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Information Resources for U.S. Department of Energy Pollution Prevention Programs

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Executive Summary

In support of the U.S. Department of Energy's (DOE's) pollution prevention efforts being conducted under the aegis of DOE's Office of Environmental Restoration and Waste Management (EM) program, Pacific Northwest Laboratory was tasked with evaluating pollution prevention information resources. The goal of this activity was to improve the effectiveness of DOE's pollution prevention activities through improved information flow, both within the complex, and more specifically, between DOE and other organizations that share similar pollution prevention challenges. This report presents our findings with respect to the role of information collection and dissemination within the complex, opportunities for learning from successes of the private sector, and specific information needs of the DOE pollution prevention community.

These findings were derived from a series of interviews with pollution prevention coordinators from across the DOE complex, review of DOE site and facility pollution prevention plans, and workshops with DOE information users as well as an information resources workshop that brought together information specialists from private industry, non-profit organizations, as well as state and regional pollution prevention assistance programs.

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1.0 Introduction

The principal goal of this project was to help EM-352 identify opportunities to improve the effectiveness of DOE's pollution prevention activities through improved information flow. Specifically, the project team attempted to:

- Identify the primary process-specific waste stream categories for DOE facilities as understood by the DOE contractors.
- Provide DOE with an improved understanding of how information about pollution prevention programs is promulgated.
- Provide DOE with a strategy for collecting information relevant to the needs of pollution prevention coordinators and others working within the DOE complex to reduce DOE's waste generation.
- Provide pollution prevention coordinators with a useful guide to locating current information related to pollution prevention technologies, policy development, and management techniques.
- Identify opportunities to provide for better exchange of information between DOE and other organizations sharing similar pollution prevention challenges.

2.0 Background

Information resources play an important role in the implementation of any pollution prevention program. New and more environmentally benign technologies for manufacturing are being developed on a regular basis. Regulatory changes continue to change environmental priorities, as well as the options for addressing them. Tools and methodologies such as lifecycle analysis and design for environment are undergoing intense discussion.

In short, environmental managers find themselves in an environment of continual change, where today's information rapidly becomes obsolete. It is optimistic to think that the situation will reverse itself; indeed, the trend appears to be in the opposite direction, toward even more rapid change. Responding to these trends will require that DOE develop increasingly effective systems for information collection, analysis, and dissemination to meet its pollution prevention goals in an effective manner.

An evaluation of DOE's pollution prevention priorities certainly supports the need for effective information collection and communication strategies. Many of the waste streams that DOE facilities are seeking to eliminate or reduce originate from processes that are also found in the private manufacturing sector (e.g., plating, painting, vehicle maintenance, electronic assembly, and parts cleaning). Anecdotal evidence obtained from private sector manufacturers and facilities within DOD indicate that substantial reductions (up to 90%) of the waste produced in these operations can be eliminated through effective implementation of existing technologies, improved housekeeping and procurement practices, and hazardous inventory management strategies. Indeed, successes within the DOE complex seem to indicate that many of these same results have been achieved within individual operating units.

Unfortunately, lines of communication between DOE and industry are often not clear enough to facilitate effective information exchange. The challenge is to ensure that up to date information on available technology is continually being brought into the DOE community, and that promising DOE technologies can move rapidly out into the private sector. In order to meet this challenge, it is

important to look at the overall system through which DOE's pollution prevention information is processed. A conceptual view of this information process is depicted in Figure 2.1.

Even now, data are being transferred within the information system depicted in Figure 2.1. Most of the players recognize the value of communicating with each other to help meet their particular needs. Still, the information exchange to date has generally been ineffective in producing the desired pollution prevention results. Before this can be improved, there are two clarifications in perspective that must begin. First, a definition of information must be given. Second, a shift in focus from information delivery systems to include information collection strategies must be created.

2.1 Defining Information

A pragmatic definition of information is "data that are presented in a way that increases its value." We tend to think of data in terms of numeric results--of experiments, surveys, etc. Taken alone the data may be interesting, and may even prove useful; but in most cases, data by itself cannot support further conclusions. Without being given some context with which to interpret the data, there is opportunity to misunderstand or overlook its relevance. The data need presentation within a "frame of reference" before they have real value. Once the data are presented in context, they can be called information and can be used to facilitate action.

Figure 2.1. A conceptual view of who requires and provides pollution prevention information. The arrows indicate information flow.

Further, "useful information" can be defined as "data, opinion, or analysis that can be applied to help solve a problem." Another way of looking at the "usefulness" of information is to consider whether or not it helps the user move closer to a decision.

2.2 Incorporating Information Gathering into Information Systems Development

A common tendency in addressing information systems development is to focus on the physical implementation and delivery mechanisms (newsletters, conferences, bulletin boards, stand-alone software applications, expert systems, etc.) rather than the information itself. DOE is currently looking at these delivery strategies to transfer pollution prevention information to the internal "environmental community." To be effective, these delivery mechanisms need to be balanced by an effective collection strategy. The collection strategy should

- Focus on the information needs of those who are most likely to use the information to effect reductions in waste. This includes pollution prevention coordinators, production and maintenance staff, management, and researchers.
- Use existing information resources (such as newsletters, databases and bulletin boards, conferences and symposia) to the greatest extent possible.
- Include both technical and programmatic information.

The details of information collection strategies will clearly vary somewhat from facility to facility. In particular, the specific information resources that are monitored will depend on the pollution prevention priorities and the process technologies supported at the site. Consequently, in this report we sought to identify a wide range of information resources (listed in Appendix A) as well as some generic criteria for selecting and evaluating resources. By examining this issue from a complex-wide perspective, it is hoped that our findings can be useful in helping DOE develop a more effective pollution prevention program.

3.0 Approach

Throughout this effort, the focus has been on providing answers to a relatively few key questions:

- What kinds of information are needed within the DOE pollution prevention community?
- What information resources are currently available via commercial and public data sources which can meet these needs?
- Which characteristics of information resources (for example, timeliness, accuracy, ease and cost of access, completeness, and format of the available data) are most important in determining the usefulness of the information?
- How can DOE implement information management strategies that will enhance the effectiveness of its pollution prevention programs?

In documenting the information needs of the pollution prevention community both within and external to DOE, PNL relied on a number of sources, including:

- telephone interviews and discussions with pollution prevention coordinators from across the DOE complex, to further identify their information needs and priorities

- a collection of documents including site and facility pollution prevention plans from DOE Office of Energy Research, DOE Defense Programs, and DOE-EM facilities
- participation in information discussion groups and workshops held in conjunction with the DOE-EM352 Waste Minimization Field Coordination Group
- discussions with our counterparts in industry, state and regional technical assistance programs, U.S. Environmental Protection Agency, and others in the pollution prevention field.

In addition, a workshop was conducted in cooperation with the Pacific Northwest Pollution Prevention Research Center, in which environmental librarians, clearinghouse managers, and other information specialists were brought together to discuss the role of information in supporting a pollution prevention program. Topics discussed at the workshop included the needs of pollution prevention information users, characteristics of useful information, current information sources, and improving information delivery. This workshop proved invaluable in reaching the findings presented later in this report.

4.0 Findings

4.1 Information Needs for Pollution Prevention Programs

DOE's pollution prevention programs do not suffer from a lack of information. Rather, the problem is sorting through the immense amount of information that is available, and focusing attention on those information resources that provide some value to the programs.

Effective collection of relevant information must be preceded by an understanding of the needs of the program. There is growing acceptance that pollution prevention is an important subject within the DOE complex. However, this acknowledgment does little to define our information needs. Further definition of the DOE complex pollution prevention concerns is in order. There are three overriding pollution prevention needs within the complex:

1. Establishing and communicating programmatic priorities and direction.
2. Implementing pollution prevention into DOE operations.
3. Developing technologies/applications for pollution prevention markets.

Information resources that are of value will address these needs; facilitating program development, expediting pollution prevention implementation, and promoting technology transfer.

4.1.1 Establishing and Communicating Program Direction

The DOE complex comprises many individual sites, programs, offices, and other organizational entities that must be provided with an overall programmatic direction if DOE hopes to realize its high-level pollution prevention goals. This direction includes communication of terminology, practices, priorities, reporting requirements, funding opportunities, and other information that facilitates a common understanding of both the problems (i.e., specific waste streams) and acceptable solutions.

While policies and requirements are generally communicated through "official" DOE communications channels, including memos and Secretary of Energy Notices, many of these documents are open to some degree of interpretation, and are necessarily couched in legal jargon. A component often missing is a critical analysis or guidance document that translates the intent of the formal

policies into practices and procedures that can be implemented. Providing information at this level involves more than simple collection and dissemination of journal articles and memos, and requires careful analysis of documents and a working understanding of the policy-making process.

In Appendix A, the first section is dedicated to information resources that address the programmatic side of pollution prevention. These resources can be used by the environmental community within the DOE complex to help shape, and approach a common understanding of, DOE pollution prevention policy and requirements.

4.1.2 Implementation of Pollution Prevention at U.S. Department of Energy Operations

Another need within DOE is to successfully implement pollution prevention technologies and practices. Pollution prevention is best described as a philosophy, like efficiency or cost effectiveness, that should be overlaid on all business and operating decisions in a manufacturing facility, laboratory, or other industrial operation. However, simply grasping the concept of pollution prevention will rarely provide satisfactory progress toward meeting the intent of pollution prevention. The concept needs to be physically installed in our operations. This means DOE laboratories must produce less hazardous and mixed waste needing treatment, DOE production plants must incorporate clean manufacturing technologies into their factories, and that waste reduction techniques be integrated into activities such as drilling of water monitoring wells and decontamination/decommissioning of obsolete buildings and equipment.

Much work has been done to determine the primary "waste streams" coming from DOE operations. The result is a greater understanding of the hazardous, mixed, radioactive, and nonhazardous materials that need to be managed, treated, or disposed. With this perspective, some of the materials of concern have been chlorinated fluorocarbons (CFCs), toxic solvents like trichloroethylene and methyl ethyl ketone (MEK), plutonium and other radioactive materials, heavy metals like chromium, and nonhazardous materials like wood wastes, paper, and plastics. Such knowledge, however, is of limited value when targeting pollution prevention needs because it gives little insight to the *sources* of the wastes. To effectively carry out source reduction and recycling of hazardous materials, it is essential to know the sources, or processes, that are producing those materials.

The performance of Process Waste Assessments (PWAs) has been a good first step in uncovering opportunities for implementing pollution prevention in DOE operations. From our review of a sampling of the PWAs conducted by DOE facilities, and through interviews with several pollution prevention coordinators within the Complex, several common priority sources emerged, as shown in Table 4.1.

Table 4.1. Primary Sources of DOE Waste Streams

- Laboratory operations
- Waste water
- Auto and equipment maintenance
- Photographic and graphic processing
- Machining and mechanical surface preparation
- Degreasing and solvent cleaning
- Metal chemical finishing
- Electronics manufacturing
- Coating application and stripping
- Polymer and composite production and processing

It is important to note that most of these processes are also of concern to manufacturers in the private sector; indeed there is an immense amount of printed material available in journals, trade magazines, from state technical assistance programs, and other "private sector" sources on nearly every one of the sources listed in Table 4.1.

