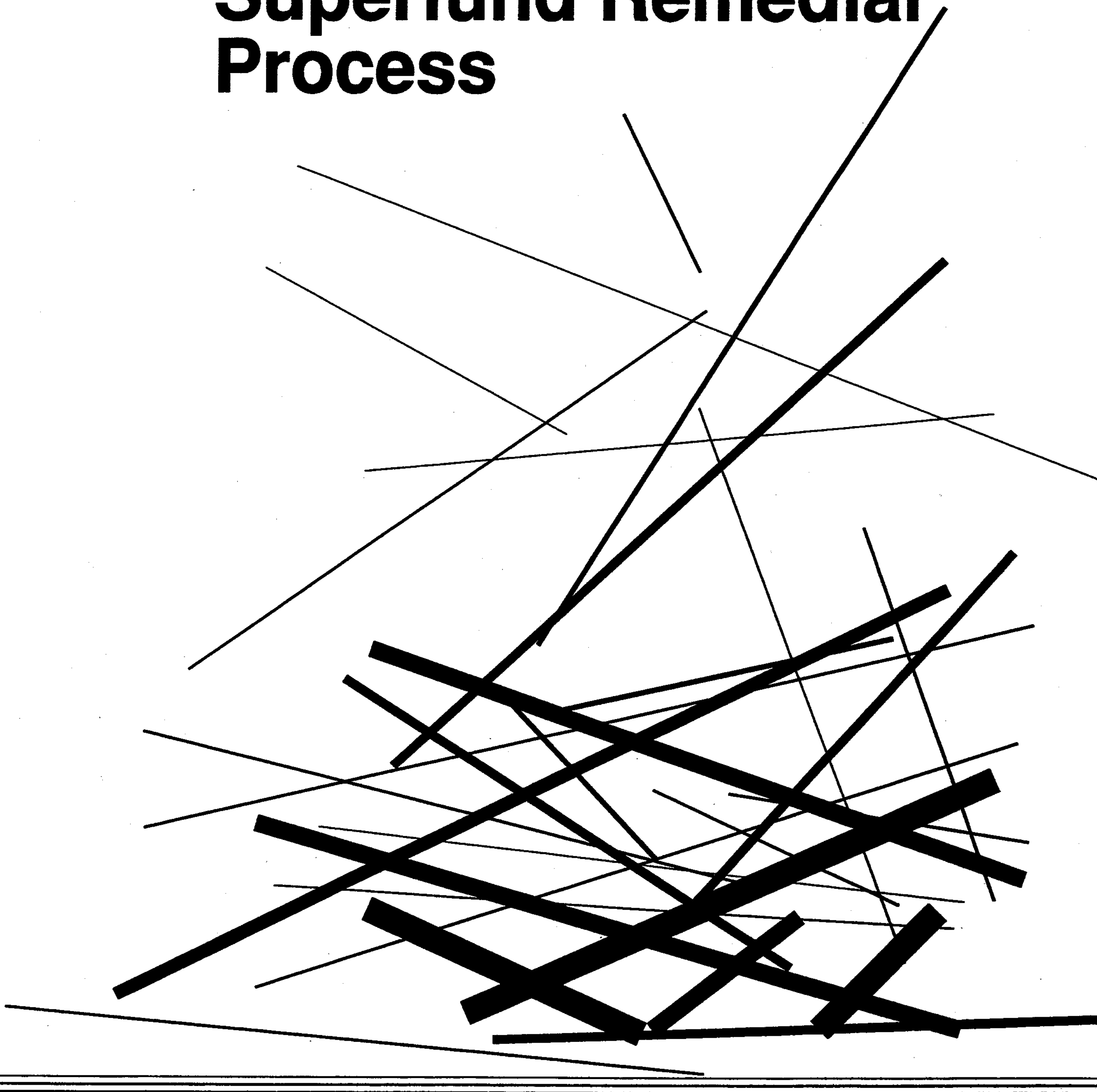
United States
Environmental Protection
Agency
Region 5

Waste Management
Division
77 West Jackson Boulevard
Chicago, Illinois 60604

May 1993

EPA

Guidelines for Making Environmentally-Sound Decisions in the Superfund Remedial Process



GUIDELINES FOR MAKING ENVIRONMENTALLY-SOUND DECISIONS IN THE SUPERFUND REMEDIAL PROCESS

MAY 1993

Table of Contents

This document was developed by Diana Mally, Karen Lumino, Tom Barounis, Debbie Siebers, Ted Smith, and Kathleen Warren.

The authors would like to acknowledge the assistance of Donna Twickler, Susan Swales, Jacqueline Kline, and Terry Branigan in the preparation of this document. Special thanks to Birute Bulota for the cover design and Steve Buch for printing assistance.

Guidelines for Making Environmentally-Sound Decisions in the Superfund Remedial Process

INTRODUCTION

In 1990, the Congress declared pollution prevention to be the national policy of the United States. The Pollution Prevention Act of 1990 states that

> "...pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner."

The idea of minimizing the amount of hazardous waste generated is not new in regulatory history. In 1986, with the Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA), the Congress declared that "...wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible." The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 mandates the selection of remedial actions that utilize resource recovery technologies or permanent solutions to the maximum extent practicable. The Pollution Prevention Act codifies the evolution of this Nation's thinking concerning the best way to address the problems of environmental management.

Over the past several months, representatives from the Offices of Superfund and Program Management with a shared interest in pollution prevention have met to discuss its applicability to Superfund. The first issue that needed to be addressed was whether or not pollution prevention even applies to the Superfund program. Although the Pollution Prevention Act embodies an environmental management hierarchy, U.S. EPA defines pollution prevention as source reduction only. On first thought, one might conclude that since Superfund deals with waste that has already been generated, there is no opportunity for the pollution to be "prevented or reduced at the source." If, however, one thinks of the Superfund program itself as a generator of hazardous waste, opportunities for pollution prevention do present themselves. Actions can be taken during the course of the investigation and cleanup, be it Superfund or RCRA corrective action, that reduce the amount of waste generated. Fifty-five gallon drums could be cleaned and reconditioned, instead of landfilled. Solvents could be recycled instead of being incinerated. Treatment trains could be employed to reduce the volume of waste requiring final disposal. Whether it's called "pollution prevention", "waste minimization", or "waste reduction" (as we will call it in this document), the goal of the authors is to promote a mind set that will result in less waste being generated during the investigation and cleanup process, and will encourage project managers to look for opportunities for making environmentally-sound decisions throughout the remedial process.

The purpose of the guidelines that follow is to help project managers identify, assess, and implement opportunities for limiting waste generation during the remedial process of the Superfund program. It may not be apparent at first where opportunities exist outside of selecting remedies that use resource recovery technologies, but waste reduction approaches can be applied to all waste generating activities. Although these guidelines are geared towards Superfund, similar situations exist during RCRA corrective action.

Waste reduction opportunities are identified in the following sections:

- Remedial Investigation - minimization of waste in the investigation and reporting processes

- Feasibility Study - incorporation of recycling, recovery technologies, and waste minimization in the alternatives array

- Early Actions and Presumptive Remedies - mitigation of future contamination through accelerating the remedial process

- Remedial Design/Remedial Action - minimization of waste generated during field work, and reusing on-site materials to the maximum extent practicable

- Enforcement Settlements - inclusion of pollution prevention conditions in enforcement documents

- Community Relations - educating the public about pollution prevention

Paper reduction opportunities are discussed in Attachment A, and may be used during any part of the remedial process. Technologies and their waste reduction advantages and disadvantages are discussed in detail in Attachment B. Specific examples of projects in Region V where waste reduction concepts are being utilized or considered are discussed in Attachment C. Attachment D includes examples of language which incorporates pollution prevention provisions into enforcement settlements. Keep in mind while reading these guidelines that the overall goals are to reduce, as appropriate, the need to treat or dispose of waste, and to conserve energy and resources.

