are involved in the planning and implementation of such a program. Industries often provide training and equipment to local government emergency management personnel and may be persuaded to assist in the development and maintenance of an ongoing TAP. Technical assistance programs may be developed similar to the one developed in cooperation with the University of Minnesota. In that program engineering students are encouraged to intern for periods of up to several months with businesses and local governments across the state. The internships are designed so that students may work as hazardous waste management engineers and assist the hosting party in the development of a hazardous waste management program.

A particularly strong concern that schools, businesses, and any other party for that matter, may have is the issue of liability. If assistance is offered to help solve a particular technical problem and the solution literally or figuratively explodes, to what degree will the provider of that assistance be held liable? The answer to this question is unclear. Until some resolution is reached, potential liability may well discourage some otherwise willing and capable parties from making themselves available as resources to, or sponsors of a technical assistance program.

The Federal and many state governments have established advisory and/or regulatory agencies which, if not devoted entirely to providing technical assistance, may have a section or an office which provides it. These resources may be used by local governments in their own TAPs. Because these are services supported by state and federal governments, fees, if any, are relatively low. In fact, these agencies may even provide funding and/or start-up money for such local programs.

Federal agencies that may be of assistance include the EPA RCRA Ombudsman, the EPA Small Business Ombudsman, the EPA RCRA/Superfund Hotline, and the Small Business Administration. Reportedly, EPA is developing a new SQG education program which would also be a likely source of assistance (Minnesota Waste Management Board, June 1985).

Within the state of North Carolina, there are number of state agencies that may be helpful. These agencies include: the Governor's Waste Management Board, the Solid and Hazardous Waste Management Branch, the Department of Human Resources' Public Affairs Office, the Public Health Library, the Department of Natural Resources and Community Development, and the Science and Technology Research Center. Each of these agencies and offices, either wholly or in part, deals with hazardous waste management. The resources in these agencies should be tapped and used to assist in the establishment of a local program.

Technical assistance, to be effective, must be consistent and reliable. It is important that local providers of technical assistance be familiar with the applicable federal and state regulations and that the assistance provided be consistent with these regulations. One of the best ways to ensure this

familiarity and consistency is with careful and thorough communication with the appropriate governmental parties and full utilization of their assistance and expertise.

Trade associations are a very important potential source of information for the TAP. They are able to provide specific information about the nature, characteristics, problems, and needs of the trade(s) they represent. This information is of use in designing a TAP to ensure that it is consistent with the needs of its constituents. The more that the TA providers know about a business, the more success they are likely to have in gaining the acceptance of and helping the business.

The relationship between the TAP and the trade associations should not be a one-way transfer of information. In addition to the TAP receiving information and guidance from the trade association, the TAP should provide information and guidance to the association. The trade association is, though perhaps to varying degrees, trusted by its members (as indicated by their continued membership). Therefore, for the TAP to be endorsed by the association and to use the association as an outreach mechanism would encourage the acceptance of the program by small businesses. If the TAP provides the association with information about the program's goals, objectives, services, and facilities, the association may in turn recommend the program to its members and may refer members that are seeking assistance.

For all of the advantages that trade associations may be to a TAP, it is important to realize that not all types of businesses and not all businesses of a given type are necessarily members of a trade association. This is particularly true for small businesses. Furthermore, some businesses may

belong to associations that are poorly organized and managed, or that are predominantly concerned with other issues and only marginally with hazardous waste issues. If a TAP were to adopt a policy of using trade associations as their only outreach mechanism, it is very possible that certain types of businesses, or various businesses within types, may be systematically overlooked. Trade associations may be a very useful resource for local governments that are planning and/or supporting a TAP, but they are not adequate as a sole resource.

A local government has the option of employing a private consulting firm. Conceivably, a municipality could contract with a firm and give the firm the entire responsibility of developing and operating the TAP. Even though this approach could absolve a municipality from the administrative and technical burdens of providing technical assistance to its local businesses, it is an approach that is likely to be economically prohibitive for many municipalities.