Not all of the waste sources found in the DOE complex, however, are well studied or documented. Many of the DOE sites face unique situations because of the special requirements imposed by the presence of radioactive or other special materials. In addition, our experience at Hanford has shown that minimization of secondary wastes from environmental sampling, decontamination and demolition, and environmental remediation are also of concern. To date, very little attention has been given on prevention or minimization of these wastes, either in the private sector or within DOE. In addition, laboratory wastes have not been the focus of pollution prevention efforts until very recently. As a result, getting access to information on reducing wastes from these processes can be a challenge.

The resource directory included in Appendix A has information sources sorted by the DOE process categories listed above. Resources listed under each category can be used as a starting point to build an information file suited to one's specific needs to implement and achieve pollution prevention results.

4.1.3 Developing Technologies and Applications for Pollution Prevention Markets

A third pollution prevention need of the DOE Complex is technology transfer. Information flow should support both the identification of commercial technologies that can be applied within DOE to solve its problems, as well as the identification of technology needs that might be met by application or redirection of DOE competencies.

Many of the products and systems developed within DOE have direct applicability to pollution prevention operations. New chemical processes, computer management systems, and technical developments can be used to reduce material use, prevent emissions of hazardous substances, and provide efficient operations in industry. Information on how to communicate with industry and businesses, how to measure the economic and environmental impact of new technologies, and how to market our technologies and expertise to meet the needs of the pollution prevention market is critical for DOE to remain competitive as emphasis shifts away from defense programs.

With the evolving emphasis on using DOE's technical resources to solve problems of broad national importance, technology transfer has become something of a cliché within the system. However, beyond the rhetoric is a powerful concept that is premised on the assertion that DOE's technical capabilities are complementary to those of the private sector. To begin tailoring our "core competencies" to be used in business and industrial pollution prevention markets, creating new information linkages to the private sector will be an important priority.

DOE's need for technology transfer of pollution prevention expertise was not the focus of this project and is not intended to be an emphasis in this report. For this reason there is only a limited assessment of useful information resources to meet this need. This does not reduce the importance of developing DOE technologies to meet pollution prevention markets. Technical assistance programs, industrial conferences, and environmental economics and business resources have some provisions to facilitate technology transfer.

4.2 Types and Sources of Information

Because of the diversity of information resources in the pollution prevention area, an understanding of the types and sources of information helps focus the use of these resources and speeds access

to useful information. This section will define the different types of information and present several ways information sources can be categorized and organized.

Pollution prevention information resources provide two distinct types of information: 1) technology information, which includes technical evaluation of alternate processes and practices, vendor and product data, technology case studies, and other descriptions of pollution prevention strategies that the information consumer can use to help make decisions regarding their own operations; and 2) programmatic information, which includes regulatory and policy analysis, pollution prevention planning and management strategies, and exploration of pollution prevention concepts (such as industrial ecology and design for environment). Programmatic awareness generally does not provide consumers with sufficient information to make decisions resulting in actual pollution prevention, but may provide them with alternate perspectives on environmental issues.

Both technology and programmatic information are important to an effective pollution prevention program. The programmatic information is needed to help eliminate some of the conceptual, organizational, and institutional barriers to process and product change, and to provide a cognitive framework for recognizing the appropriate technology information when it is presented in unexpected ways. The technology information is essential for reducing the real and perceived risks of adopting new technology, adapting existing technology, and evaluating alternatives. Put another way, the programmatic information helps to create an environment conducive to change; the technical information provides an appropriate direction for the change. Both components are critical to implementing pollution prevention strategies.

To gain access to the appropriate information for pollution prevention, a method of organizing the resources is needed. Categorization is somewhat arbitrary, but some logical schemes organize by source or by content. One source categorization is to group resources according to where they are located in the marketplace. For example, these categories might include:

- government sources
- commercial sources
- direct industry sources
- academic sources.

An important attribute of this grouping is that one would generally expect to find more programmatic information from government or academic sources, or more technology information in the commercial and industrial arenas. However, none of these categories should be considered the sole source for a particular type of information. Also, such delineation is not especially useful when categorizing pollution prevention resources because many pollution prevention needs and issues are so universal across the marketplace that the origination of the resource becomes irrelevant. Yet because the purpose of this report is to extend DOE information resources, most of the references we focused on are from outside the government arena.

A more useful source categorization is to group according to the form of the resource. In the Appendix we designated information sources into four general "format" categories:

- publications (journals, newsletters, directories)
- organizations (federal agencies, research centers, assistance centers)
- individuals (industry contacts, technical experts)
- electronic information systems (databases, software applications, networks).

Each of these “format” categories has unique attributes contributing to its usefulness as a resource. These are explored in some detail in the qualities assessment section of this report.

Knowledge of the content of the resources is also important. Categorization can be made according to the following types of content:

- technical
- methodology
- policy and regulatory guidance
- funding information
- “library” resources (i.e. resources of resources)
- current awareness.

A second “content” categorization scheme we used to organize information resources was according to the primary processes generating wastes within the DOE (refer back to Table 4.1). By using this sorting technique, the consumer is able to more quickly access information to address their particular technical needs. Figure 4.1 illustrates the extent that the various categorization schemes can be used to supply either programmatic or technical information.

Figure 4.1. Various categorization schemes can be used to find either programmatic or technical information.

4.3 Assessing Information Quality

Right away we need to remove the philosophy "He who has the most information wins." Information is not a limited resource. Nor are information resources limited to any particular medium. To avoid becoming full-time information collectors, or becoming overwhelmed with where to start, this section will provide some criteria to filter information resources to the bare essentials.

4.3.1 Quality Assessment Criteria

There are four simple criteria to assessing information quality. First, the information must relate to our specific problem or need. Second, the information should facilitate ongoing communication. Third, the information must be accessible. Finally, the information must be reliable. The following paragraphs discuss each of these guidelines.

Criterion #1: Information must relate to our specific problem or need. The rapid proliferation of information in all aspects of our professional and personal lives is a favorite topic of discussion among everyone from television commentators to serious researchers. And in fact, many people feel overwhelmed by the quantity of information available on any topic. There is simply not enough time to maintain a thorough knowledge of the published literature in any but the most specialized field, and certainly it would be impossible to keep up with the immense amount of information available on a topic as broad as pollution prevention.

The consequences of the information glut go well beyond the frustration of not keeping up. If significant resources are dedicated to collecting and storing such information that is not relevant to our needs, then it may even become a detriment to our ability to solve problems. The challenge is finding that (relatively) small piece of information that *applies* to our particular concern. This means spending time defining the needs before looking for information sources. Then it is an easier matter to assess each piece of information with the question, "Will this help solve my problem?"

Defining relevance is difficult at times, because pollution prevention is a very "people-oriented" approach to solving what are fundamentally technology problems. Descriptions of effective affirmative procurement or incentive programs may be very helpful to someone seeking to establish similar programs - they may be of marginal value to someone trying to "close the loop" on chromium releases from a plating line. Because most pollution prevention coordinators do not have the luxury of specializing in only one or two aspects of their program, some survival strategies are needed to help sort through the barrage of information we are all subject to:

- Don't feel the obligation to read (or even save) everything that comes across your desk. Articles or documents that are clearly redundant, or those with a clear lack of relevance to your program, can be safely discarded or ignored - even though that is counter to the first instincts of most pollution prevention coordinators, who must remain generalists to be effective in their role.
- Go to the source where possible. Much of the best pollution prevention information doesn't come from pollution prevention sources. Trade and professional associations, industry newsletters and magazines, specialty conferences, and other such sources have begun to feature pollution prevention or waste minimization articles and papers. Many of these are much more likely to have detailed discussions of technical data, methodology, or outcomes than the "pollution prevention media," which often repackage this information for a more policy-oriented audience. Keep in mind that trade associations vary widely in their willingness and ability to assist non-members, but that membership is often an option even for federal facilities.
- Maintain a balance between context and content information sources. As noted many times in this report, pollution prevention has an important process orientation that provides a new way of solving old problems. It is important to include a focus on the "why do we do what we do?"

(context information) as well as "how and what" (content information). The context information tends to be found first in those sources that directly address the pollution prevention "community" rather than the technical press.

- Delegate information tracking responsibilities. Many of the people who pollution prevention coordinators deal with in their daily responsibilities are much more specialized in their areas of interest. Chances are good that the paint shop foreman keeps up with the trade press, for example. Creating internal information networks that tap into individual and organizational interests and strengths will help you to identify relevant pollution prevention articles that may arise in relatively obscure places.

In summary, the inclusion of relevance as a criteria for information quality means becoming selective about what information you collect, and how you collect it. This means spending time defining the needs before looking for information sources. These needs should be frequently reassessed as the program grows and priorities are shifted. However, this assessment process will help to insure that time spent on information collection will be effective.

Criterion #2: Information should facilitate ongoing communication. Remember that data are only a tool, not the solution. Most sources of data are incomplete, lacking information on specific process conditions, parameters, methodology, or details of implementation that often prove critical in replicating or adapting the results to new situations.

Because of this trait, which is common to all published information, the best information resources are those that open the opportunity for ongoing communication between people and organizations sharing common information needs. This "networking" approach to information gathering can quickly leverage the resources needed to locate and collect needed documents or other information, at relatively little expense. It is often adopted unconsciously, or in ad-hoc fashion but can be an even more powerful strategy for information collection when included as an explicit criteria for evaluation of information resources.

Criterion #3: Information must be accessible. One of the greatest frustrations when working to solve problems is not being able to tap information resources. There are several ways that information can be beyond reach. While cost of access is the most common limitation, information access can also be restricted by membership requirements (as with trade associations), lack of appropriate training or equipment (often a limitation in the use of electronic information resources), or poor indexing or cataloging of the information resources (such as the lack of full-text searching on-line resources, or poorly organized filing of hard-copy resources).

Some strategies for dealing with the cost of information and other access issues include the following:

- Consider the true economics of the information source. Membership in trade associations and similar groups can be costly, and getting approval for such memberships for DOE facilities can be administratively challenging. However, these organizations can often be rich information resources and provide opportunities for real interaction with industrial colleagues, leading to technology transfer. Before dismissing such actions as cost-prohibitive, consider the costs of not having the information, and make the decision on that basis.
- When using on-line resources, such as commercial databases or systems such as the EPA's PIES system, be sure that the search is well-defined, that the searcher is trained in the use of the resource. Have the key words and other search terms handy, in a written search strategy that can serve as a "script" for the search. On-line costs can be significantly reduced by applying these simple strategies.

- Use off-line versions of on-line resources. Data vendors such as DIALOG are making selected resources available in CD-ROM versions, to provide essentially unlimited searching for a (usually small) fixed fee. This can be a cost-effective strategy for routine searches of common databases.
- Use subcontracts for information monitoring. A number of information-oriented agencies and organizations exist that continually monitor information related to pollution prevention to serve some selected constituency (examples are RIOTECH, which serves an economic development function in the Rio Grande basin, and the Pacific Northwest Pollution Prevention Research Center, which serves as a regional focal point for pollution prevention in the Pacific Northwest). Many of these agencies are receptive to working in a contracted role, to routinely pass along information that meets some criteria for selection that can be provided as part of the statement of work.

When assessing information quality, make a judgment on how quickly, efficiently, and completely you can gather the information. When the time spent collecting the information is excessive, resources are diverted the real task of taking action to solve a problem.