REMEDIAL INVESTIGATION ACTIVITIES AND WASTE REDUCTION

Scoping

The amount of generated waste and residuals that require treatment or disposal can be reduced through proper planning of all Remedial Investigation (RI) activities. It is during scoping, the first step in the RI process, where most of this planning occurs. In order to limit waste generation during the investigation, it is important to write sound waste reduction practices into the scoping documents, which typically include a work plan, a field sampling plan, and a quality assurance project plan (QAPP). Otherwise, these practices may be overlooked.

Additional deliverables developed during the scoping process usually include a health and safety plan and a community relations plan. The project team should remember to apply the paper reduction techniques discussed in Attachment A while developing all of the scoping documents. If the investigation is phased or broken into operable units, project managers can rely heavily on what has already been written for an earlier operable unit or phase by referencing plans rather than including or repeating them.

The field sampling program developed during scoping should concentrate on collecting only the amount of data needed to sufficiently characterize the site, to assess risks posed by the site, and to evaluate the most practicable remedial actions for the site. Waste generation during field sampling may be minimized in the following ways: 1) an efficient sampling program, 2) limiting investigation-derived waste, and 3) minimization of decontamination events and activities. These ideas are discussed in more detail in the following paragraphs.

An Efficient Sampling Program. An efficient sampling program will take into account the evaluation of existing site data, and will be designed to minimize the number of samples collected.

Project managers should evaluate and use existing site data, such as data collected during the Preliminary Assessment/Site Inspection (PA/SI) process. The quality and quantity of the existing data may be adequate enough to make decisions at the site. Minimally, existing data should be used to focus the collection of additional samples.

The number of samples that will be collected and subsequently analyzed may be minimized to reduce the use of energy, money, water, and laboratory chemicals, while minimizing the volume of sample residuals which will require disposal. Project managers can use field screening methods to help strategically place and limit the number of samples collected. *Field Screening Methods Catalog - User's Guide* (September 1988, EPA/540/2-88/005) assists in identifying field screening methods applicable to specific site types. Statistical methods and guidance can be used to determine the minimum number of samples required to make decisions. The minimum number of samples required to adequately evaluate background chemical concentrations at a site should also be defined up front. Project managers should work with the state to decide if regional background levels, or background concentrations determined for another site in the area, can be used at their site. Helpful references for designing a data collection program include *Guidance for Data Useability in Risk Assessment, Part A* (April 1992, PB92-963356) and the *Data Quality Objectives for Remedial Response Activities, Volumes 1 and 2* (March 1987, EPA/540/G-87/003,004).

Limiting Investigation-Derived Waste. Project managers should also strive to limit the generation of Investigation-Derived Wastes (IDW), such as development water, purge water, drilling mud, cuttings, materials from collection of samples, and personal protective equipment (PPE). If possible, IDW should be considered part of the site and should be managed with other wastes from the site, consistent with the final remedy. This will avoid the need for separate treatment and/or disposal options. If protective, avoid containerizing IDW and return it to its source. Some states may require that IDW be handled as solid waste once it is containerized even if it is found to be nonhazardous. Site managers may want to consider drilling methods and sampling techniques that generate little waste. Alternative drilling and subsurface sampling methods may include the use of small diameter (2-inch) boreholes, the use of drilling procedures that utilize air versus mud, as well as borehole testing methods such as cone penetrometer or hydropunch instead of coring. Site managers should also be careful to keep hazardous wastes separate from nonhazardous wastes in order to avoid cross-contamination. Additional ideas to minimize IDW can be found in the *Guide to Management of Investigation-Derived Waste* (January 1992, PB92-963353).

Minimization of Decontamination Events and Activities. The RI plans should specify field work support activities, especially decontamination procedures, that will limit the amount of waste created during the investigation. The project team should consider substituting less toxic, aqueous-based, or phosphate-free cleaners for solvent-based cleaners used for decontamination of equipment and clothing. The team should also plan to keep decontamination events and activities to a minimum. For example, the exclusion zone should be planned for convenience and to limit traffic between hot and clean zones to decrease decontamination events and activities. The field crew can use dedicated sampling equipment and containers to reduce the frequency of decontamination. Project managers should remember that these field support activities can also be applied to Remedial Design or Remedial Action field work.

Site Characterization

After scoping, the next step in the RI process is site characterization during which field sampling and laboratory analyses are initiated and conducted. This is when implementation of the waste reduction practices written into the scoping plans should begin. If field sampling is phased, the results of the initial sampling effort should be used to refine plans developed during scoping. During field work, implement the waste minimization procedures described above and use good housekeeping practices (e.g., prevent leaks and spills, avoid using excessive amounts of decontamination fluid and other materials).

FEASIBILITY STUDY ACTIVITIES AND WASTE REDUCTION

Feasibility Study Report

The RI is generally followed by a Feasibility Study (FS) in which remedial alternatives are developed and evaluated. It is important to identify and retain reuse/recycle technologies during the technology identification and screening steps of the FS. The best potential for waste reduction in the Superfund remedial process may be the "refining" of Superfund wastes to recover a product that can be reused or recycled. SARA's mandate is to select remedial actions that utilize permanent solutions and alternative treatment technologies or (emphasis added) resource recovery technologies to the maximum extent practicable. The tendency in Superfund, to date, has been to select remedies involving treatment. To incorporate waste reduction into our decision making, consider retaining resource recovery or recycling when assembling technologies into alternatives and performing the detailed analysis. When reuse or recycle alternatives are impracticable, consider and retain alternatives that reduce the volume of waste and/or minimize residuals, and do not simply transfer contaminants from one medium to another.

These guidelines, in part, are intended to be used for incorporating waste reduction procedures into the remedy selection process. The feasibility of including waste reduction practices as part of any recommended alternative will, of course, be subject to the statutory requirements of CERCLA/SARA and the evaluation criteria established in the National Contingency Plan (NCP).

Technologies

Technologies to consider during the FS, and their environmental benefits, are described in Attachment B. Examples of technologies and sites where these technologies are being or have been used or explored include:

- Resource recovery/recycling
  - Solvent recovery at removals
  - Recycling or smelting of drums and containers (Laskin Poplar Oil)
  - Metals recovery (Arrowhead)
  - Waste oils and hazardous waste burned as fuel, e.g., BTU recovery in a Boilers and Industrial Furnaces (BIF) unit (St. Louis River)
  - Methane recovery from landfills
  - Product recovery, e.g., free oil off water table (Koch Refinery)

- Volume reduction
  - Soil washing (Macgillis & Gibbs)
  - Particle separation (GLNPO studies)
  - Solvent extraction (Fields Brook)
  - Ground water applications, e.g., SPB membrane filtration

- Chemical alternation/neutralization
  - Chemical dechlorination, e.g., APEG, KPEG

- Thermal treatment
  - Incineration (Laskin Poplar Oil)
  - Low temperature thermal desorption (OMC)
  - Boilers and Industrial Furnaces

- In-situ remediation
  - Soil vapor extraction (Verona, Seymour)
  - Bioremediation (Seymour)

Attachment C contains specific Region V examples of Superfund projects that have utilized or have considered some of these technologies.