An approach that perhaps is more in line with the means of local governments is to employ private consulting firms to perform one or more discrete tasks or segments of the TAP development. Such a segment would be one that was beyond the means or ability of the local government to perform. An example of such an approach can be found in Larimer County, Colorado, in which a private firm was hired to identify the local businesses within the SIC codes considered likely to result in the generation of hazardous wastes ("Survey of small," 1985). The results of such an effort could then be used as an indicator of the need for and scope of TAP. Retaining the services of a private consulting firm may be an expensive undertaking, but it need not be

prohibitive for local government if the local government can refine and clearly express its needs.

There are a variety of resources available to local governments that may be utilized in the development and support of a TAP. The use of these resources may greatly facilitate the development of a technical assistance program that is timely, reliable, and fully utilized.

CHAPTER VI

TECHNICAL ASSISTANCE PROGRAMS: SCOPE AND MECHANISM

The preferred scope of a TAP is defined by the needs of its users and the ability of the providers to meet those needs. Therefore, the scope of a TAP should be determined by the providers on a case-specific basis. For example, a community that has a large diversity of hazardous waste generators will require a TAP that is similarly diverse. In a community with limited resources, on-site technical evaluation may not be possible. Finally, in a community that already has existing sources of technical information (e.g., local colleges or large companies), a local government's TAP may be needed only to refer users to other sources of already available technical assistance. As each of these examples shows, the exact nature of a TAP may vary from provider to provider and from target audience to target audience.

It is possible, however, to generalize as to the scope of a TAP, the need to tailor its specific scope to case-specific circumstances notwithstanding. In general, a TAP that is sponsored by a local government should contain elements that will assist its users in:

- identifying regulatory requirements and responsibilities applicable to their operations;
- identifying, contacting, and utilizing sources of financial and technical assistance, as well as professional counsel; and
- identifying, implementing, and evaluating appropriate waste minimization and management options, and quantifying the costs and the benefits associated with these options.

By incorporating these three elements, as appropriate, into a TAP, the user of the assistance will be aided in proper hazardous waste management.

There are four mechanisms that local governments may use to provide TA, in the form of the elements described above, to the small quantity hazardous waste generator. None of these mechanisms is intended to be used singularly. Each mechanism is expected to fill its own niche within the larger organization of the TAP. These four mechanisms are:

- Information transfer;
- Comprehensive on-site evaluation;
- Referral by and to other sources of assistance; and
- Advertise, sponsor, or conduct continuing education opportunities.

The information transfer mechanism is predominately a one-way transfer of information from the TAP to the client. Its primary purposes are to answer relatively straight-forward questions, to provide references to technical literature, and to promote further interest in the TAP. It is an approach that may be undertaken to the degree of resources available to it. It need not, though it can be, highly resource intensive and therefore, should be practical for a wide variety of municipalities. Virtually all of the model programs identified in Chapter III use this approach.

Specifically, information transfer may include a TA newsletter on a regular basis or news bulletins as needed; and responding to telephone calls, correspondence or visits by potential generators. This approach will efficiently satisfy many information requests that are substantially similar

(e.g., information about new or amended regulations, information about workshops or other programs, citations of books and articles, municipality-wide statistics and trends, or referral to other local, state, or federal agencies). This mechanism is one that may be used to transfer information when the need is precise and straight-forward.

A second mechanism involves an on-site visit to the business or industry requesting assistance. As noted in Chapter IV, however, on-site evaluation is a resource intensive approach and not all municipalities will have the resources or the need for such an approach. This approach has been used primarily by those model programs that are state supported (e.g., the Georgia Tech program, the MnTAP program in Minnesota, and Environmental Facilities Corporation program in New York). A visit can be used to assess the specific processes which generate hazardous wastes, to suggest methods for reducing or eliminating waste production, or to recommend techniques for managing the waste. The visit may also be used to assist and encourage the generator to begin formulating a comprehensive hazardous waste management plan.

An on-site visit may involve one or more technical or engineering experts who can work cooperatively with the client to evaluate the fundamentals of the industrial process being used; to determine whether or not the process results in the generation of hazardous waste, and if so, how much; and to discuss technical and economic solutions or alternatives. Since a TAP is usually advisory in nature, the client must make the final decision on which alternatives and solutions he chooses, if any, to implement.