Criterion #4: Information must be reliable. Perhaps this seems obvious, yet often critical information becomes worthless because it cannot be substantiated or duplicated. You must be able to confirm the information is valid, accurate, and current. In scientific and technical communities, the traditional method of doing this is to rely on peer-reviewed sources. However, non-reviewed sources of information are rapidly proliferating, and may contain very useful information. This can be particularly true in the pollution prevention field, where manufacturing practices change rapidly, and where a true scientific or engineering discipline has yet to evolve its own culture and standards of acceptability.

In the absence of such traditional means of assessing the reliability of sources, there are some proxies which can be applied:

- If you cannot assess the reliability of the information itself, consider what you know of the organization you're obtaining it from. Do they routinely assess the information quality of materials they provide? Do they have vested interest in providing incomplete or otherwise misleading information? Do they have a reputation for reliability? Asking yourself these questions will often help you to determine how much faith you should put in the information you've received.
- Can the information be independently documented or validated? For technology information, can you find other references or vendors to validate the data? For programmatic information, can you tie the information back to a source document or individual within an agency?
- Does the information pass the "common sense" rule? Too often, even experienced technical staff can be so desperate for a solution to a problem that they forget to ask if the answer they find makes sense.
- Experience counts. Keep notes (mental or otherwise) on your information sources, including the usefulness or accuracy of the information they've provided you in the past. Reliable information resources are reliable precisely because they are consistent in their ability to help solve problems, so past performance matters.

Information from unknown sources or those of questionable reliability is not necessarily "bad," but should be subject to closer scrutiny than information from reliable sources. Applying the above "tests" to the information will often be sufficient to screen out information that is misleading or incorrect.

4.3.2 Assessment of Information Resources

Useful information is valuable no matter how you get it. There should not be much critique of specific resource categories. Some clarification, however, of drawbacks and attributes of the form of information is appropriate, and is presented in the following paragraphs.

Publications: This resource nearly always has the most data and detailed information of the four categories. For this reason, trade journals, vendor literature, newsletters, directories, and environmental technology and management magazines are valuable resources of pollution prevention information. However, caution should be taken when using such information as the sole source on which to base decision-making. Most often the information given in publications has been written and edited to present it in a favorable, appealing light. Especially in trade journals and vendor literature, case studies are usually success stories, minimizing the difficulties and emphasizing the benefits of the technology used or action taken. Often the best information - case studies of what was tried and failed - is not published or emphasized. When selecting information from publications, give rigorous scrutiny of the data, check the references, and if possible, get in contact with the source to discuss the information.

Another weakness in publications is the lack of accessibility to supporting information. Frequently, potentially valuable information will be briefly mentioned in a journal article or flashed as a news update, and will have no indication of how to verify or get more details about the information. The consumer might go to great lengths in attempt for further facts before finding the source. Many times further information is just not available.

The most valuable publications are directories. The EPA and other federal agencies, trade associations, research centers, and academic institutions publish various directories of pollution prevention related information. Most directories meet all four criteria of useful information. Of course, directories are not the solution to DOE pollution prevention needs, but they can quickly guide to resources that can meet the needs.

Organizations: Research centers, information clearinghouses, trade associations, technical assistance programs, and government agencies and centers are perhaps the best, most accessible resources of pollution prevention information. While this category generally does not supply great detail or extensive data, it gives the greatest breadth of information. Organizations are usually prepared with staff to address concerns and to research for sources of further information. Also, this form of resource also has the greatest potential to tailor the information given to fit specific needs.

Organizations are used most effectively as a resource to find other resources. This attribute could be seen as a detriment, because organizations can seldom offer immediate answers to problems. Expect to be required to follow up on the leads provided from organizational sources before gaining enough details to address specific concerns. Nonetheless, the follow-on work will be focused on the scope of the issue to be addressed.

The most significant weakness of organizational information sources is related to their strength; effective organizational sources depend on people to meet the needs of the information consumers. Often, organizations are financed by grants and donations, and are not financially secure from year to year. For this reason the organizations may be understaffed, or suffer from a high turnover of employees. The quality of the information housed in the organizations will inevitably suffer in such cases.

Individuals: Individuals--technical and programmatic experts, environmental professionals, engineers, industrial contacts--are the ideal information resources to solve pollution prevention concerns. Attempting to go directly and exclusively to this resource, however, is not recommended. While ultimately the most effective solutions are supported by information supplied by individuals, this form of resource is the least accessible of the four categories. There are some significant reasons for the inaccessibility.

Individual industrial contacts supply a wealth of information to help implement pollution prevention technologies and practices into operations; however, they are difficult to access for three reasons. First, individuals usually do not have time set aside to share information about the areas of their expertise. While most individuals are eager to discuss the challenges they had to meet to implement pollution prevention in their operations, any time they spend doing so prevents them from actually accomplishing their duties. Second, industrial experts are usually assigned to an explicit task, to solve a site-specific concern. Upon completion of the task, the individual is assigned to another task, often in an unrelated field. The experience and expertise goes with the individual, usually undocumented and untraced. Accessing the resource at this point is difficult at best. Finally, there are often bureaucratic and administrative barriers obstructing access to the individual experts. Some companies require all outside communications to go through an administrative "gatekeeper". This is practical for sensitive information, but most pollution prevention issues do not meet this criteria, and can be quickly and effectively addressed by individual engineers or technical experts. If the information consumer must contact the individuals through a gatekeeper, the administrative procedure takes more time than the issue justifies. Other resources can more efficiently provide the information needed.

Some gatekeepers, however, are valuable information sources. Technology transfer focal points--individuals who provide a liaison function within an industry or company--can sometimes be a conduit, bypassing the bureaucratic hurdles, to the individual sources of information. This technology transfer focal point performs much like the clearinghouse organizations mentioned earlier. Similarly, this function has the same weakness resulting from inconsistent support from the industry or company, and thus may not be a reliable resource.

Electronic information systems: With the near daily quantitative leaps in electronic technical developments, this resource has the greatest potential for usefulness. Electronic information systems (EISs) such as environmental databases, hazardous material inventory and tracking systems, waste exchange bulletin boards, regulatory and legislative networks, waste minimization modeling software applications, and pollution prevention clearinghouses have the capability to help information consumers as they work to accomplish pollution prevention. The greatest limitation of this resource is that it is under utilized not only by the consumer, but more important, by the information suppliers. As mentioned in the background section of this report, electronic information systems often have much more time spent on the dissemination engines than on the collection engines. When EISs are not constantly fed with new, current, and appropriate information, consumers will stop using them.

We must also acknowledge that EISs are a new technology. Most of these systems are still in development. As environmental professionals continue to expand their understanding of what EISs are capable of, this category of resource will improve as a tool for supplying information.

At the information specialist's workshop that was held in conjunction with the Northwest Pollution Prevention Research Center as one of the tasks of this project, a number of specific suggestions to improve electronic information systems were given. Many of these suggestions are quite detailed and address dissemination strategies rather than collection techniques, but are worth including here.

- There is a primary need for a standardized approach to queries of bibliographic databases. In discussing search query languages, several participants recommended the OCLC's Z39.50 ANSI as the best available model. It is important to point out that this does not imply a standardized user interface; but rather that the underlying structure of how the data are stored be implemented according to a consistent standard to facilitate searching multiple databases.
- Participants noted that unless an extremely complete thesaurus was provided, the ability to do full-text (as opposed to abstracted or keyword-based) searching should be retained.
- Both the information specialists and the pollution prevention specialists stressed the importance of adding value at any stage of the information process. They described the ideal resource as offering good documentation (both on-line and print) and good support (including a support

person available by phone after 5 p.m. Eastern time). They agreed that an on-line, "one-stop" environmental resource would be ideal, with the closest existing model being the "libraries" of papers available on Lexis/Nexis.

- In discussing document delivery mechanisms, the workshop group agreed that the goal of passive, automatic searches (SDI lines were mentioned as an example) should be pursued. The information could be sent as electronic mail, rather than hard copy, in many cases. (This is currently available through the software at Statenet, which can download information as a Paradox file.) In broad terms, the group agreed that the delivery system has to be set up by a human brain and that the main sources of difficulty are graphics and color compatibility.

The listed comments should be referenced as DOE continues to develop EISs to address pollution prevention concerns.

5.0 Conclusions

The following points are made as conclusions.

- Rapid changes in technology and products, many of which are commercially available, require continual monitoring of information sources to maintain current awareness of pollution prevention opportunities. The same is true of emerging pollution prevention methodologies such as lifecycle analysis, and design for the environment, both of which are subjects of intense discussion and study in the private, academic, and government sectors.
- An enormous amount of information with direct relevance to DOE's pollution prevention programs is available through sources outside of DOE. These sources include state and regional technical assistance programs, private non-profit and university-based programs, other federal agencies such as EPA and the Department of Defense, as well as offices within DOE (most notably the Office of Industrial Technologies' Industrial Waste Reduction Program). Many of these programs operate clearinghouses, publish newsletters, operate bulletin boards, or have other information dissemination activities that can be very useful in maintaining current awareness.
- Both information specialists and information users within the DOE complex indicated that an important need was for well-informed analysis and synthesis of the wide range of information which is available. For information to be useful, it must lead to action - and information provided outside the context of this analysis often does not bring the user any closer to a decision.
- Finally, there are no direct solution or action strategies to the DOE pollution prevention needs given in this report. The purpose of this report was to identify and evaluate information resources that can be used as tools to develop pollution prevention action strategies. The responsibility of actual action strategy development must be accepted by the information consumer; specifically, the environmental professionals within DOE who are tasked to achieve waste minimization or pollution prevention. By understanding the qualities and limitations of information resources, the information consumers should be more efficient and better equipped when taking this responsibility.

Appendix A

Resource Directory Category List

Appendix A: Resource Directory Category List

1 Pollution Prevention - General Programmatic Resources

- General Programmatic Resources
- Affirmative Procurement
- Environmental Economics
- Materials and Waste Inventory & Tracking
- PWAs

2 Pollution Prevention - General Technology Resources

- General Technology Resources
- Energy Conservation
- Solid Waste

Technology Resources Sorted by Waste Generating Processes

3 laboratory operations

4 waste water

5 auto/equipment maintenance

6 photographic/graphic processing

7 machining and mechanical surface prep

- machining oils, coolants, and lubricants
- skin polish/sandblasting, etc.

8 degreasing and solvent cleaning

9 metal chemical finishing

- plating
- conversion coating
- deoxidizing/desmuting/descaling
- chemical milling/etching
- inorganic coating stripping (such as copper stripping)
- penetrant/magnetic particle/nital etch inspection
- flame spraying

10 electronics manufacturing

- printed circuit board operations

11 coating application and stripping

- application
- stripping

12 polymer and composite production/processing

- tool release processing

The contents of this directory have been collected from our office files. While every reasonable effort was made to verify the information contained, we cannot assume responsibility for the quality, capability, or availability of the resources in this document, nor can we guarantee this document as comprehensive or complete.