Since this document is intended to be primer on waste reduction opportunities in the Superfund remedial process, it simplifies and summarizes technical discussions about technologies. A good source of detailed technical information about these technologies is *Innovative Treatment Technologies, Overview and Guide to Information Sources* (October 1991, EPA/540/9-91/002). Within the Waste Minimization, Destruction, and Disposal Research Division of the U.S. EPA-ORD Risk Reduction Engineering Laboratory (RREL) in Cincinnati, Ohio, is a branch dedicated to pollution prevention research. This branch, along with the Office of Solid Waste of U.S. EPA Headquarters, was recently involved in the production of the *Facility Pollution Prevention Guide* (May 1992, EPA/600/R-92/008). The Guide, along with its predecessor, the *Waste Minimization Opportunity Assessment Manual* (July 1988, EPA/625/7-88/003), guides the reader through the decision making process of applying waste minimization and source reduction concepts to various processes. Although developed primarily with industry in mind, these concepts can be part of the evaluation of technologies and treatment train options during the alternatives screening process. For more information on this document, or to identify any research efforts that may help with a particular waste stream, contact Lisa Brown of the Process Engineering Section at (513) 569-7634. The *Facility Pollution Prevention Guide* is planned to be updated every three years and can be ordered from CERI by calling (513) 569-7562.

Treatability Studies

Treatability studies are conducted to provide additional information for evaluating technologies, or to reduce cost and performance uncertainties for treatment alternatives. Treatability studies will generally include the following steps: 1) preparing a work plan for the bench or pilot studies, 2) performing field sampling, bench, and/or pilot testing, and 3) evaluating data and preparing a brief report. Project managers should try to apply paper reduction techniques when developing treatability study documents, by using existing site plans, including QAPPs, to the maximum extent possible. Site managers should strive to conserve resources, including internal resources. A treatability study QAPP will often not require review and approval by the Quality Assurance Section if the testing performed during the treatability study is related only to the engineering or operating parameters of a cleanup method. Project managers should also try to limit sampling and waste generation during the study. These and other waste reduction practices should be specified in any treatability study plans to ensure these practices are implemented.

Treatability studies provide a great opportunity to focus on treatment trains which minimize residuals and do not simply transfer pollutants to other media. Treatability studies also allow investigation/refinement of environmentally-beneficial technologies, e.g., technologies which conserve energy or other resources.

EARLY ACTIONS AND PRESUMPTIVE REMEDIES

At any point during the RI/FS, the project manager should evaluate the potential for early actions and/or presumptive remedies. One of the most environmentally-beneficial tasks that can be performed at Superfund remedial sites is an early action remedy. For example, any early action ground water removal and treatment remedy will reduce the amount of ground water that comes into contact with the contaminated plume. Early action removal of source materials that are grossly contaminated, followed by a cleanup of any material with a residual risk, reduces the potential for further migration of highly contaminated media.

Currently, U.S. EPA is working on incorporating presumptive remedies into the Superfund process. Presumptive remedies will streamline, and hopefully shorten, the RI/FS process by using past experience to focus on the most likely remedies for specific types of sites (e.g., wood preserving facilities, landfills). Streamlining the RI/FS process will enable remedial action to be initiated relatively quickly. Quick action controls the migration potential of the contaminated media earlier; consequently, a lesser volume of media becomes affected by the contamination. For example, a cap is usually a component of a presumptive remedy for a municipal landfill site. Evaluating the need for and installing a landfill cap early in the site assessment and cleanup process would prevent the vertical infiltration of surface water into the landfill. Hence, less leachate would be created and less ground water would become contaminated.

Of course, these activities make good sense from a project management standpoint. These guidelines reemphasize the need to take early action at Superfund remedial sites in an effort to minimize the amount of contaminated media that needs to be remediated.

REMEDIAL DESIGN/REMEDIAL ACTION ACTIVITIES AND WASTE REDUCTION

Remedial Design (RD) activities involve the preparation and review of the bid specifications and the specific Remedial Action (RA) contractor plans (if any) as outlined in the specifications. Paper consumption and EPA resources can be reduced by requiring less than four design packages (30%, 60%, 90%, and final). This decision will be based on the scope and complexity of the RA.

Waste reduction activities discussed for the RI field work may be applicable throughout the remedial process. These activities include prudent management of purge water and drilling mud. Also, careful selection and minimization of decontamination fluids should be continued from the RI phase into the RA.

Site managers may also want to consider using available on-site soils and materials to the maximum extent possible during the RA for backfilling or material handling purposes. This allows for reuse of soil and/or debris and negates the need to pay for extra materials and transportation from off-site sources. However, project managers should be cautioned that if the soil used as backfill is mixed with a restricted RCRA hazardous waste, the backfilling might constitute "disposal" and may trigger the RCRA Land Disposal Restrictions.

RECYCLING/REUSE AND PURCHASE OF RECYCLED MATERIALS

Opportunities for recycling or material reuse exist throughout the remedial process. For example, fifty-five gallon drums are often needed only temporarily on-site, for collecting purge water, PPE, etc. Once the drums are no longer needed, consideration should be given to reusing them for a later phase of the work, to using them at another site, or to sending them to a drum recycler/reconditioner instead of to a landfill. Another idea is to set up bins on-site for collecting employees' paper, cans, bottles, newspapers, etc., for recycling. Other environmentally-beneficial options, such as purchasing recycled materials (e.g., reconditioned drums), will become apparent as recycling and reuse is emphasized. Project managers should recognize that the Federal Government is the nation's largest consumer, and as such, they can help stimulate the market by purchasing items made of recycled materials.

Recycling or reusing site debris during the remedial action should be considered. Both large rocks found during excavation and debris could be decontaminated and used for backfill, as appropriate. Decontaminated metal debris could be recycled. The project manager may need to work closely with the PRPs and possible recyclers to encourage the reuse of site materials. Once field work begins, more site specific waste reduction and recycling opportunities will reveal themselves.

ENFORCEMENT

Enforcement activities are an important part of every Superfund site. U.S. EPA encourages meaningful PRP participation during the investigation and cleanup of sites. This is accomplished by negotiating with the PRP an Administrative Order or Consent Decree, which will generally contain the scope of the activities to be performed, oversight roles and responsibilities, and the enforcement options that may be exercised in the event of noncompliance.

Project managers should be creative and encourage the inclusion of pollution prevention conditions in the Agency's enforcement settlements, including settlements with Federal facilities. For example, project managers could require in the order/decree the implementation of some of the paper reduction techniques discussed in Attachment A.

The project manager may also suggest that the PRP submit, obtain U.S. EPA approval for, and undertake an environmentally-beneficial project or a supplemental environmental project in exchange for a reduction in the amount of an assessed penalty. Supplemental environmental projects have to meet certain criteria described in Agency policy regarding the kinds of projects that are appropriate for penalty reduction, situations under which they should be considered, and the amount by which the penalty demand can be reduced. The policy describes five specific categories of projects the Agency will consider as supplemental environmental projects in a settlement: pollution prevention, pollution reduction, environmental restoration, environmental auditing, and public awareness. It may be possible to undertake a supplemental environmental project at the Superfund site itself, especially if the site is an operating facility or there is a chance to create or restore a wetland on an abandoned part of the site. Alternatively, PRPs often own or operate other facilities where such projects may be undertaken.

While supplemental environmental projects in lieu of civil penalties are common with respect to RCRA settlement documents, this approach is not commonly employed in Superfund. These projects have the potential to provide useful environmental benefits, but will require close coordination within the Agency and with other interested parties. Examples of language which specifically incorporates pollution prevention provisions into enforcement settlements are provided in Attachment D. For more information, contact your site attorney, Terry Branigan at 353-4737 or Jacqueline Kline at 886-7167 in ORC, or Susan Swales at 353-4775 in RCRA.