For on-site evaluations to be successful, TAP representatives must be adequately qualified to perform industrial or commercial evaluations.

Clearly, the representative of the TAP should have an interdisciplinary background. The background may include engineering, environmental management, or small business administration; or it may simply include a great deal of general business experience. The TAP representative should not have to depend completely upon his own technical resources. As indicated in Chapter V, it is important that the TAP use resources available to it to provide an ongoing support network upon which its representatives may rely.

The third mechanism that local governments may use to provide TA is a system of referrals that may include referral of clients by the TAP to other sources of assistance; and vice versa (i.e., the referral of clients by other parties to the TAP). Each of the model programs identified in Chapter III uses this approach.

The TAP may refer a client to another source of assistance for several reasons. One reason might be that a client is not a SQG. Another is that the client's needs may place too great of a demand upon the program or require more sophistication than the program can provide. Also, there may be another source of assistance that could better serve the client. Whatever the reason for the referral, maintaining a current, complete, and active list of alternate sources of TA will enable the TAP to refer clients to other avenues of assistance appropriately and efficiently.

The SQG may be referred to the TAP by official organizations such as federal, state, and local regulatory agencies; or by other local businessmen or trade associations. The referral of potential clients to the TAP by third parties is an important mechanism for reaching local businesses and obtaining

a favorable reputation. The program should encourage all parties that it interacts with to refer potential clients.

The fourth mechanism for providing TA to SQGs involves advertising, sponsoring, or conducting continuing education opportunities. These opportunities may include workshops, lectures, and seminars. All of the model programs in Chapter III use this approach. All parties involved with hazardous waste management should remain current and informed. Regulations may change, new technological processes may emerge, and various local events and initiatives may occur.

Possible sponsors of educational opportunities may include trade associations, universities and colleges, industries, governmental agencies at all levels, and private groups. As the TAP becomes aware of these opportunities it should advise its clients of them. The program may publish a regular newsletter and it may include these opportunities in a column dedicated to such information. As an alternative to a regular newsletter, news bulletins may be provided as needed to inform clients of educational opportunities and other events worthy of note.

If the TAP perceives a need for education or opportunities of a specific nature and the need does not seem to be met, the TAP should consider steps it could take to fill the void. The TAP may co-sponsor a program with another organization, or conduct one on its own.

By using these four mechanisms to provide TA, the program can develop a well organized approach for reaching businessmen that are potentially SQGs. The mechanisms are mutually reinforcing and comprehensive. The fine tuning and balance of one mechanism against another will necessarily depend upon the

particular circumstances of the community, the businessmen, and the TA providers.

CHAPTER VII

MONITORING AND EVALUATION OF A TECHNICAL ASSISTANCE PROGRAM

Programs, whether in the public or private sector, must be periodically evaluated for cost effectiveness, budgeting, planning, and determining how well they have met established objectives. This is especially true for programs in the public sector because there is usually less intensive internal oversight, little or no profit motive, the absence of any type of marketable product, and little competition.

Local government technical assistance programs are not exempt from this general management function. If these programs are to be effective in protecting the community environment, the health of local citizens, and in establishing a positive business climate for existing and new industries, they should be regularly monitoring and evaluated. The following criteria are suggested for measuring the success of these programs:

- Feedback from local businesses and industries;
- Frequency of fines, penalties, and enforcement actions against local businesses for violating hazardous waste regulations;
- Amounts of hazardous waste generated by local businesses and industries;
- Incidence of accidental spills;
- Incidence of chemical fires;
- Self evaluation; and
- External evaluation.

The first five criteria are relatively straight-forward objective measures of program success. The last two criteria are more subjective. Indices such as requests for assistance, site visits performed, and information distributed can be used in self-evaluation.

Feedback from the clients may come in two forms, either solicited or unsolicited. Unsolicited feedback may consist of multiple requests for assistance from the same client, referrals to similar clients, or continued attendance at educational or briefing sessions. Solicited feedback may take the form of pre- and post-assistance surveys. The pre- and post-survey could include information on changes in processes, waste reuse and/or recycling activities, and compliance with regulatory standards. These data may be collected, analyzed and used to judge the impact of the TAP on waste reduction and environmental releases.