1

Pollution Prevention - General Admin & Reporting

- General Programmatic Resources
- Affirmative Procurement
- Environmental Economics
- Materials and Waste Inventory & Tracking
- PWAs

General Programmatic Resources	Resource name	Prevent!
	Form of resource	Publication: newsletter (monthly)
	Type(s) of information	current awareness
	Scope of resource	laboratory focused pollution prevention awareness
	Description	A monthly newsletter published at the Idaho National Engineering Laboratory, Prevent! is primarily targeted to increase laboratory staff awareness of pollution prevention opportunities and activities. The newsletter gives visibility to activities happening beyond the INEL facility as well as internal progress to pollution prevention. The format of the newsletter includes a cover story and several departments, including Tech exchange, Recycling bin, Meet your recycling coordinator, News to reuse, Ask Auntie waste, and Waste not, a material exchange classified section.
	For more details	Contact: Carrie Doughty Prevent! P.O. Box 1625 M/S 3950 Idaho Falls, ID 83415-3950 208-526-5372

General Programmatic Resources	Resource name	Waste Minimization & Recycling Report
	Form of resource	Publication: newsletter (monthly)
	Type(s) of information	current awareness / technical / policy and regulatory guidance
	Scope of resource	Activities, publications, case studies contributing to progress in waste minimization and recycling
	Description	Published monthly by Government Institutes, this newsletter is intended to give "timely and practical information on Pollution Prevention". Features include a Federal Report, International Scene, State Scene, Case Studies, Spotlight, Profile (an interview section), and Waste Minimization Reflections.
	For more details	Government Institutes, Inc. 4 Research Place, #200 Rockville, MD 20850 phone:301-921-2355 Subscriptions are \$198 for 12 issues.

General Programmatic Resources	Resource name	1993 Reference Guide to Pollution Prevention Resources
	Form of resource	Publication: directory
	Type(s) of information	resources for: technical information / policy and regulatory guidance / funding information
	Scope of resource	a comprehensive resource covering a wide selection of industries and process applications, focusing by state, by industry, and by type of resource.
	Description	Because of its well thought out format and comprehensive listing of information, this directory is an essential source book for any pollution prevention program. The guide supplies contacts for training opportunities, technical assistance, publications, and state and federal programs and contacts. Supplied are contacts to receive industry and process specific guides, fact sheets, and available alternatives. Contacts for pollution prevention clearinghouses, research and training centers, and pollution prevention events and conferences are included. Local resources are listed for each state as well as US Islands and territories.
	For more details	document # EPA/742/B-93-001 available through the EPA Library or by writing: Office of Pollution Prevention and Toxics U.S. Environmental Protection Agency 401 M Street, S.W. (7409) Washington, D.C. 20460

General Programmatic Resources	Resource name	Kansas City Plant Pollution Prevention Quarterly Report
	Form of resource	Publication: activity report
	Type(s) of information	technical information / current awareness
	Scope of resource	Focuses on site priority activities and waste streams, as well as relevant information from other sources
	Description	This quarterly report is a good resource of success stories in pollution prevention activities that have reduced waste from typical industrial operations including machining, electronic assembly, vapor degreasing, cold solvent cleaning, plating, polymer production, sanitary trash, and other processes contributing to KCP priority waste streams.
	For more details	Dave Eggers, D/922, SC8 Allied Signal Inc. Kansas City Division P.O. Box 419159 Kansas City, MO 64141-6159 Phone: 816-997-4045 FAX 816-997-5903

General Programmatic Resources	Resource name	Pollution Prevention FAX Sheets
	Form of resource	Publication: Other
	Type(s) of information	current awareness
	Scope of resource	none given
	Description	none given
	For more details	Pollution Prevention FAX Sheets Jack Snider Martin Marietta Astronautics Group P.O. Box 179 Denver CO 80201 phone: 303-977-3322 FAX: 303-977-3844

General Programmatic Resources	Resource name	Pollution Prevention Review
	Form of resource	Publication: journal (quarterly)
	Type(s) of information	current awareness / methodology / policy and regulatory guidance / technical information
	Scope of resource	Supplied primarily from manufacturing and process industries.
	Description	Published quarterly by Executive Enterprises, Inc. Excellent publication that focuses solely on pollution prevention topics, with an emphasis on pollution Prevention management methodologies, data tracking systems, technical case studies, and regulatory updates. Technology articles are usually industry-specific case studies or reviews. Regular features include "Washington Watch," a regulatory review; "In the States," a review of regional and local programs and regulatory developments; "Practical Pollution Prevention," "Technological Developments," and "Resource Review."
	For more details	Pollution Prevention Review Ann Graham, Editor c/o Executive Enterprises Inc. 22 West 21st Street New York, NY 10010-6990 800-332-8804 subscription rate (as of 8/93) is \$152 for one year, \$280 for two years.

General Programmatic Resources	Resource name	Business and the Environment
	Form of resource	Publication: Journal (monthly newsletter)
	Type(s) of information	policy and regulatory guidance / current awareness / funding information
	Scope of resource	the business aspects of environmental management
	Description	This monthly publication gives a quick synopsis and analysis of current business and regulatory actions that impact environmental management and operations. The standard format is to have a Focus Report, a Special Report, and departments on Corporate Initiatives, Emerging Markets, and Regulatory and Policy Trends.
	For more details	Editor: Kathleen M. Victory Cutter Information Corp. 37 Broadway Arlington, MA 02174-5539 phone: 617-648-8700 FAX: 617-648-8707 Subscription: \$497 / year

General Programmatic Resources	Resource name	EPA On Line Library System (OLS)
	Form of resource	Electronic Information System: database
	Type(s) of information	technical resource information
	Scope of resource	EPA related citations and summaries from literature
	Description	The OLS is a computerized catalog of the U.S. Environmental Protection Agency library network. EPA provides OLS at no cost to support public access to environmental information. The OLS consists of several related databases that can be used to locate books, reports, and articles on a variety of topics. The OLS can be searched by numerous access points, such as title, author, and keyword. The several databases are: the National Catalog, which contains the holdings of the EPA libraries nationwide, including EPA reports, books, and journal titles, the Hazardous Waste database compiled by EPA Headquarters Library, the Clean Lakes database, and the Chemical Collection System.
	For more details	for the OLS User Guide and other system documentation contact the EPA Library at Research Triangle Park, NC, telephone 919-541-2777. For system technical assistance call EPA's National Computer Center at 1-800-334-2405.

General Programmatic Resources	Resource name	Institute for Cooperation in Environmental Management
	Form of resource	Organization:
	Type(s) of information	
	Scope of resource	none given
	Description	
	For more details	phone: 215-829-9470

General Programmatic Resources	Resource name	INFORM: Environmental Dividends: Cutting More Chemical Wastes
	Form of resource	Publication: Report Organization: nonprofit research program
	Type(s) of information	technical/ methodology
	Scope of resource	Pollution prevention management strategies assessment
	Description	Environmental Dividends is the publication of the results and findings of an extensive survey of industrial waste management and minimization programs. The report analyses and quantifies the benefits achieved by over 180 individual source reduction activities reported from 29 chemical manufacturing plants. The activities resulting in source reduction included process changes, operations changes, equipment changes, chemical substitutions, and product changes. The report also tracked the "Pollution Prevention Program Features", such as Written source reduction policy, Leadership, Materials accounting, Materials balance, Full cost accounting, and Employee involvement, and indicated which features had the greatest results. INFORM is a national nonprofit environmental research organization that seeks solutions to problems related to chemical hazards, municipal solid waste, air quality, and agricultural water use.
	For more details	For copies of Environmental Dividends: Cutting More Chemical Wastes contact INFORM at: INFORM, Inc. 381 Park Avenue South New York, NY 10016-8806 phone: 212-689-4040 FAX: 212-447-0689 copies are available for \$75.00 plus \$3.00 postage & handling

General Programmatic Resources	Resource name	EPA Pollution Prevention Information Exchange System (PIES)
	Form of resource	Electronic Information System: bulletin board
	Type(s) of information	technical / current awareness
	Scope of resource	general pollution prevention communication, information, and resources
	Description	PIES is a bulletin board that contains articles on pollution prevention, waste reduction, hazardous waste, and environmental protection; federal, state, and corporate program summaries; legislative summaries; abstracts; the Pollution Prevention Information Clearinghouse (PPIC) contact list; the International Cleaner Production Information Clearinghouse (ICPIC); regional roundtables, and many other mini exchanges.
	For more details	<p>Contact the Pollution Prevention Information Clearinghouse with questions or for a "PIES Quick Reference guide" at:</p> <p>Pollution Prevention Information Clearinghouse Environmental Protection Agency, PM211-A 401 M Street, SW Washington, D.C. 20460</p> <p>phone: 202-260-1023 FAX: 202-260-0178</p> <p>The PIES Technical Support Office is at (phone) 703-821-4800, (FAX) 703-821-4775.</p>

General Programmatic Resources	Resource name	Computer-aided Environmental Legislative Data System (CELDS)
	Form of resource	Electronic Information System: database
	Type(s) of information	policy and regulatory guidance
	Scope of resource	Environmental and Health related regulations
	Description	Regulatory citations and compliance; RCRA/HSWA, CERCLA/SARA, TSCA, and DOT; waste transport, disposal, and treatment; solid waste; wildlife management; pesticide data management; radiation waste management; Federal Register summaries.
	For more details	<p>U.S. Army Corps of Engineers Construction and Engineering Research Laboratory (CERL)</p> <p>No phone number or way to contact</p> <p>\$200.00 hook up fee plus \$90.00 per hour.</p>

General Programmatic Resources	Resource name	Pollution Prevention Site Management Structure
	Form of resource	Other: DOE Model P2 Activity
	Type(s) of information	methodology, funding information
	Scope of resource	An organizational structure to enhance total site participation and ownership of waste minimization and implementation of P2 technologies and practices.
	Description	A novel approach to managing pollution prevention at a site is by incorporating "Matrix management" and "democratic legislative philosophy" into the process. Matrix management is used to manage programs such as waste minimization and pulls in the appropriate people, regardless of organizational reporting structure, to meet the needs of the program. The Waste Min Program has a manager whose staff reports to him/her "dotted line" from various organizations across the laboratory. To implement the program, each organization at has "elected" MinNetReps, the number representatives assigned to the organization determined by the volume of hazardous waste that organization generates. These MinNetReps are responsible for performing the PWAs, implementing pollution prevention alternatives, reporting progress, and submitting ideas for funding. The MinNetReps are paid by the Waste Min Program. The program gets its money by "taxing" each organization based, again, on the waste volume that the organization generates. The organizations get the money to pay the "tax" by making allowance in their project budgets (similar to how automotive shops charge their customers for an oil disposal fee). This method of management works well to give the organizations visibility of the cost of the wastes they generate, and to give them ownership of how they solve their problems.
	For more details	Gordon Smith Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185 Phone: 505-848-9769 FAX: 505-848-0244

Affirmative procurement	Resource name	The Official Recycled Product Guide
	Form of resource	Publication: directory
	Type(s) of information	technical resource information
	Scope of resource	Nationally available products containing recycled materials.
	Description	not obtained
	For more details	American Recycling Market, Inc. Yearly subscription available by calling 1-800-267-0707.