COMMUNITY RELATIONS

One of the strengths of the Superfund program is in its accessibility to the public. Perhaps more than with any other program in the Agency, the Superfund program provides opportunities to educate and to disseminate information to the public.

At those points in the remedial process where community relations activities occur, the project manager should emphasize those aspects of an investigative activity or a remedy selection that have waste reduction merits. The project manager may accomplish this by informing the Community Relations Coordinator of these merits, documenting them in proposed plans and fact sheets, and pointing them out during public meetings. Doing so may increase the public's acceptance of a chosen remedy and enhance cooperation between the public, the state agency, U.S. EPA, and PRPs.

Education is also an important element of Superfund's outreach. Project managers could use public meetings as opportunities to inform citizens about what they can do, on a personal level, to prevent pollution. Placing pamphlets, facts sheets, and other educational materials about pollution prevention on a table near the entrance to the meeting room is an easy and effective way to disseminate information. This information can be either general in nature or tied to the type of contamination at the site. For example, at a site where petroleum contamination is a problem, the project manager may provide information on recycling used motor oil. Check frequently with the Office of Public Affairs for handouts; new fact sheets are always being developed.

CONCLUSION

The goal of the Superfund Program is to clean up uncontrolled hazardous waste sites and to prevent the further release of contaminants that pose unacceptable human health and ecological risks. The RI/FS phase of the cleanup process involves determining the nature and extent of contamination at a site and the development of alternatives for the remediation of the contamination. With appropriate foresight and planning, the work that is done during the RI/FS can be performed so as to reduce the release of hazardous substances into the environment by incorporating waste reduction principles and practices into the process.

The opportunities available for limiting the environmental impacts of RI activities, as suggested in these guidelines, are intended to facilitate the reduction of waste materials and administrative paper generated during the investigation. Site scoping can be an effective means of minimizing investigation-derived waste by limiting the amount of sampling performed, incorporating existing data to focus sample collection, and using field screening methods. Sample collection procedures that limit the amount of material collected, and good housekeeping practices are additional tools for minimizing waste generation.

Remedial alternatives that minimize or eliminate the amount of residual waste material should be fully explored during the FS. The treatment technologies outlined in these guidelines represent a few of the approaches that may be taken to accomplish waste reduction goals.

As discussed earlier, the implementation of early actions at Superfund sites helps control the spread of contaminants because less contaminated material will ultimately need to be removed and/or treated. Consequently, less energy is needed to treat the material, and the amount of treatment residuals produced is reduced. In addition, presumptive remedies can allow the agency to streamline the Superfund evaluation and cleanup process, thereby improving consistency, reducing costs, and increasing the speed with which sites are cleaned up.

The RD/RA phase of a cleanup project offers opportunities for waste reduction similar to those identified for the RI. These include such considerations as focusing on prudent field activities and decontamination procedures, minimizing document reviews, and implementing other appropriate paper reduction techniques.

Emphasis placed on the waste reduction aspects of the remedial process may also facilitate PRP cooperation, particularly if it offers cost-savings, shorter implementation times, and/or the potential for eliminating or significantly reducing hazardous residuals during a cleanup, for which the PRPs would, otherwise, still be held liable. Specific pollution prevention requirements can be incorporated into consent decrees or other enforcement documents, both in relation to implementation of paper reduction techniques and to actual on- or off-site activities.

There is a move in this country to shift the emphasis of environmental protection away from end-of-pipe controls to pollution prevention. Although U.S. EPA's working definition of pollution prevention is source reduction only, the pollution prevention "philosophy" can embrace much more than that. The purpose of this document is to introduce the pollution prevention philosophy to those involved in cleanups - both in Superfund and RCRA. The method used to accomplish this is by providing examples of specific waste reduction activities that can be implemented within the Superfund remedial process. This is not intended to be an exhaustive list. The hope is that once the pollution prevention philosophy has been embraced, project managers will identify other opportunities for making environmentally-sound decisions. Set up a recycling corner in the trailer on-site; restore wetlands; or plant trees to help offset, even in the slightest way, global climate change.

The principles of waste reduction are such that they should complement the project manager's goals of accomplishing site cleanup in the quickest, most efficient, and most cost-effective manner possible. Understanding these principles, and incorporating them into a site management plan, will benefit the project manager, the public, and the environment.

Attachment A

PAPER REDUCTION TECHNIQUES

There are several ways the Office of Superfund can reduce the amount of paper used throughout the entire Superfund process. Some examples of paper reduction are as follows:

- Use double-sided pages

On August 15, 1989, Charles Grizzle, then the Assistant Administrator of U.S. EPA, made two-sided copies the Agency policy. Project managers should request that our contractors and the Potentially Responsible Parties (PRPs) also utilize double-sided pages in all submittals. For the PRP these conditions could be placed in enforcement orders. For EPA contractors, the contracts or Statements of Work (SOWs) could identify these requirements.

- Use binders and replacement pages

Project managers could require the use of binders and replacement pages in response to Agency comments rather than an entirely new submission of the revised document. As stated above, these requirements could be placed in enforcement orders for PRPs and contracts or SOWs for contractors.

- Use of report addenda

Additional phases of a project may utilize addenda to available documents such as the FSP, QAPP, and Health and Safety Plan rather than creating a new document. The addenda must only identify where the document differs from the original and what additions were made.

- Encourage the use of recycled paper

Executive Order #12780, signed by President Bush on October 31, 1991, requires the Federal Government, as the Nation's largest single consumer, to encourage the development of economically efficient markets for products manufactured with recycled materials.

- Reference Standard Operating Procedures (SOPs)

The documents which support the Work Plan, such as the Quality Assurance Project Plan (QAPP) and the Field Sampling Plan (FSP), could reference standard protocols for field and analytical activities rather than copying the actual procedure and attaching it to the document.

- Pass information on computer disks

The site-specific QAPP, for example, can be written from the model QAPP, which is available on a computer disk. In addition, the RPM can review the site-specific QAPP on disk and the revisions can be submitted on disk. Therefore, only the final approved version would need to be printed on paper.

In addition, field data could be submitted on a computer disk rather than as hard copies.

- Reduce distribution list

Our distribution list requires the production of several copies of most of our documents in draft and final stage. This subject is being investigated by a Quality Action Team (QAT), which will evaluate who needs specific documents for review and at what stage of the process, so that the minimum number of copies can be made.

Attachment B

TREATMENT TECHNOLOGIES AND THEIR WASTE REDUCTION ADVANTAGES AND DISADVANTAGES

VACUUM EXTRACTION

Technology Description

Vacuum extraction, also known as soil vapor extraction (SVE), in-situ vaporization, or soil venting, is designed for separation/segregation and volumetric reduction of hazardous materials in soils, sludges, and sediments. The technology physically removes volatile compounds from the vadose zone. In general, air is injected into the ground. Contaminated vapors and entrained water are drawn to extraction wells where the vapor and the liquid are separated. The liquid may be treated at a waste water treatment facility and the vapors are typically treated by carbon adsorption or thermal destruction.

Technology Applicability

The process is generally applicable to volatile and, to a lesser degree, moderately volatile organic compounds in the vadose zone. The process works well with most soil types. The soil should have high air conductivity, be well-drained, have low organic carbon content, and have low silt and clay content.

Handling Requirements

Vacuum extraction is an in-situ process. Storage for soil tailings from drilling and process products is required.

Process Residuals

Process residuals include vapor and liquid treatment residuals (spent granular activated carbon), contaminated ground water, and soil tailings from drilling the wells. Some process residuals require treatment. Contaminated water and tailings may be treated at an on- or off-site facility. The vapor and liquid treatment residuals may be treated or recycled.