The pre- and post-surveys may also be used to inquire about other non-objective measures such as how has the TAP helped the client? What is the most important thing that the client knows now that he did not know prior to receiving TA? Does the client believe the TAP has helped him avoid future liability claims? Does the client think the TAP has been able to save him money? what did the client like most/least about the TAP? How would the client change the TAP? Would the client recommend the TAP to another businessman? All of these questions, though they have non-quantitative answers, would be useful in determining the strengths and weaknesses of the TAP. In order to maximize the effectiveness of the TAP, it will be necessary to document and interpret all of this information and use it to modify the program.

Self evaluation of the program may take the form of weekly discussions with all personnel. At these discussions, actions and responses of the clients and the TAP personnel should be analyzed, criticized, and improved. These discussions should consider the effort, time, and money expended on each technical assistance project. TAP personnel should ask themselves the following questions:

- Are we making efficient use of our resources?
- Is the TA that we provide of high quality?
- Is the TA having its desired impact?
- What should we do differently?

The program director or manager may request an external evaluation periodically. The party actually chosen to perform this evaluation may vary. If a TAP Advisory Committee was previously established, it may perform the evaluation. An ad hoc TAP evaluation committee may be created expressly for the purpose of evaluating the program. Such an ad hoc committee may consist of representatives from regulatory agencies, local industry, local citizens, academic faculty, or others. External evaluators should have access to TAP records and files (to the degree that client confidentiality is not compromised) and should examine each case. The disposition of the case and the manner in which it was handled should be considered. Another source of external evaluation may be a technical assistance "roundtable." Such a roundtable may be comprised of representatives from regulatory agencies, local industry, local citizens, academic faculty, or others. It would meet on a

regular and continuous basis. Besides providing TAP review and evaluation, a roundtable would discuss technical assistance and hazardous waste issues in general and promote awareness and understanding. These functions complement the goals and efforts of the TAP.

By using this tiered approach to monitoring and evaluation (i.e., client feedback, self evaluation, and external evaluation), the TAP will be able to keep a record of its progress, know its successes and failures, and know its strengths and weaknesses. Given this information, the TAP will be in a position to continually refine and improve upon its quality and performance. By so doing, the TAP will maximize its contribution to improving hazardous waste management.

CHAPTER VIII

DISCUSSION AND CONCLUSIONS

The four mechanisms for providing TA described in Chapter VI are based upon the model programs described in Chapter III. These mechanisms include: information transfer, on-site evaluation, referral, and continuing education. In the development of a TAP, a municipality should consider its needs and abilities. Its needs may be estimated with a survey of local businesses that are potential SQGs to determine their number and growth, an assessment of the need for off-site treatment, storage or disposal capacity, an evaluation of local hazardous waste management practices, and a survey of relevant federal, state and local regulations. In considering its abilities, a municipality should consider its financial resources, its human resources, its technical expertise, and its working relationship with local businesses. After making such need and ability evaluations, a municipality may then design a TAP using each of the four mechanisms, to variously weighted degrees, to provide the most appropriate assistance.

The importance of local assistance should not be overlooked. Though there are state and federal organizations and agencies that are charged with hazardous waste management, when an accidental spill occurs or an abandoned site is found to be leaking, the destruction and tragedy that occurs is experienced most intensely at the local level. It is the local air, water, and ecology that is damaged and it is the local residents who bear the risk of health and property damage. Consider some examples that have recently taken place in North Carolina (Andrews, Burby, Turner, 1985):

- The wells of two mobile home parks in Cumberland County were found to be contaminated by gasoline. As many as 80 similar situations were estimated to exist around Fayetteville. Because of this, the City water-line had to be extended to provide an alternate water source.
- In Salisbury, two lagoons were found that were used to store hazardous chemicals that could run off into the public water supply.
- In 1981, High Rock Lake was polluted with mercury. After spending \$3 million, clean-up efforts continue, but most of the mercury is still there.