Affirmative procurement	Resource name	Government Services Administration (GSA) Recycled Products Guide
	Form of resource	Publication: directory
	Type(s) of information	technical resource information
	Scope of resource	products containing recycled materials available through GSA/Federal Supply Services supply system
	Description	The Guide is to help establish the federal government as the leader to stimulate markets for recyclable materials and the use of recycled products nationally. The Guide details how to order and obtain over 700 quality recycled and recycled content products in the federal community. The Guide divides the items into three sections according to the method by which they are made available in the supply system: 1) the Stock Program, 2) the Special Order Program, and 3) the Schedule Program, including the New Item Introductory Schedule (NIIS). the Guide is meant as a recycled product highlighter to the GSA Supply Catalog.
	For more details	Mailing List Code: RCPG-0001 Copies may be obtained, without cost, by authorized users of GSA sources of supply and services, from: General Services Administration Centralized Mailing List Service P.O. Box 6477 Fort Worth, TX 76115 phone: 817-334-5215

Affirmative procurement	Resource name	National Association of State Purchasing Officials (NASPO)
	Form of resource	Organization: State agency
	Type(s) of information	technical resource information
	Scope of resource	Affirmative Procurement
	Description	not obtained
	For more details	Contact Council of State Governments at 202-624-5460

Affirmative procurement	Resource name	National Recycling Coalition (NRC)
	Form of resource	Organization: Federal agency
	Type(s) of information	technical resource information
	Scope of resource	recycling
	Description	The NRC has some "sub-councils": the Buy Recycled Business Alliance, directed by Phil Bailey, and the National Recycling Congress.
	For more details	Contact the NRC at 202-625-6406

Environmental Economics	Resource name	Primer for Financial Analysis of Pollution Prevention Projects
	Form of resource	Publication: report
	Type(s) of information	financial accounting / technical information / methodology
	Scope of resource	the financial and economic considerations of pollution prevention investments.
	Description	This document, written by the American Institute for Pollution Prevention (AIPP), was prepared as a guide to pollution prevention investment. It starts at the point that pollution prevention projects that are technically equivalent to current practice have been identified. The emphasis is on the basic analytical techniques needed to justify pollution prevention investments. The concentration is on weighing economic and financial aspects of the various projects options instead of the technical factors. In order to receive funding, it is often essential that the project successfully compete in the company's capital funding sequence or before the bank's loan committee. The primer is a guide to calculate the more definable costs such as utilities, labor, and capital costs. The intangible costs such as future liability of waste cleanup, site remediation, or potential legal action are not the focus of the document, and are only mentioned briefly in an appendix.
	For more details	document # EPA/600/R-93-059 available through the EPA Library or by writing: Center for Environmental Research Information Cincinnati, Ohio 45268

Environmental Economics	Resource name	Environmental Economics: What's the Bottom Line?
	Form of resource	Publication: article
	Type(s) of information	technical overview and contacts
	Scope of resource	summary of environmental accounting methods and approaches

Description

This feature article in Pollution Prevention Northwest, the quarterly newsletter of the Pacific Northwest Pollution Prevention Research Center, explores several environmental accounting methods to help determine "if pollution prevention pays". The accounting methods and concepts discussed are Activity Based Costing, Total Cost Assessment, Life Cycle Costing, Present Value, Risk Analysis, Pollution-Added Accounting, Design for Environment, Washington State Pollution Prevention Planning Financial Analysis, and Industrial Ecology. The article highlights each methods applicability and provides contact names for further information on the method. The article also includes a selected list of Environmental Accounting Resources, including publications, software, and a case study.

For more details

Contact the Pacific Northwest Pollution Prevention Research Center (PPRC) and ask for a copy of the Spring/Summer, 1993 edition of the Pollution Prevention Northwest report. The PPRC address is:

1326 Fifth Avenue, Suite 650
Seattle, WA 98101

Phone: 206-223-1151

FAX: 206-223-1165

Internet: bsrc_pprc@ccmail.pnl.gov

**Inventory &
Tracking****Resource name****TOXNET - TRI Database****Form of resource**

Electronic Information System: database

Type(s) of information

technical information

Scope of resource

chemical toxicity and industrial release information

Description

TOXNET (TOXicology data NETwork) is a computerized system of files on toxicology, hazardous chemicals, and related areas. The database provides an integrated approach to the building, updating, and review of records, along with a sophisticated search and retrieval module. Some of the files operated from TOXNET are the Hazardous Substances Data Bank, the Chemical Carcinogenesis Research Information System, the Integrated Risk Information System, and the Directory of Biotechnology Information Resources. Of particular usefulness is the TRI (Toxic Chemical Release Inventory) Series. This series of files contains data, collected from industry by the EPA, on the estimated releases to the environment (air, water, land, or underground injection) of over 300 listed toxic chemicals. Also included is information on amounts of chemicals transferred to waste sites, and methods used for waste treatment. The data are collected annually and represent a unique source of publicly accessible environmental information.

For more details

on how to access TOXNET contact:

Specialized Information Services Division
National Library of Medicine
8600 Rockville Pike
Bethesda MD 20894

Phone: 301-496-6531

Inventory & Tracking	Resource name	National Materials Exchange Network (NMEN)
	Form of resource	Electronic Information System: bulletin board / clearinghouse
	Type(s) of information	technical information
	Scope of resource	national clearinghouse of materials available for use/reuse.
	Description	NMEN is a national partnership of industrial waste exchanges which provides information on waste by-product, off-spec, overstock, obsolete, and damaged materials; used and virgin, non hazardous, solid, and hazardous. The system allows companies to publicize their waste streams to encourage reuse. The system lists "materials available" and "materials needed" in 17 categories.
	For more details	the service is free and can be accessed by modem by calling 1-800-858-6625. User assistance is available by calling 509-325-0507. For more information on the system contact Bob Smee at 509-325-0551.

PWAs	Resource name	Graded PWA approach
	Form of resource	Other: management process application
	Type(s) of information	methodology
	Scope of resource	applicable to all process waste streams
	Description	This objective of the DOE "graded" approach is to complete the assessment of process waste streams and identify opportunities for pollution prevention in a prioritized, cost-effective method. The approach depends on having a Priority Material Waste Stream List (PMWSL). The graded approach has three levels of assessment effort. The first level, which requires the least effort, is an Activity Characterization. If the activity does not use or generate an item on the PMWSL then the PWA is complete. Otherwise, those operations that apply to the PMWSL are then given a Weighted Sums Criteria Evaluation (WSCE). If the score is below a certain level, the activity is given a Level II Informal Assessment, which identifies pollution prevention options and recommends implementation based on existing and available data. If the WSCE score is above a certain level, a Level III Formal Assessment is performed. This is a full scope assessment, which requires the use of new data for the extensive evaluation. A Level III PWA includes a process flow diagram, and an economic and technical analysis of all the options identified.

For more details

Contact: Susan Pemberton, D/837, 2C43
Allied Signal, Inc.
Kansas City Division
P.O. Box 419159
Kansas City, MO 64141-6159

Phone: 816-997-5435
FAX: 816-997-2049

PWAs	Resource name	The EPA Manual for Waste Minimization Opportunity Assessments
	Form of resource	Publication: report
	Type(s) of information	methodology
	Scope of resource	How to assess manufacturing processes to find opportunities to reduce wastes
	Description	This manual, published by the EPA Office of Research and Development, Hazardous Waste Engineering Research Laboratory, establishes the standard by which EPA considers effective waste reduction efforts. The manual comes complete with worksheets to help in performing each step of the opportunity assessment. The steps outlined in this manual are a good foundation to performing Process Waste Assessments (PWAs). The advisory committee that contributed to the manual is an excellent resource of some of the countries most active thinkers regarding pollution prevention and waste minimization. The manual also has some useful appendices containing references and government technical / financial assistance programs listed by state.
	For more details	document # EPA/600/2-88-025 available through the EPA Technical Library or by writing: Hazardous Waste Engineering Research Laboratory Office of Research and Development U.S Environmental Protection Agency Cincinnati, Ohio 45268

Pollution Prevention - General Technology Resources

- General Technology Resources
- Energy Conservation
- Solid Waste

General Technology Resources	Resource name	ECM Newsletter; Environmentally Conscious Manufacturing
	Form of resource	Publication: newsletter (quarterly)
	Type(s) of information	technical information / current awareness
	Scope of resource	advances in environmentally conscious manufacturing processes.
	Description	The ECM Newsletter is published at Sandia National Laboratories to disseminate information obtained from research and development programs and demonstration, testing, and evaluation projects at research facilities on environmentally conscious manufacturing processes. The newsletter encourages contributions from outside researchers and other sources. Each issue includes a News in Brief section followed by case studies and articles of the status and progress of various environmentally conscious projects.
	For more details	Contact: Tracy Dunham Environmentally Conscious Manufacturing Division 6611 Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185 phone: 505-845-9776 FAX: 505-844-0116

General Technology Resources	Resource name	International Journal of Environmentally Conscious Manufacturing
	Form of resource	Publication: journal
	Type(s) of information	technical / methodology / current awareness
	Scope of resource	
	Description	none given
	For more details	Editors: Mo Jamshidi and Mo Shahinpoor ECM Press P.O. Box 20959 Albuquerque, NM 87154-0950

General Technology Resources	Resource name	Air, Waste and Environmental Research Faculty Profile Directory
	Form of resource	Publication: directory - also available in database format
	Type(s) of information	current awareness
	Scope of resource	Key North American university faculty engaged in air, waste, and environmental management research
	Description	Provides single source access to the details of university research being conducted on a number of critical technologies in environmental management. The publication contains profiles of researchers in the U.S., Mexico, and Canada. The research areas include air and ground water pollution, hazardous and non hazardous waste, liquid and solid waste, municipal solid waste, rivers and streams, ecological and health effects of various pollution sources, and others. Each profile includes address information, general and specific research interests, waste treatment/control sub-specialties, funding sources, courtroom/litigation experience, staff size and qualifications, collaboration interest with industry, and commercial readiness. The directory also includes three indices: by expertise (including areas as low level radwaste, pollution prevention, used tires, and waste minimization), treatment and controls, and name.
	For more details	Air & Waste Management Association Edited by Synergistic Technologies, Inc. Database format available through Synergistic Technologies, Inc. Call 1-800-972-8501

General Technology Resources	Resource name	Bench marking for Waste Minimization Methodology
	Form of resource	Publication: report (available after 1/94) Other: management process application
	Type(s) of information	technical information / current awareness
	Scope of resource	a process to review implemented waste reduction practices and determine their applicability for other, similar operations

Description	The application of the 12-step Bench marking Methodology can be done by anyone in the DOE to assess waste streams and waste minimization techniques. The 12 steps are as follows: 1) identify process to be benchmarked, 2) establish management commitment and level of involvement, 3) identify and establish team, 4) define and understand process to be benchmarked, 5) identify metrics and collect process data, 6) evaluate current performance, 7) identify bench marking partners (users of alternate processes), 8) collect process data from partners, 9) analyze bench marking partners' process data and compare against internal process data, 10) conduct site visits, interviews, and re-analyze data, 11) report recommendations and implement improvements, 12) monitor results, continuing to improve using bench marking process. Two case studies of the methodology, photographic wastes and motor oil wastes, have been done and are included as appendices to the report.
For more details	Victoria Levin Organization 6625 Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185 phone: 505-844-8956 FAX: 505-844-1723

General Technology Resources	Resource name	Environmental Progress
	Form of resource	Publication: journal (quarterly)
	Type(s) of information	technical/ current awareness
	Scope of resource	multiple aspects of the pollution problem
	Description	Environmental Progress is a publication of the American Institute of Chemical Engineers. It deals with multifaceted aspects of the pollution problem. It provides thorough coverage of abatement, control, and containment of effluents and emissions within compliance standards. Papers cover all aspects including air, liquid, and solid wastes. Progress and technological advances vital to the environmental engineer is reported in the publication.
	For more details	Environmental Progress AIChE 345 East 47th Street New York, NY 10017

Subscription price is \$114/year.