Waste Reduction Advantages

- Minimal disturbance to the soil, e.g., minimal volatilization due to handling.
- Possible energy and resource savings due to reduced volume of waste to be handled/treated.
- No chemicals are required in the extraction process itself.
- Reduces volatile organic contaminant concentration in the vadose zone, reducing the potential for further migration.

Waste Reduction Disadvantages

- No destruction of contaminants results from the process.
- Post-treatment of residuals may be required.

Possible Improvements

There are several modifications or additions that may be incorporated into this technology to improve its efficiency. Bioventing makes use of the fact that extraction causes an increase of oxygen in the soil which improves biodegradation of contaminants. Radio-frequency heating and steam-enhanced extraction increase the rate of volatilization and efficiency.

SOIL WASHING

Technology Description

Soil washing is a separation and volume reduction mechanical process that removes contaminants from extracted soils in one or both of two ways. The first solubilizes contaminants in the wash water, which usually contains a surfactant or other extracting agent. The second uses particle size separation techniques to concentrate contaminants into a smaller volume of soil, since most organic and inorganic contaminants bind to finer-grained clay and silt particles. The wash water and cleaned soil are separated. The spent wash water is treated to remove the contaminants prior to recycling back to the treatment unit.

Technology Applicability

Soil washing is effective on coarse soils (composed primarily of sand and gravel) with a wide range of organic, inorganic, and reactive contaminants. Soils containing a large amount of clay and silt do not respond well to soil washing. Volatile organics are the contaminants most easily removed from soil, followed by semivolatile organics which require a surfactant. To remove metals and pesticides from soil, acids or chelating agents are required.

Handling Requirements

Soil washing is an ex-situ process requiring excavation and/or moving of the contaminated soil. Screening to remove debris and large objects is also required.

Process Residuals

Residuals include the cleaned soil, waste water, contaminated solids, waste water treatment sludges, and air emissions. Waste water must be treated at a treatment facility on- or off-site. Whenever possible, treated waste water should be recycled in the soil washing process. Air emissions are frequently collected and treated. Contaminated solids and waste water sludge, as well as the spent carbon from the air pollution control equipment, must be appropriately treated.

Waste Reduction Advantages

- Reduction of volume to be treated has energy and resource reduction potential.
- Can be used in a closed treatment system to control ambient volatile emissions.
- Waste water and blowdown water can be recycled in the soil washing process after treatment.

Waste Reduction Disadvantages

- Post-treatment of some residuals (contaminated waste water, waste water treatment sludge, solids, spent carbon) often required.
- Little reduction of toxicity within the process.
- Possible fugitive air emissions, especially during excavation.
- Some surfactant and extracting agents may be difficult to remove from treated soil.

Possible Improvements

Several vendors can provide a soil washing technology tailored to the specific types of contaminants present. Soil washing is often used in combination with other treatment technologies.

THERMAL DESORPTION

Technology Description

Thermal desorption is essentially a separation or removal process that relies on other treatment technologies to treat the residuals. Thermal desorption will volatilize selected contaminants, but typically not oxidize or destroy them. The desorption phase can be done in several ways. Examples are rotary kiln, or screw augers indirectly fired, or heated distillation chambers. The waste comes into contact with heat, and the highly volatile components, along with water, are driven off. Soil/sludge is typically heated to 200°F-1000°F based on the thermal desorption system selected. Steam or a carrier gas (nitrogen) is used to sweep away the contaminants. The bed temperature and residence time are the primary factors affecting the performance of each method.

Technology Applicability

Desorption is used primarily for organic wastes, especially volatile organics. Wastes with low moisture content are preferred.

Handling Requirements

Desorption is an ex-situ process. Required waste handling involves excavation and material screening. Dewatering may be necessary to achieve acceptable soil moisture content. Little land space and site preparation are necessary to site the actual facility; however, land space is necessary to store process products.

Process Residuals

The desorption process produces the following residuals: the treated medium, condensed contaminants, water, particulate dust, clean off-gas, and spent carbon. Off-gas from the desorption, which includes baghouse dust, steam, and volatilized organics and inorganics, is typically condensed, collected and sent through activated carbon or an afterburner, depending on the concentrations. The condensed water can be recycled for use in the air pollution control system or used in the steam carrier, if applicable. The cleaned off-gas, which is not condensed, is monitored and released to the atmosphere. The spent carbon is disposed of. Concentrated, condensed organic contaminants are containerized for further treatment or recovery. The treated medium is landfilled or backfilled on-site.

Waste Reduction Advantages

- Chemical oxidation/reaction not encouraged; no combustion by-products.
- Less energy consumption than incineration, at least in the short-term. The post-treatment required, however, will consume additional energy.
- Volatilized organics can be condensed for reuse as fuel for an incinerator or kiln.
- Indirect heating at low temperatures prevents the formation of incomplete combustion products and volatilization of some metals such as lead and cadmium.
- Vaporized-condensed water from desorption can be treated and recycled back in the process. When oil is used as the heat transfer material, it can be recycled as well.
- Has the ability to separate and recover concentrated contaminants.

Waste Reduction Disadvantages

- Decontaminated soils retain some organics.
- Some technologies release small quantities of nitrogen, which is used as a carrier gas.
- Volatile contaminants may be released during excavation.
- No destruction of contaminants.
- The treated media may require further treatment, based on residual organic and/or inorganic content.

IN-SITU VITRIFICATION

Technology Description

In-situ vitrification (ISV) is capable of destruction, removal, and immobilization of hazardous materials in soils and sludges. The process uses electrodes inserted into the soil, typically with flakes of graphite deposited into the soil as a starter path for the electrical current, which eventually heats the soil to 1600°C-2000°C. As the soil is melted, organic contaminants are vaporized and pyrolyzed, non-volatile inorganics are dissolved and incorporated into the melt, and volatile metals are vaporized and rise to the surface. A vacuum hood placed over the area collects off-gases, which are typically treated before being released to the atmosphere. The process results in the formation of a stable glass and crystalline structure with very low leaching characteristics.

Technology Applicability

Vitrification has the potential to destroy, remove, or immobilize all contaminant groups (e.g., radioactive, organic, and inorganic). Locations with high soil moisture can increase costs significantly and high concentrations of buried metals could lead to shorting between the electrodes.

Handling Requirements

Vitrification is an in-situ process. The ISV equipment is contained in mobile trailers and when the treatment is completed, the equipment is moved to the next location. There is generally a volume reduction in the melted zone, so clean soil cover is placed over the subsided surface while the melt cools. Cooling to ambient conditions can take several months.

Process Residuals

Process residuals include the vitrified soil, treated off-gases, spent activated carbon, and scrubber water from the air pollution control equipment. The off-gases typically consist of vaporized organics and volatile metals. The spent activated carbon and scrubber water must be treated or disposed of.

Waste Reduction Advantages

- The process can destroy contaminants, providing a reduction of toxicity without further treatment.
- Minimal handling of the contaminated soils means small amount of volatilization prior to treatment.
- No chemical additives involved in the process.

Waste Reduction Disadvantages

- Off-gas treatment is required for contaminants vaporized from the soil.
- Though a pressurized hood is placed over the process area, there is some concern that organic vapors can migrate away from the soil mass being vitrified.
- Further treatment or disposal of the spent activated carbon and scrubber water is required.
- The vitrified soil is a permanent subsurface structure with long-term durability that can alter land use of the area.
- The process requires high energy input.