Local government involvement in hazardous waste management is a very effective way of preventing occurrences such as those described above. Even if such incidents still occur, their impact will be lessened by proper local response, planning, and management. Through the development and implementation of a strong and well thought-out TAP, local hazardous waste management practices will be greatly improved.

For all of its potential and importance, however, it must be kept in mind that an effective TAP will be one that is not operated with an attitude of independence and omnipotence. The TAP should be operated in a manner that is consistent with its niche in local government. It is also important that the TAP, as a representative of local government, maintain a sense of its function in the local/state/federal government partnership. The local government is hardly endowed with boundless power or infinite resources. It must function within the larger context of intergovernmental cooperation, and even further, cooperation with business and other private interests.

One way of forging a strong cooperative effort is to organize a hazardous waste management "roundtable", concurrent with, or even preceding the

BIBLIOGRAPHY

- ANDREWS, R.N.L., BURBY, R.J., and TURNER, A.G. Local Governments and Hazardous Materials: A North Carolina Guide, Draft. Chapel Hill, NC: UNC Center for Urban and Regional Studies, Conservation Foundation of North Carolina, June 1985.
- BRANT, W.M. Dade County's Hazardous Waste Management Program. Miami, FL: Environmental Resources Management, May 1983.
- BRECKLING, E. (Ed.) Federal RCRA Hazardous and Solid Waste Amendments of 1984. North Carolina Waste Management Newsletter, March, 1985, 17, 1-11.
- Environmental regulations and small businesses: An overview of issues concerning the economic impact of EPA regulations on small businesses, CONSAD Research Corporation, September, 1983. (Jones, M.D., and Berkey, E. Responding to small business environmental issues. Washington, D.C.: U.S. Environmental Protection Agency, March 1984.)
- HILL, C., JONES, M.D., and BERKEY, E. Compliance assistance for small quantity generators of hazardous waste. Lexington, KY: Council of State Governments, October 1984.
- IMRA Third Annual Report. Albany, NY: New York State Environmental Facilities Corporation, 1984.
- JONES, M.D., Impact of hazardous waste regulations on small business. Atlanta, GA: Symposium on Current Topics in Hazardous Waste Control, Georgia Institute of Technology, February 6-7, 1984.
- JONES, M.D., and BERKEY, E. Responding to small business environmental issues. Washington, D.C.: U.S. Environmental Protection Agency, March, 1984.
- KOHL, J., MOSES, P., and TRIPLETT, B. Managing and recycling solvents: North Carolina practices, facilities, and regulations. Raleigh, NC: Industrial Extension Service, School of Engineering, North Carolina State University, December 1984.
- MCDANIEL, M.A. Piedmont waste exchange: Annual Report 1983-1984. Charlotte, NC: Urban Institute, University of North Carolina at Charlotte, 1984.
- Mid-year evaluation of Georgia Tech on-site hazardous waste management consultation program. Washington, D.C.: Small Business Ombudsman's Office, Environmental Protection Agency, March 1984.
- Minnesota Waste Management Board. Florida Amnesty Days let residents "come clean" with hazardous wastes. Foresite, March 1985 5 (2), 3;6.
- Minnesota Waste Management Board. MnTAP helps firms cut costs, reduce hazardous wastes. Foresite, April 1985, 5 (3), 2-3;6.

Minnesota Waste Management Board. Speakers affirm importance of hazardous waste reduction. Foresite, June 1985, 5 (5), 1-3;6.

RUDER, E., WELLS, R., BATTAGLIA, M. and ANDERSON, R. National small quantity hazardous waste generator survey. Washington, D.C.: Environmental Protection Agency, Office of Solid Waste, February, 1985.

Survey of small quantity industrial waste generators in Larimer County, Colorado. Fort Collins, Colorado: Department of Political Science, Colorado State University, 1985.

THOMPSON, F.M., BENJAMIN, Y.H.L., and MARPLE, V.A. Study on the requirements of a hazardous waste technical assistance program. Minneapolis, MN: University of Minnesota, February 1984.