General Technology Resources	Resource name	Pollution Equipment News
	Form of resource	Publication: directory and newsletter
	Type(s) of information	technical/current awareness
	Scope of resource	vendor environmental control equipment resource

Description	This periodical newsletter is published seven times a year and is supplemented by an annual Buyers Guide. The newsletter is comprised mostly of brief descriptions of environmental equipment ranging from monitors, controls, and recycling equipment, to material handling and remediation equipment. The newsletter also has articles exploring the potential uses of various equipment and their effectiveness. The publication is free.
For more details	Pollution Equipment News Rimback Publishing Inc. 8650 Babcock Blvd. Pittsburgh, PA 15237-5821 Subscription is free to environmental professionals.

General Technology Resources	Resource name	Pollution Prevention Advisor
	Form of resource	Publication: Newsletter (quarterly)
	Type(s) of information	current awareness, technical information, methodology
	Scope of resource	pollution prevention and waste minimization practices and technologies.
	Description	The newsletter is a quarterly publication published for the Nuclear Weapons Complex and others interested in the DOE Defense Programs (DP). The purpose is to inform of DOE DP's goals, policies, and plans for pollution prevention. The function is to enhance reader awareness of advances in pollution prevention methods and technology; to apprise them of trends in DP industry; and to highlight the successes of DP initiatives to reduce costs, reduce health risks, increase production efficiency, reduce accident risks, and improve DP reputation.
	For more details	for subscription or contribution contact the Managing Editor at: Pollution Prevention Advisor 365-C Emory Valley Rd. Oak Ridge, TN 37830 phone: 615-481-0036 FAX: 615-481-0038

General Technology Resources	Resource name	The National Environmental Journal (TNEJ)
	Form of resource	Publication: journal (bi-monthly)
	Type(s) of information	technical / current awareness
	Scope of resource	all aspects of environmental management with focus on technology and case studies

Description	This environmental trade journal gives current information on environmental technologies, from facility design, to source reduction, to recycling and recovery, to treatment technologies. The publication is free to environmental professionals. Several standard departments and columns are useful in support of pollution prevention, including the Technology Update, Case Histories, Legal Counsel, Literature News, and Advertisers Index. Especially useful is the Waste Reduction Q & A department, which answers in detail specific questions how to reduce waste in industrial operations.
For more details	request subscription by writing: the National Environmental Journal P.O. Box 2567 Columbus, GA 31902-2567 Phone: 404-324-6746 FAX: 404-324-1177 Subscription is free to environmental professionals.

General Technology Resources	Resource name	Technology Gateway Assistance Program (TechGAP) - formerly called Innovative Concepts Program
	Form of resource	Organization: technical assistance program
	Type(s) of information	technical information / funding information
	Scope of resource	new waste stream prevention / utilization technologies
	Description	TechGAP is to help government and commercial program managers identify innovative new technologies, help innovators formulate intellectual capital from raw concepts, and connect the two groups together. Many of the new technologies being developed through TechGAP are waste reduction technologies. TechGAP has had excellent success in getting follow-on funding of concepts using the program. The program offers mentoring of inventors on marketing and technical strategies to further their concepts, publication of "Tech Briefs" of the concepts, dissemination of information across industry and government, and visibility through Technology Fairs. TechGAP is a good resource both for awareness of potential new technologies to reduce wastes and prevent pollution, and for support in development of such concepts by innovators.
	For more details	Elliott Levine, Program Manager CE-521, 5E-052 1000 Independence Ave., SW Washington, DC 20585 FAX: 202-586-1605

General Technology Resources	Resource name	Center for Industrial Services (CIS)
	Form of resource	Organization: technical assistance program
	Type(s) of information	methodology / technical information / policy and regulatory
	Scope of resource	a state waste reduction training center
	Description	The center sponsors an extensive waste reduction assessment training program that includes in-depth waste reduction training courses. This training program was originally developed to instruct retired industrial engineers and managers, who became a highly skilled assessment team. A key program for the center has been waste reduction assessments by full-time field engineers and retired engineers.
	For more details	Cam Metcalf Center for Industrial Services University of Tennessee 226 Capitol Boulevard Building Suite 606 Nashville, TN 37219 phone: 615-242-2456

General Technology Resources	Resource name	Illinois Hazardous Waste Research and Information Center
	Form of resource	Organization: technical assistance / clearinghouse
	Type(s) of information	technical information / policy and regulatory guidance / methodology / current awareness / funding information
	Scope of resource	pollution prevention methodologies and technologies
	Description	The HWRIC is a division of the Illinois Department of Energy and Natural Resources. HWRIC combines research, education, and technical assistance in a multidisciplinary approach to manage and reduce hazardous waste in Illinois, and to a limited degree, across the US. HWRIC collects and shares this information through its library/clearinghouse and several computerized waste management tools. One of these computerized tools is the Waste Reduction Advisory System (WRAS).
	For more details	Dr. David Thomas, Director Hazardous Waste Research and Information Center One East Hazelwood Drive Champaign, IL 61820 phone: 217-333-8940 FAX: 217-333-8944

General Technology Resources	Resource name	Waste Minimization Managers Group
	Form of resource	Organization: DOE Contractors technical board
	Type(s) of information	technical information/methodology/ current awareness
	Scope of resource	focuses on 8 common DOE Waste Streams
	Description	The WMMG was established within the DOE Albuquerque Operations Office with the primary responsibility to formulate and implement a complex-wide program to address environmental, safety and health, and waste minimization priorities at the front end of the weapons production process, from design through production and retirement. The WMMG reviews and prioritizes all the proposed activities from the design laboratories and production plants, making funding recommendations to DP and EM. A technical advisory group (Waste Stream Managers) comprising representatives from each of the seven production plants and the three design laboratories was established to aid in this process. Eight waste streams are monitored the WSMs: Solvents, Polymers, Plating, Miscellaneous, Plutonium, Uranium, Tritium, and Mixed Wastes. The role of the Waste Stream Manager is to: Facilitate as Program Manager for the assigned waste stream; Identify top issues and recommend proposals for funding; eliminator project redundancy; act as liaison between the WMMG and the plants and laboratories in all policy and funding issues, recommend strategy and proposals to WMMG, and perform program reviews.
	For more details	Rick Cameron DOE Albuquerque Field Office P.O. Box 5400 -- WQD Albuquerque, NM 87185 phone: 505-845-6361 FAX: 505-845-4722

General Technology Resources	Resource name	Pacific Northwest Pollution Prevention Research Center (PPRC)
	Form of resource	Organization: Other
	Type(s) of information	Technical information / funding
	Scope of resource	Emphasis on source reduction technology development and demonstration in manufacturing, agriculture, and commercial sectors.
	Description	The PPRC is a non-profit organization formed to identify opportunities and overcome obstacles to pollution prevention in the Northwest. The PPRC is dedicated to protecting public health, safety, and the environment by mobilizing public and private resources to support applied research and other project that result in more efficient use of resources, more profitable business practices, and a healthier environment. PPRC activities include identifying research and project needs, facilitating the transfer of pollution prevention information, and providing research support.

For more details

Pacific Northwest Pollution Prevention Research Center,
1326 Fifth Avenue, Suite 650
Seattle, WA 98101

phone: 206-223-1151
FAX: 206-223-1165
Internet address: bsrc_pprc@ccmail.pnl.gov

General Technology Resources	Resource name	Waste Reduction Resource Center
	Form of resource	Organization: clearinghouse/technical assistance
	Type(s) of information	technical/methodology/policy and regulatory guidance/current awareness
	Scope of resource	waste reduction information for EPA region IV
	Description	The WRRC provides waste reduction information to the eight southern-most United States through a multi-media resource library. Topics covered include all industrial categories, manufacturing processes, hazardous waste streams, and water and air discharges. Specific information includes economic and technical data, process descriptions, waste reduction techniques and implementation strategies. The library also includes information on municipal recycling, solid waste reduction, environmental audits, and perspectives in pollution prevention. Some specific services of the WRRC include development of Specific Information Packages tailored to help in recommendations and solutions, provision of contact lists and expert referral, collation of case studies, and on-site technical assistance.
	For more details	Vic Young Waste Reduction Resource Center 3825 Barrett Drive, Suite 300 Raleigh, North Carolina 27609 Phone: 919-571-4100 or: 800-476-8686

General Technology Resources	Resource name	Martin Marietta Technology Transfer Focal Point
	Form of resource	Individual: Industry focal point
	Type(s) of information	technical resource information/ methodology
	Scope of resource	pollution prevention technologies and activities within Martin Marietta operations

Description	Martin Marietta is best known as an aerospace and defense contractor, but also has operations in aggregates and mining activities. The corporation maintains operations using chemical processes, painting, machining, electronics manufacturing, parts cleaning, and other technologies to manufacture their products. The pollution prevention technology transfer focal point is able to direct outside consumers to the appropriate organizations and individuals within Martin Marietta that have expertise in particular waste minimization activities or technologies appropriate to their operations. Many of these technologies have close, or direct applications within DOE operations.
For more details	Jennifer Stevens Martin Marietta 7921 Southpark Plaza, Suite 210 Littleton, CO 80120 phone: 303-971-1884 FAX: 303-971-5056

General Technology Resources	Resource name	Northrop Aircraft Division Technology Focal Point
	Form of resource	Individual: Industry focal point
	Type(s) of information	technical resource information
	Scope of resource	pollution prevention materials and process activities within Northrop Aircraft Division operations
	Description	Northrop Aircraft Division, located in southern California, is subject to some of the most stringent environmental regulations in the nation. This has challenged the company to emphasize source reduction in their manufacturing processes. The environmental technology development has followed three main thrusts; chrome elimination, air toxics use reduction, and VOC emission reduction. The Materials and Processes environmental technology focal point can direct outside consumers to Northrop experts supporting these developments.
	For more details	Calvin Fong Senior Technical Specialist Northrop Aircraft Division One Northrop Avenue Hawthorne, CA 90250 phone: 310-332-6661

General Technology Resources	Resource name	The Boeing Company Technology Transfer Focal Point
	Form of resource	Individual: Industry focal point
	Type(s) of information	technical resource information
	Scope of resource	pollution prevention technologies and activities within Boeing operations

Description	The Boeing Company is an aerospace manufacturer. The company maintains operations using chemical processes, painting, machining, electronics manufacturing, parts cleaning, and other technologies to manufacture their products. The Boeing Company does not currently have a central pollution prevention office, however, within their Corporate Environmental Affairs, there is an information clearinghouse function that can address outside queries on Boeing use of pollution prevention technologies and practices. This information / technology transfer focal point is able to direct outside consumers to the appropriate organizations and individuals within the company that have expertise in particular waste minimization activities or technologies appropriate to their operations. Many of these technologies have close, or direct applications within DOE operations.
For more details	William Ernst Manager, Environmental Technology and Information The Boeing Company P.O. Box 3707, M/S 7E-EH Seattle, WA 98124 phone: 206-393-4700 FAX: 206-393-4718

General Technology Resources	Resource name	RACT/BACT/LEAR Clearinghouse from Control Technology Center
	Form of resource	electronic information systems: software and database
	Type(s) of information	technical information / policy and regulatory guidance
	Scope of resource	technical information on air pollution control technology
	Description	This is a menu driven system designed to help air pollution control personnel make control technology determinations. The system contains pollutant limits and required control technology or process modifications for various source types throughout the country. It covers reasonably available control technology (RACT), best available control technology (BACT), and lowest achievable emission rate (LEAR).
	For more details	EPA Office of Air Quality Planning and Standards, Emissions Standards Division technical support phone: 919-541-0800 Access to the system requires an account with EPA's National Computer Center (NCC). Average cost for moderate use is \$100 per month per user i.d. NCCs phone number is: 1-800-334-2405.