Possible Improvements

There is a possibility of using the vitrified soil as a foundation for structures or as building material. Process modification may allow recycling of treated scrubber water into the off-gas treatment system. With improvements in the effectiveness of the hood and confirmation that the vitrified soil is indeed permanently sound, vitrification may be a promising technology.

BIOREMEDIATION

Technology Description

Bioremediation can be used for the destruction of organic contaminants. It involves enhancing the contact of waste with microbes which degrade the organic molecules through ingestion. The process may be applied in-situ or ex-situ. The in-situ process involves enhancing microbial activity in the contaminated media in order to optimize the biodegradation of contaminants without excavation or removal of the contaminated media. Conditions affecting microbial growth which can be engineered include nutrient supply, temperature range, oxygen content, and pH level. Ex-situ processes involve removal of the contaminated media into a reactor. Examples include slurry phase, contained solid phase (composting), and land treatment. Ex-situ processes are generally more controllable than the in-situ processes and are also more costly.

Technology Applicability

Bioremediation is appropriate for treating organic contaminants found in soil, sludges, ground water, and surface water. In-situ processes are only applicable to sites with favorable physical and chemical conditions. The in-situ type works best with coarser soil, such as sand and gravel, and soils with high hydraulic conductivity. High concentrations of pesticides, herbicides, heavy metals, highly chlorinated organics, or inorganic salts in the contaminated material may be toxic to the microorganisms needed for biodegradation. Some wastes are hard or slow to degrade.

Handling Requirements

Bioremediation can be in-situ or ex-situ. Ex-situ bioremediation requires excavation. Slurry phase requires a tank or lagoon in which the contaminated soil will be placed for treatment. Land farming and contained solid phase involving placing soils in a treated bed located near the site of excavation.

Process Residuals

Process residuals include treated, dewatered solids, process water, possible volatile emissions, and air and water treatment residuals. The solids may require further treatment. Process water can be treated in an on-site system and can usually be recycled for slurrying purposes. An activated carbon system may be necessary during operation for the possible air emissions.

Waste Reduction Advantages

- In slurry phase, enclosed reactors capture fugitive volatile emissions.
- Indigenous microbes are used to biodegrade contaminants. Minimal to no chemical additives are involved in the process.
- In-situ processes re-inject water into the ground, thereby recycling it.
- In-situ processes require no excavation.

Waste Reduction Disadvantages

- Ex-situ processes require excavation, which releases volatile contaminants.
- Post treatment of residuals may be required.
- Large quantities of waste water can result from dewatering slurried soil.
- Volatile emissions are uncontrolled during land treatment.
- In-situ bioremediation can require very long treatment periods (months to years), which may allow contaminant migration.
- In-situ processes may contribute to contaminant migration because water is generally pumped through the soil.

Possible Improvements

A detailed site, soil, and waste characterization must be conducted in order to evaluate the feasibility of using bioremediation. Refinements/ enhancements to existing systems have broad applicability.

SOLVENT EXTRACTION

Technology Description

Solvent extraction utilizes organic solvents to separate hazardous organic pollutants from oily wastes, soils, sludges, and sediments. The process involves the transfer of contaminants to the solvent. Subsequently, contaminants are separated from the solvent, which is then recycled.

Technology Applicability

Solvent extraction has proven effective in the treatment of sediments, sludges, and soils contaminated with PCBs, volatile organic compounds, halogenated solvents, and petroleum wastes. Although it does not destroy wastes, solvent extraction provides a means of separating hazardous materials from contaminated media, reducing the volume of the hazardous waste that must be treated.

Handling Requirements

As an ex-situ process, solvent extraction involves the excavation and/or moving of waste material to the process location and the screening and removal of debris. The waste may need to be made pumpable by the addition of solvent or water. In addition, the temperature of the wastes may need adjustment. At the end of the extraction process, solvent is recycled and concentrated contaminants are removed from the system. Land space is necessary to set up the equipment and store process product streams.

Process Residuals

Solvent extraction processes generate the following residuals: concentrated contaminants, treated media, solvent, and water. Recovered contaminants may then be recycled, reused, or further treated before ultimate disposal.

Waste Reduction Advantages

- Significantly reduces the volume of contaminants requiring disposal.
- Solvents can generally be recycled and reused.
- Oil can be recovered for reuse.

Waste Reduction Disadvantages

- Volatile contaminants may be released during excavation.
- If the process requires water, the water may require further treatment.
- Solid residuals may require further treatment.
- Available systems utilize flammable fluids.

Possible Improvements

Several different commercial-scale units are in operation. Vendors can modify processes for site specific contaminants and characteristics.

DECHLORINATION

Technology Description

Dechlorination involves the treatment of chlorinated aromatic contaminants in soils, sludges, or liquids. It is generally a batch reactor process in which contaminated media are heated and physically mixed with an alkaline hydroxide/polyethylene glycol mixture. In the process, chlorine atoms are replaced by glycol chains forming less toxic, water soluble compounds such as glycol ether and/or a hydroxylated compound and an alkali salt.

Technology Applicability

The process is capable of reducing the toxicity of halogenated organic compounds, particularly dioxins and furans, PCBs, and certain chlorinated pesticides. It is appropriate for soils, sludges, sediments, and liquids. Metals and other inorganics may interfere with the dechlorination reaction.

Handling Requirements

Dechlorination processes involve heating and physical mixing of contaminated soils, sludges, or liquids with chemical reagents. The waste material must be excavated and subsequently screened to remove debris and large particles. The waste may require dewatering, since very wet materials require excessive quantities of reagent. Mixing may be required to achieve a uniform feed size.

Process Residuals

The process residuals resulting from the use of this technology include residual media with treatment byproducts, wash water, and spent carbon. Treated residuals are rinsed to remove reactor byproducts and reagent and then dewatered for disposal. Carbon filters are used to trap volatile organics that are not condensed in the vapor. Spent carbon may be regenerated or disposed, while the wash water may be recycled into the process.

Waste Reduction Advantages

- Reagents can be recycled.
- Reaction products are non-toxic.
- Energy requirements are moderate.

Waste Reduction Disadvantages

- The process may generate waste water requiring conventional treatment.
- Volatile contaminants may be released during excavation.
- Very wet materials will require excessive quantities of reagents.

Possible Improvements

Variations of the reagents used in the dechlorination process can increase the technology's applicability and efficacy.

INCINERATION

Technology Description

Incineration involves the volatilization and combustion of organic constituents in hazardous wastes by direct contact with a high temperature flame ranging from 1800°F-2500°F.

Technology Applicability

Incineration is applicable mainly for organic hazardous wastes. Theoretically, any organic molecule can be stoichiometrically combusted to yield water and carbon dioxide. The process parameters of the incinerator will depend upon the nature of the waste being combusted. Most hazardous organic wastes require a "Destruction Removal Efficiency" (DRE) of 99.99%. Substances governed by the Toxic Substances Control Act regulations, including PCBs and dioxins require a 99.9999% DRE. Wastes which include inorganic constituents may be incinerated provided that the emissions conform to Clean Air Act regulations.

Handling Requirements

Prior to a burn, wastes are normally excavated and placed in a staging area near the incinerator. Screening is required to remove oversized particles. Dewatering or mixing may be necessary to achieve acceptable soil moisture content. The waste material may also require mixing to achieve uniform feed size. During a burn, wastes are fed into the incinerator in batches or in a continuous stream. Feed mechanisms include a screw conveyer or a gravity feeder for solids and a pump with a nozzle for liquids.