General Technology Resources	Resource name	Waste Reduction Advisory System (WRAS)
	Form of resource	Electronic Information Systems: software application
	Type(s) of information	technical information / methodology
	Scope of resource	computerized management tool to explore waste reduction options
	Description	<p>The WRAS is a user-friendly computerized waste management tool developed by the Hazardous Waste Research and Information Center (HWRIC), the US EPA, and other State waste management programs. It provides waste generators with a wide range of options for reducing and recycling industrial waste. The WRAS has two parts: the Waste Reduction Audit Checklist (WRAX) and the Waste Reduction Information Bibliography (WRIB). The WRAC gives individualized waste reduction assistance via a series of questions presented in the audit checklist. It is designed to assess a facility's current waste reduction activities and then identify potential waste reduction techniques for each waste generating process and job operation. The WRIB provides users with more than 300 literature abstracts and case studies on current waste reduction technologies. Currently, the WRAS case study data base is being merged with the EPA PIES data base.</p> <p>A fully executable WRAS program, complete with a User's Guide is available for IBM compatible PCs with at least 640K of memory, a hard disk, and DOS version 2.1 or greater.</p>
	For more details	<p>Alisa Wickliff Hazardous Waste Research and Information Center One East Hazelwood Drive Champaign, Illinois 61820</p> <p>phone: 217-244-8905 FAX: 217-333-8944</p> <p>Cost of the WRAS program is \$95.</p>

General Technology Resources	Resource name	Aerospace Hazardous Materials Management Conference
	Form of resource	Other: Conference (annual)
	Type(s) of information	technical information/ methodology/current awareness
	Scope of resource	Aerospace manufacturing pollution prevention technologies and operational practices

Description	This annual conference, sponsored by the Aerospace Industries Association (AIA), is intended to gather the engineers and the environmental professionals supporting waste reducing methods and technologies for aerospace manufacture. The representation of regulators and of product vendors has generally been kept to a minimum to facilitate the free, objective exchange of ideas and methods. The original focus of these meetings was on manufacturing source reduction technologies. This focus has since broadened to include all aspects of pollution prevention operations, including management strategies and good housekeeping techniques.
For more details	Glynn Rountree Aerospace Industries Association of America, Inc. 1250 I Street NW Washington, D.C. 20005 phone: 202-371-8401 FAX: 202-371-8470

Energy Conservation	Resource name	National Appropriate Technology Assistance Service (NATAS)
	Form of resource	Organization: technical assistance program
	Type(s) of information	technical/ methodology
	Scope of resource	technical assistance in implementing renewable energy or energy efficient technologies.
	Description	NATAS is operated by the National Center for Appropriate Technology under contract to the U.S. DOE, and is chartered to find technical solutions to the problems facing disadvantaged Americans, especially problems caused by the use of energy. NATAS provides two kinds of assistance services -- technical engineering and commercialization assistance. The Service employs Energy Specialists to help with projects that use renewable energy or energy efficiency technologies such as solar, photovoltaics, wind, microhydro, biomass, and alternative fuels, as well as building systems including insulation, heating, ventilation and cooling systems, lighting, and construction materials.
	For more details	George Everett, Program Director National Appropriate Technology Assistance Service U.S. Department of Energy P.O. Box 2525 Butte, Montana 59702-2525 phone: 800-428-2525 in Montana: 800-428-1718 The service is toll-free and all assistance is free of charge.

Solid Wastes	Resource name	Solid Waste Information Clearinghouse
	Form of resource	Organization: clearinghouse
	Type(s) of information	technical/methodology/policy and regulatory guidance/current awareness
	Scope of resource	all aspects of solid waste management
	Description	The clearinghouse is a part of the Governmental Refuse Collection and Disposal Association (GRCDA) and provides information on all aspects of solid waste management including recycling and source reduction. The clearinghouse also has an electronic bulletin board capability. The clearinghouse is funded by the USEPA.
	For more details	Solid Waste Information Clearinghouse Governmental Refuse Collection and Disposal Association P.O. Box 7219 Silver Spring, MD 20910 Phone: 800-677-9424 Modern-phone: 301-585-0204

laboratory operations

Resource name	DOE Laboratory Contact
Form of resource	Individual: program manager
Type(s) of information	technical/methodology/policy and regulatory guidance/current awareness
Scope of resource	potential alternative solutions to reduce laboratory wastes.
Description	Brookhaven National Laboratory has begun implementation of some alternatives to reduce laboratory wastes. The lab has subdivided laboratory waste issues to Lab packs, Ignitables, and mixed wastes. Some of the mixed lab wastes are evaporated bottoms, chromium, activated lead, mercury, corrosives, and spent solvents. Each waste that is identified requires a unique strategy to reduce its impacts. This resource can help in establishing direction of how the DOE should address laboratory wastes.
For more details	George Goode Brookhaven National Laboratory Bldg. 535A Upton, NY 11973 phone: 516-282-4549 FAX: 516-282-7618

Resource name	Northeast Waste Management Officials' Association (NEWMOA)
Form of resource	Organization: technical assistance/clearinghouse
Type(s) of information	technical/methodology/current awareness
Scope of resource	Northeastern states pollution prevention needs
Description	Because of the industry base in this region, NEWMOA has been collecting information related to laboratory processing waste streams.
For more details	Terri Goldberg 85 Merrimac Street Boston, MA 02114 phone: 617-367-8558 FAX: 617-367-2127

waste water treatment

Resource name	Ground Water On-line
Form of resource	Electronic Information System: database
Type(s) of information	technical information
Scope of resource	Covers the science and technology of ground water supply and protection.
Description	This electronic information system is managed by the National Ground Water Information Center, and covers the science and technology of ground water supply and protection.
For more details	The National Ground Water Information Center 6375 Riverside Drive Dublin, OH 43017 phone: 614-761-1711

Resource name	Waste water Treatment Information Exchange (WTIE)
Form of resource	Electronic Information System: bulletin board
Type(s) of information	technical/ current awareness/ policy and regulatory guidance
Scope of resource	information on small scale water systems
Description	WTIE provides a forum for discussion of ideas and exchange of information about small-scale waste water systems. Includes electronic mail, conferencing, surveys and news bulletins. The service is sponsored by the Office of Waste water Enforcement and Compliance.
For more details	Waste water Treatment Information Exchange West Virginia University, National Small Flows Clearinghouse P.O. Box 6064 Morgantown, WV 26506 phone 304-293-4191 or 800-544-1936

Automotive Maintenance	Resource name	Application of Bench marking Methodology Case Study - Motor Oil Waste
	Form of resource	Publication: report, Individual: tech transfer focal point
	Type(s) of information	technical information / current awareness
	Scope of resource	a technical review of implemented alternatives to reduce motor oil wastes from automotive maintenance operations
	Description	The report is to be a summary of a pilot bench marking technique of implemented alternatives to reduce motor oil wastes. A team of 6 DOE process experts coordinate a technical literature search of alternatives and select "partners" who are using various alternatives. The team then reviews the implemented strategies and documents their success and technology transfer applicability. The intent of the report is to reduce the need to "reinvent the wheel" to reduce waste from this common waste stream.
	For more details	Victoria Levin Organization 6625 Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185 phone: 505-844-8956 FAX: 505-844-1723

Photographic/ graphic processing	Resource name	Application of Bench marking Methodology Case Study - Photographic Waste
	Form of resource	Publication: report, Individual: tech transfer focal point
	Type(s) of information	technical information / current awareness
	Scope of resource	a technical review of implemented alternatives to reduce photographic processing wastes
	Description	The report is to be a summary of a pilot bench marking technique of implemented alternatives to reduce photographic processing wastes. A team of 5 DOE process experts coordinate a technical literature search of alternatives and select "partners" who are using various alternatives. The team then reviews the implemented strategies and documents their success and technology transfer applicability. The intent of the report is to reduce the need to "reinvent the wheel" to reduce waste from this common waste stream.
	For more details	Victoria Levin Organization 6625 Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185 phone: 505-844-8956 FAX: 505-844-1723

Photographic/ graphic processing	Resource name	Chemical Free Development Systems
	Form of resource	Other: Alternate technology
	Type(s) of information	technical information
	Scope of resource	Case study / implementation / use experience using alternatives to traditional chemical photographic development systems.
	Description	none given
	For more details	Gordon Smith Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185 Phone: 505-848-9769 FAX: 505-848-0244

7

machining and mechanical surface prep

- machining oils, coolants, and lubricants
- skin polish/sandblasting, etc.

Resource name	Machining Coolant Management - Industrial contact
Form of resource	Individual: Industrial Contact
Type(s) of information	technical/ methodology
Scope of resource	Expert in implementation of waste reducing coolant management systems
Description	The Boeing Company Auburn plant machines and forms a major portion of the companies commercial airplane parts, including wing spars and skins. The site has implemented several machine coolant management measures, reducing the purchases and disposal of coolant by up to 85%. The management measures included giving the machine operators ownership of their own machines coolant maintenance, standardizing the types of coolants used in the shops, and implementing coolant regeneration and recycling systems. The measures can be incorporated on any scale for dramatic and cost effective results.
For more details	Rick Freeman, Engineer Boeing Commercial Airplane Group P.O. Box 3707 Seattle, WA 98124 phone: 206-931-5098

Degreasing	Resource name	Aqueous Cleaning - Industry expert
	Form of resource	Individual: Industry contact
	Type(s) of information	technical information, current awareness
	Scope of resource	industrial use of alternatives to vapor degreasing
	Description	Jack Snider has extensive experience and success in implementing aqueous cleaning technology into strict specification cleaning environments, especially in tank line chemical processing lines. His expertise includes industry and military specification coverage of cleaning technologies, technical and chemical properties of traditional and alternative processes, and equipment criteria of various strategies. Specific areas of interest include cleaning solution bath purification, acid regeneration, and electrode dialectic technology.
	For more details	Jack Snider Martin Marietta Astronautics Group P.O. Box 179 Denver CO 80201 phone: 303-977-3322 FAX: 303-977-3844

Cold Solvent Cleaning, Degreasing	Resource name	Clean Air Act Amendments (CAAA) of EPAs Technology Transfer Network (TTN)
	Form of resource	Electronic Information System: bulletin board
	Type(s) of information	policy and regulatory guidance
	Scope of resource	devoted to Clean Air Act amendments
	Description	This bulletin board has the capability of downloading the full text of the proposed hazardous organic NESHAPs to the Clean Air Act. The bulletin board is accessed through the EPA Technology Transfer Network (TTN) which is operated by the EPA's Office of Air Quality and Planning Standards (OAQPS). TTN also is the access point of OAQPS's other electronic bulletin boards. The service is free except for the phone call.
	For more details	For modem-phone access call: 919-541-5742. Technical support is available at: 919-541-5384.