Process Residuals

The combustion process yields two residual products: solids in the form of ash, and gases. Ash is an inert inorganic material comprised of carbon, salts, and metals, most of which collects at the bottom of the primary combustion chamber. Combustion gases are comprised primarily of carbon dioxide and water, plus small quantities of carbon monoxide, nitrogen oxides, and other gases depending on the composition of the waste burned. Combustion gases are treated with scrubber water, thus creating a waste water which must also be treated.

Waste Reduction Advantages

- The incineration process almost completely destroys all organic hazardous constituents.

Waste Reduction Disadvantages

- Volatile contaminants may be released during excavation.
- Emissions control systems generate scrubber water or spent activated carbon which require treatment.
- Some inorganic contaminants are not destroyed by incineration. As a result, some may be present in the ash while others are volatilized and released into the flue gas. High inorganic concentrations in the flue gas and/or ash may require further treatment.
- Incinerators require a great deal of energy to operate.

Possible Improvements

Waste liquids can be used as an energy source for most incineration systems.

GROUND WATER PUMPING AND TREATMENT

Technology Description

Conventional ground water pump-and-treat technology involves pumping contaminated ground water and passing it through a treatment process to remove contaminants.

Technology Applicability

This technology is best applied to mobile contaminants (K_{ow} <3.5) in homogeneous aquifers with high permeability. These conditions are most conducive to the extraction of contaminants with the ground water, making them available for treatment. Contaminants for which the technology may be applicable include volatile and semivolatile organics, pesticides, cyanide, and radionuclides. Enhancements which may promote more thorough removal/treatment of less mobile contaminants include pulsed pumping, reinjection, chemical extraction, and steam extraction.

Handling Requirements

Most ground water pump-and-treat systems are ex-situ processes. Handling requirements include determining how to dispose of treated water, often over a long period of time. In addition, treatment residuals must be considered.

Process Residuals

Depending upon the treatment process used, residuals which may, themselves, require treatment and/or disposal include such materials as spent activated carbon, ion exchange resins, and chemical precipitates. Furthermore, depending upon the level of treatment achieved, treated water may be recycled into the aquifer, conveyed to a publicly-owned treatment works (POTW), or used as a potable water supply.

Waste Reduction Advantages

- Successful containment remedies utilizing pump-and-treat technology prevent the contamination of clean portions of an aquifer by limiting or stopping the migration of contaminants.

Waste Reduction Disadvantages

- Contaminated treatment media, such as spent carbon, may themselves require treatment and/or disposal.
- Management of large quantities of treated water often requires discharge to a POTW, to surface waters, or reinjection into the aquifer.
- Most ground water treatment technologies are ex-situ and may require operation over a long period of time.

Possible Improvements

The development of successful in-situ methods could represent a significant advance in minimizing treatment residuals. Some ground water treatment options separate the contaminants from the ground water through membrane microfiltration to concentrate the contaminant in a smaller volume of ground water. The SITE program demonstrated the SPB membrane technology on ground water contaminated with PAHs and PCP from a wood preserving site. The demonstration showed the technology concentrated the feedwater to 20% of the original volume, and this reduced volume of water contained 80% of the contaminants.

Attachment C

SPECIFIC REGION V PROJECTS THAT INCORPORATE WASTE REDUCTION CONCEPTS

Verona Wellfields
Battle Creek, MI

Technologies: Soil Vapor Extraction (SVE) for soils

Environmental Benefits - In-situ soil vapor extraction (SVE) treatment eliminates the need for waste handling and associated volatilization. The volume of material requiring treatment is reduced to the volatile fraction as opposed to both the soils and associated volatiles in an ex-situ treatment technology. Sandy soils on-site increase the effectiveness.

Phase - RD/RA

Fields Brook
Ashtabula, OH

Technologies: B.E.S.T. solvent extraction for sediments,
Incineration

Environmental Benefits - Solvent extraction separates contamination from the medium and therefore concentrates the contamination in a smaller volume. The estimated volume reduction anticipated is a reduction from 19,000 cubic yards to 4,000 gallons of liquids to be incinerated.

Phase - RD

OMC
Waukegan Harbor, IL

Technologies: Taciuk unit (low temperature thermal desorption) for sediments

Environmental Benefits - Separates organics from sediments, reducing the volume of materials to be treated. The condensed contaminant-laden material will require further treatment.

Phase - RA

Seymour
Seymour, IN

Technologies: Bioremediation, pump and treat for ground water;
Bioremediation, vapor extraction and capping for soils

Environmental Benefits - Minimal to no chemical additives are required for bioremediation of ground water. Treatment residuals are minimized with in-situ soil bioremediation technologies.

Phase - O&M

St. Louis River/Interlake/Duluth Tar Site
Duluth, MN

Technology: Burning excavated tar for energy recovery

Environmental Benefits - The tar has a high BTU value; burning the tar for energy recovery allows for a beneficial reuse of the waste.

Phase - RA

Arrowhead Refinery Site
Hermantown, MN

Technology: BIF Unit (Wet Process Cement Kiln)

Environmental Benefits - Burning sludge for BTU value allows for beneficial reuse of waste. High lead content in waste is partitioned into cement, eliminating the generation of hazardous ash that would likely need to be stabilized and landfilled.

Phase - RD

Laskin/Poplar Oil
Jefferson, OH

Technology: Metals reclaiming/smelting of decontaminated tanks and debris

Environmental Benefits - Through the smelting process, this material is now able to be reused and is not occupying valuable solid waste landfill space.

Phase - RA

GLNPO/Bureau of Mines activities through an IAG

Pilot studies have been performed in the Saginaw River for particle size separation of the sediments. The average PCB concentration was 3 ppm. 80% of the sediments were sands and contained 0.1 ppm PCBs. 20% of the sediments were silts and contained 10 ppm PCB. The PCBs concentrated in the silt fraction of the sediments. There are several different ways to separate the different size particles, including magnetism, hydrocyclone, or screening, etc., to allow only the more heavily contaminated fraction to be treated.

The Bureau of Mines is also working on metal recovery. For more information, call Jim Allen from the Bureau of Mines at (801) 524-6147.

Attachment D

EXAMPLES OF POLLUTION PREVENTION PROVISIONS IN ENFORCEMENT SETTLEMENTS

The following is an excerpt from a draft Clean Air Act Federal Facilities Compliance Agreement for a U.S. Department of Energy (DOE) facility. It contains draft language to encourage U.S. DOE to complete environmentally significant projects, rather than those of less obvious benefit to the environment.

IX. SANCTIONS

43. If U.S. EPA determines that U.S. DOE has failed to meet any requirement of this Agreement, including any requirement of the U.S. EPA approved compliance plan, it shall issue a written notification of noncompliance ("NON") to U.S. DOE and U.S. DOE shall, in accordance with the procedure in paragraphs 44 through 48, propose, obtain U.S. EPA approval for, and complete an environmentally beneficial project ("EBP").

44. Unless U.S. EPA elects, in accordance with paragraph 48 herein, to aggregate sanctions for noncompliance specified in the NON, within sixty (60) days of the date U.S. EPA issues a written NON U.S. DOE shall submit to U.S. EPA a proposed EBP which must include a description of the goal(s) and costs of, and schedule of activities for, the proposed project. U.S. DOE must propose an EBP that will result in prevention or reduction, recycling, or environmentally safe treatment or disposal of pollution not otherwise required by any Federal, State, or local law.

45. Nothing in this Part IX shall be construed as a requirement that U.S. DOE obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. § 1341. If U.S. DOE lacks appropriated funds for proposed project costs, it must specify in the schedule of activities included with its proposed EBP those

activities necessary to make requests to Congress for sufficient appropriations. If U.S. DOE fails to complete scheduled appropriation request activities contained in a U.S. EPA approved EBP, U.S. EPA may unilaterally terminate this Agreement in its entirety.