Cold Solvent Cleaning, Degreasing	Resource name	Environmentally Conscious Manufacturing Integration Demonstration (ECMID)
	Form of resource	Other: User Test Facility
	Type(s) of information	technical information, methodology
	Scope of resource	Testing of alternative cleaning method, equipment, and materials in a shop scale environment
	Description	none given
	For more details	George Bohnert Allied Signal Inc. Kansas City Division P.O. Box 419159 Kansas City, MO 64141-6159 phone: 816-997-5069

Degreasing	Resource name	Industry Cooperative for Ozone Layer Protection (ICOLP)
	Form of resource	Organization: clearinghouse/ technical assistance program
	Type(s) of information	technical / methodology / policy and regulatory guidance / current awareness
	Scope of resource	Regulatory restrictions of and alternatives materials for CFC- containing solvents.
	Description	ICOLP was formed in 1989 to aid in the worldwide exchange of information on alternative technologies, substances, and processes for CFCs and other ozone-depleting substances (ODSs). In combining the support of government agencies and technical organizations with the funding and research efforts of ICOLP member industrial companies, the organization has created a unique global partnership for exchanging information on ODS alternatives through a variety of outreach projects. The primary means of disseminating information on ODS alternatives, ICOLP has developed OZONET, an electronic database providing technical abstracts of alternative technologies, information on substitute solvents, a bulletin board for current information updates, and a listing of key contacts in the field. OZONET is available through the United Nation's OzonAction Information Clearinghouse. ICOLP also has manuals available on specific aspects of eliminating CFCs, including some alternatives for metal cleaning.
	For more details	Industry Cooperative for Ozone Layer Protection 2000 L Street, Suite 710 Washington, DC 20036 phone: 202-737-1419 FAX: 202-296-7442 For access information to OZONET contact the OzonAction Information Clearinghouse (OAIIC) at 703-821-4800

Cold Solvent Cleaning, Degreasing	Resource name	CFC and Halon Information Clearinghouse (CHIC)
	Form of resource	Organization: Clearinghouse
	Type(s) of information	technical
	Scope of resource	Information relating to CFCs and Halons.
	Description	The clearinghouse collects information relating to Halons, refrigerants, solvents, MILSPECS, and NAVAIR applications.
	For more details	Sponsored by the US Navy phone: 703-769-1883 FAX: 703-769-1885

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metal chemical finishing

- plating
- conversion coating
- deoxidizing/desmuting/descaling
- chemical milling/etching
- inorganic coating stripping (such as copper stripping)
- penetrant/magnetic particle/nital etch inspection
- flame spraying

Conversion Coating	Resource name	Alternate Conversion Coatings and Anodize
	Form of resource	Individual: Industry contact
	Type(s) of information	technical information, current awareness
	Scope of resource	industry and military specification coverage, technical and chemical properties of traditional and alternative processes
	Description	John Golden has a Ph.D. in Chemical Engineering and is a Senior Engineer at Boeing Defense and Space group. Worked extensively on development and implementation of anodize and alodine alternatives at the Boeing Company. In addition to hands on knowledge of the corrosion protection and fatigue properties of traditional processes (such as Chromic Acid Anodize) and various alternatives (such as Boric Sulfuric Acid Anodize), Mr. Golden has been actively working with the military to gain approval of using alternative conversion coating processes on military programs. He is a good resource to discuss the technical, regulatory, and specification ramifications of using pollution prevention technologies in conversion coating processes. Mr. Golden also is active in support of the Space Station program and has wide general knowledge in other pollution prevention processes, such as aqueous cleaning technologies
	For more details	John Golden Boeing Defense and Space Group P.O. Box 3707 M/S 82-32 Seattle, WA 98124 telephone: (206)773-2055 FAX: (206) 773-4946

Plating, Conversion Coating, Deoxidizing	Resource name	Aerospace Chrome Elimination (ACE) team
	Form of resource	Organization: technical exchange
	Type(s) of information	technical / methodology/ current awareness
	Scope of resource	alternatives for chromated processes in aerospace manufacturing.
	Description	The ACE committee is comprised of approximately ten aerospace contractors and three military technology centers. The purpose of the committee is to eliminate chromium from chemical processing systems used in the Aerospace industry. Various projects are assign to project leaders who share their results openly with the other members of the committee. Some of the projects include: chrome plating, cleaning, adhesive bonding, deoxidizing, and conversion coating of aluminum, anodize, anodize sealing, passivation, primers and topcoats.
	For more details	Aerospace Chromium Elimination Committee Luis Trupia, Chairman Grumman Aircraft Systems Bethpage, New York 11714-3582 phone: 516-575-7923 FAX: 516-575-0074

electronics manufacturing
- printed circuit board operations

Printed circuit board operations	Resource name	Pollution prevention in industrial electronics operations
	Form of resource	Individual: Industry contact
	Type(s) of information	technical information / current awareness
	Scope of resource	electronics manufacturing pollution prevention technologies, as well as general industrial pollution prevention operations
	Description	Fluke Corporation is an electronics manufacturing company. George Bissonnette is the Environmental Affairs Manager for the company. He is the focal point of all the waste reduction activities considered and used in the company. The company has successfully eliminated Chlorofluorocarbon (CFC) use in their manufacturing, has implemented fluxless and aqueous clean soldering technologies, and is evaluating inert gas soldering technologies. The site has also successfully minimized waste waters, implemented a product take-back program, and incorporated environmental packaging into their products. In recognition of the companies successes, Fluke was awarded the 1993 Governor's Award for excellence in pollution prevention.
	For more details	George Bissonnette Fluke Corporation PO Box C9090 Everett, WA 98206 phone: 206-356-5437 FAX; 206-356-5256

	Resource name	CFC and Halon Information Clearinghouse (CHIC)
	Form of resource	Organization: Clearinghouse
	Type(s) of information	technical
	Scope of resource	Information relating to CFCs and Halons.
	Description	The clearinghouse collects information relating to Halons, refrigerants, solvents, MILSPECS, and NAVAIR applications.
	For more details	Sponsored by the US Navy phone: 703-769-1883 FAX: 703-769-1885

Resource name	Clean Air Act Amendments (CAAA) of EPA's Technology Transfer Network (TTN)
Form of resource	Electronic Information System: bulletin board
Type(s) of information	policy and regulatory guidance
Scope of resource	devoted to Clean Air Act amendments
Description	This bulletin board has the capability of downloading the full text of the proposed hazardous organic NESHAPs to the Clean Air Act. The bulletin board is accessed through the EPA Technology Transfer Network (TTN) which is operated by the EPA's Office of Air Quality and Planning Standards (OAQPS). TTN also is the access point of OAQPS's other electronic bulletin boards. The service is free except for the phone call.
For more details	For modem-phone access call: 919-541-5742. Technical support is available at: 919-541-5384.

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coating application and stripping

- application
- stripping

Resource name	Clean Air Act Amendments (CAAA) of EPAs Technology Transfer Network (TTN)
Form of resource	Electronic Information System: bulletin board
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Description	This bulletin board has the capability of downloading the full text of the proposed hazardous organic NESHAPs to the Clean Air Act. The bulletin board is accessed through the EPA Technology Transfer Network (TTN) which is operated by the EPA's Office of Air Quality and Planning Standards (OAQPS). TTN also is the access point of OAQPS's other electronic bulletin boards. The service is free except for the phone call.
For more details	For modem-phone access call: 919-541-5742. Technical support is available at: 919-541-5384.

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polymer and composite production/processing

- tool release processing

Resource name	CFC and Halon Information Clearinghouse (CHIC)
Form of resource	Organization: Clearinghouse
Type(s) of information	technical
Scope of resource	Information relating to CFCs and Halons.
Description	The clearinghouse collects information relating to Halons, refrigerants, solvents, MILSPECS, and NAVAIR applications.
For more details	Sponsored by the US Navy phone: 703-769-1883 FAX: 703-769-1885

Appendix B

DOE Contractor Site Pollution Prevention Contacts

Appendix B: DOE Contractor Site Pollution Prevention Contacts

DOE / contractor pollution prevention focal points	Site	Kansas City Plant
	Name and address	Dave Eggers, D/922, SC8 Allied Signal Inc. Kansas City Division P.O. Box 419159 Kansas City, MO 64141-6159 Phone: 816-997-4045 FAX 816-997-5903

DOE / contractor pollution prevention focal points	Site	Lawrence Livermore National Laboratory
	Name and address	Mike Melzer Lawrence Livermore National Laboratory P.O. Box 808, L-626 Livermore, CA 94551 phone: 510-424-6923

DOE / contractor pollution prevention focal points	Site	Brookhaven National Laboratory
	Name and address	George Goode Brookhaven National Laboratory Bldg. 535A Upton, NY 11973 phone: 516-282-4549 FAX: 516-282-7618

DOE / contractor pollution prevention focal points	Site	Idaho National Engineering Laboratory
	Name and address	Patricia Cannon EG&G, Inc. P.O. Box 1625 Idaho Falls, ID 83415-3950 phone 208-526-7035 FAX: 208-526-1458

DOE / contractor pollution prevention focal points	Site	Savannah River Laboratory
	Name and address	Keith Stone Westinghouse Savannah River Co. P.O. Box 616 Aiken, SC 29808 phone: 803-557-9195

DOE / contractor pollution prevention focal points	Site	Pinellas Plant (Florida)
	Name and address	Dania Pendas Martin Marietta Specialty Components Pinellas Plant P.O. Box 2908 Largo, FL 34649 phone: 813-541-8814 FAX: 813-545-6206

DOE / contractor pollution prevention focal points	Site	Sandia National Laboratories
	Name and address	Gordon Smith Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185 Phone: 505-848-9769 FAX: 505-848-0244

DOE / contractor pollution prevention focal points	Site	Los Alamos National Laboratory
	Name and address	Patrick Josey Los Alamos National Laboratory MS-K572 P.O. Box 1663 Los Alamos, NM 87505 phone: 505-665-8293 FAX: 505-665-8195

DOE / contractor pollution prevention focal points	Site	National Renewable Energy Laboratory
	Name and address	Stacy O'Connell National Renewable Energy Laboratory 1617 Cole Blvd. Bldg. 1614 Golden, CO 80401 phone: 303-231-1373 FAX: 303-231-1199

DOE / contractor pollution prevention focal points	Site	Pacific Northwest Laboratory
	Name and address	Kevin Selby Battelle - Pacific Northwest National Laboratory P.O. Box 999, MS P7-78 Richland, WA 99352 phone: 509-372-0307

DOE / contractor pollution prevention focal points	Site	Pacific Northwest Laboratory
	Name and address	Tapio Kuusinen Environmental Sustainability Project Battelle - Pacific Northwest National Laboratory P.O. Box 999, MS K8-19 Richland, WA 99352 phone: 509-372-4234 FAX: 509-372-4376

DOE / contractor pollution prevention focal points	Site	Rocky Flats Plant
	Name and address	None acquired

DOE / contractor pollution prevention focal points	Site	Lawrence Berkeley Laboratory
	Name and address	None acquired

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