46. Within sixty (60) days of receiving a U.S. DOE proposed EBP, U.S. EPA shall consider, among other things, whether the environmental benefits of the project ameliorate the effects of the noncompliance, the Congressional preference for pollution prevention and reduction expressed in the Pollution Prevention Act of 1990, 42 U.S.C. §§ 11071 et seq., and any applicable U.S. EPA guidance and either approve or disapprove the project. If U.S. EPA disapproves a proposed project, U.S. DOE shall have sixty (60) days to submit a revised or new proposed project. If U.S. DOE fails to obtain U.S. EPA approval for an EBP by no later than one-hundred and twenty (120) days after the issuance date of the NON, U.S. EPA may unilaterally terminate this Agreement in its entirety.

47. The parties shall use the following table for the purpose of determining the minimum cost of an EBP:

Type of Project	Amount Per Day of Noncompliance
Pollution Prevention/Reduction	$ 750
Pollution Recycling	$1,000
Environmentally Safe Treatment of Pollution	$1,250
Environmentally Safe Disposal of Pollution	$1,500

Each of the project types specified above shall be defined consistent with the provisions of the Pollution Prevention Act of 1990, 42 U.S.C. §§ 11071 et seq.

48. U.S. EPA may specify in an NON that sanctions under this Part IX for the specified noncompliance will be aggregated with any other sanctions for noncompliance occurring during any twelve month period and U.S. DOE may propose a single EBP for the aggregated instances of noncompliance. In the NON, U.S. EPA shall specify the twelve month period and U.S. DOE shall, in accordance with the foregoing paragraphs, propose an EBP for all NONs issued during the twelve month period within sixty (60) days of the close of that period.

49. Nothing in this Agreement shall be construed to waive, estop, or in any other manner affect either parties' rights, authorities, or defenses in any future CAA proceeding.

The following is an excerpt from a Resource Conservation and Recovery Act (RCRA) Consent Decree which requires the defendant to undertake a pollution prevention and waste minimization project.

V. Pollution Prevention

The Defendant shall undertake a project, with EPA participation, to review existing and potential pollution prevention and waste minimization initiatives and alternatives at the Chambers Works facility. The project will have three principal goals: (1) to identify methods for the actual reduction or prevention of pollution for specific chemical processes at the Chambers Works facility; (2) to generate useful technical information about methodologies and technologies for reducing pollution which may help EPA assist companies implementing pollution prevention/waste minimization programs; and (3) to evaluate and to identify potentially useful refinements to EPA's and Du Pont's methodology for analyzing and reducing pollution and/or waste generating activities.

The project will consist of three phases. In Phase I the parties shall establish a technical work group composed of EPA and Du Pont representatives to coordinate the project. In addition, the parties shall develop a work plan for the activities necessary to implement the project. In Phase II, Du Pont shall carry out the work plan developed in Phase I with the oversight of the joint work group. Du Pont shall implement the pollution prevention/waste minimization assessment analyses for fifteen (15) targeted chemical processes and analyze the results of the assessments. Du Pont shall submit two draft reports, summarizing the work conducted in Phase II, which will be the basis of the final project report. In Phase III, Du Pont will respond to EPA comment(s) on the two draft reports and combine the revised documents into the final project report. The report and the findings of the project will be made available to the public and other companies by EPA.

Du Pont shall perform these three phases of the project in accordance with the provisions of Attachment A, which is incorporated by reference into this Consent Decree.

The project shall commence upon the entry of the Consent Decree with the Court. Du Pont shall complete and submit the final public report to EPA within twenty-four (24) months of the entry of the Consent Decree. On the first page of the final report, Du Pont shall include both the docket number of this case and the following certification:

> "This Report is being presented to the United States in satisfaction of the pollution prevention requirements of Section V of the Consent Decree in U.S. v. Du Pont."

The following is a description of a supplemental environmental project undertaken at a NPL site for stipulated penalty reduction for violation of a CERCLA §120 agreement.

BACKGROUND

In 1991, the United States Environmental Protection Agency (U.S. EPA) and the Department of Energy (DOE) jointly agreed to implement a environmentally beneficial project supplemental to the ongoing Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response actions at the Fernald Environmental Management Project (FEMP). Input on the potential scope of this project was solicited from many sources including FEMP personnel, Ohio Environmental Protection Agency (OEPA) and U.S. EPA personnel and the public. A listing of potential projects were defined, jointly screened and evaluated by DOE and U.S. EPA. A preferred project was tentatively identified in early Calendar Year (CY) 1992 for implementation by DOE.

SCOPE

The DOE purposes to provide a grant in funding to the Miami Conservancy District (MCD) for the management, administration and conduct of this supplemental environmental project to be completed in the vicinity of the FEMP. This grant in funding is proposed to be provided to support two ongoing environmentally beneficial programs being administered by the MCD:

1) The Grant Miami River Cleanup; and
2) The Wellhead Protection Program

GREAT MIAMI RIVER CLEANUP

It is the intent of the DOE to provide a grant to establish an escrow account to help an annual river cleanup initiative. The MCD will provide all necessary management, administrative and technical support to sponsor and conduct an annual project aimed at cleaning up along the banks of the Great Miami River. It is the understanding of the DOE that the conduct of this study will typically involve the solicitation by the MCD or its designees of volunteers and supplemental donations from local companies. The cleanup campaign will involve the safe and proper collection and disposal of garbage and other refuse located along the banks of the Great Miami River. All transportation and disposal of the collected refuse shall be performed consistent with federal, state and local environmental and transportation requirements. MCD will ensure that proper planning, safety precautions and emergency response capabilities are available during the annual cleanup projects.

The MCD will be responsible for all aspects of the Great Miami River Cleanup including:

- Providing necessary equipment, materials and training to salaried and volunteer personnel to properly and safely complete the cleanup activities.
- Providing necessary equipment, training and materials including safety and emergency response training to supervisory personnel engaged in the cleanup effort.

- Ensuring proper access to private properties along the river to complete the cleanup activities. Restoration of impacted private properties to conditions existing prior to the cleanup project.
- Proper packaging, labeling, transportation, storage and disposal of all collected waste materials in a manner compliant with existing federal, state and local regulations.
- Management and administration of the cleanup project including necessary advertising and/or solicitation required to successfully conduct the annual cleanup project, and compilation of requested reports for the DOE.

WELLHEAD PROTECTION PROGRAM

It is the intent of the DOE to provide a grant in funding to support the completion of the ongoing Wellhead Protection Program study for the Great Miami Buried Valley Aquifer in the vicinity of the FEMP. This study is currently underway through a cooperative effort led by the MCD with a consortium of local groundwater users. Phase I of a three-phase study is currently nearing completion. The proposed grant in funding would support Phase II and III of this program as defined below:

PHASE II

Development of a pollution sources inventory for the study area. The inventory would involve locating and storing information from local manufacturers, industries, businesses and private property owners who utilize or store hazardous chemicals within the designated wellhead protection areas. The inventory would support the development of monitoring program for well water users.

MCD will provide all necessary managerial administrative and technical support to complete Phase II of the Wellhead Protection Study. The FEMP will be provided one (1) copy of the Phase II study upon completion.

PHASE III

Development of a public awareness presentation and brochure on the subject of wellhead protection. The presentation materials would include a slide program to be potentially presented to various groups in the area including Chambers of Commerce, civic groups and the general public.

MCD will provide all necessary managerial, administrative and technical support to complete the Phase III activities.

EPA

United States
Environmental Protection
Agency
Region 5
77 West Jackson Blvd.
Chicago, IL 60604